

This documents which Java/C++ WPILIB routines have been duplicated in LabVIEW, and which ones are not needed (for example because all that is needed is a cluster unpack function), and what isn't done....yet...

|                      | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program |
|----------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|
| VI / CTL Totals      | 1163        | 1150       | 365         | 1055      | 674                 | 49           | 12             |
| VI Total (X)         | 1041        | 1031       |             |           |                     |              |                |
| CTL Total (Z)        | 122         | 119        |             |           |                     |              |                |
| VI Shell Total (I)   | 3           |            |             |           |                     |              |                |
| CTRL Shell Total (I) | 2           |            |             |           |                     |              |                |

Doc completed Pct  
98.88%  
Optimization Pct  
57.95%

Optimize legend: S = Subroutine, I = Inline, X = reviewed, nothing done. (In some cases, after sufficient debug and use, additional optimizations could be considered.)

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BASE

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| Category                  | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                              | Function Prototype | Notes                              | Code Review | Test Program | Error Checking |
|---------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--------------------------------------|--------------------|------------------------------------|-------------|--------------|----------------|
|                           | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program |                                      |                    |                                    |             |              |                |
| ANALOG DELAY              | X           | X          | X           | X         | I                   |              |                | AnalogDelay_Execute.vi               |                    | Similar to interpolated tree map.. |             |              |                |
|                           |             |            |             |           |                     |              |                |                                      |                    |                                    |             |              |                |
| BUMPLESS TRANSFER         | X           | X          | X           | X         | I                   |              |                | BumplessTransfer_Execute.vi          |                    |                                    |             |              |                |
|                           |             |            |             |           |                     |              |                |                                      |                    |                                    |             |              |                |
| FUNCTION GENERATOR        | X           | X          |             | X         | I                   |              |                | FunctionGenerator_Add_Value.vi       |                    | Similar to interpolated tree map.. |             |              |                |
|                           | X           | X          |             | X         | I                   |              |                | FunctionGenerator_Add_XY.vi          |                    | Similar to interpolated tree map.. |             |              |                |
|                           | X           | X          |             | X         | I                   |              |                | FunctionGenerator_Calculate.vi       |                    | Similar to interpolated tree map.. |             |              |                |
|                           | X           | X          |             | X         | SI                  |              |                | FunctionGenerator_Clear.vi           |                    |                                    |             |              |                |
|                           | X           | X          | X           | X         | I                   |              |                | FunctionGenerator_Execute.vi         |                    | Similar to interpolated tree map.. |             |              |                |
|                           | X           | X          |             | X         | SI                  |              |                | FunctionGenerator_New.vi             |                    | Similar to interpolated tree map.. |             |              |                |
|                           |             |            |             |           |                     |              |                |                                      |                    |                                    |             |              |                |
| FUNCTION GENERATOR MATRIX | X           | X          | X           | X         | I                   |              |                | FunctionGeneratorMatrix_Add.vi       |                    | Similar to interpolated tree map.. |             |              |                |
|                           | X           | X          | X           | X         | I                   |              |                | FunctionGeneratorMatrix_Calculate.vi |                    | Similar to interpolated tree map.. |             |              |                |
|                           | X           | X          | X           | X         | SI                  |              |                | FunctionGeneratorMatrix_New.vi       |                    | Similar to interpolated tree map.. |             |              |                |
|                           |             |            |             |           |                     |              |                |                                      |                    |                                    |             |              |                |

All on for auto filter...

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|------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|--|--------------------|----------------------|-------------|--------------|----------------|---|
| LEAD LAG         | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                  | Function Prototype | Notes                | Code Review | Test Program | Error Checking | x |
|                  | X           | X          | X          | X         | I                   |              |                | LeadLag_Execute.vi                       |                    |                      |             |              |                | x |
| LINEAR FILTER    | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                  | Function Prototype | Notes                | Code Review | Test Program | Error Checking | x |
|                  | X           | X          |            | X         | I                   |              |                | LinearFilter_BackwardFiniteDifference.vi |                    |                      |             |              |                | x |
|                  | X           | X          |            | X         | SI                  |              |                | LinearFilter_Calculate.vi                |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | X                   |              |                | LinearFilter_CutoffFrequency.vi          |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | I                   |              | X              | LinearFilter_Execute.vi                  |                    | Labview style helper |             |              |                | x |
|                  | X           | X          |            | No        | I                   |              |                | LinearFilter_Factorial.vi                |                    | AN INTERNAL ROUTINE  |             |              |                | x |
|                  | X           | X          |            |           | I                   |              |                | LinearFilter_FiniteDifference.vi         |                    |                      |             |              |                | x |
|                  | X           | X          |            | X         | X                   |              |                | LinearFilter_HighPass.vi                 |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | X                   |              |                | LinearFilter_HighPassBW1.vi              |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | X                   |              |                | LinearFilter_HighPassBW2.vi              |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | X                   |              |                | LinearFilter_LowPassBW1.vi               |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | X                   |              |                | LinearFilter_LowPassBW2.vi               |                    |                      |             |              |                | x |
|                  | X           | X          |            | X         | X                   |              |                | LinearFilter_MovingAverage.vi            |                    |                      |             |              |                | x |
|                  | X           | X          |            | X         | I                   |              |                | LinearFilter_New.vi                      |                    |                      |             |              |                | x |
|                  | X           | X          |            | X         | SI                  |              |                | LinearFilter_Reset.vi                    |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | SI                  |              |                | LinearFilter_ResetToValue.vi             |                    |                      |             |              |                | x |
|                  | X           | X          |            | X         | X                   |              |                | LinearFilter_SinglePoleIIR.vi            |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | X                   |              |                | LinearFilter_TimeConst.vi                |                    |                      |             |              |                | x |
| MEDIAN FILTER    | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                  | Function Prototype | Notes                | Code Review | Test Program | Error Checking | x |
|                  | X           | X          |            | X         | X                   |              |                | MedianFilter_Calculate.vi                |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | I                   |              | X              | MedianFilter_Execute.vi                  |                    | Labview style helper |             |              |                | x |
|                  | X           | X          |            | X         | SI                  |              |                | MedianFilter_New.vi                      |                    |                      |             |              |                | x |
|                  | X           | X          |            | X         | SI                  |              |                | MedianFilter_Reset.vi                    |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | SI                  |              |                | MedianFilter_ResetToValue.vi             |                    |                      |             |              |                | x |
| SLEW RATE FILTER | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                  | Function Prototype | Notes                | Code Review | Test Program | Error Checking | x |
|                  | X           | X          |            | X         | I                   |              |                | SlewRateLimiter_Calculate.vi             |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | SI                  |              |                | SlewRateLimiter_Close.vi                 |                    |                      |             |              |                | x |
|                  | X           | X          | X          | X         | I                   |              | X              | SlewRateLimiter_Execute.vi               |                    | Labview style helper |             |              |                | x |
|                  | X           | X          | X          | X         | SI                  |              |                | SlewRateLimiter_GetRate.vi               |                    |                      |             |              |                | x |
|                  | X           | X          |            | X         | I                   |              |                | SlewRateLimiter_New.vi                   |                    |                      |             |              |                | x |
|                  | X           | X          |            | X         | I                   |              |                | SlewRateLimiter_NewInitialZero.vi        |                    |                      |             |              |                | x |
|                  | X           | X          |            | X         | I                   |              |                | SlewRateLimiter_Reset.vi                 |                    |                      |             |              |                | x |
|                  | X           | X          |            | X         | SI                  |              |                | SlewRateLimiter_SetRate.vi               |                    |                      |             |              |                | x |

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|       | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                      | Function Prototype | Notes                   | Code Review | Test Program | Error Checking |
|-------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|------------------------------|--------------------|-------------------------|-------------|--------------|----------------|
| TIMER | X           | X          | X           | X         |                     |              |                | Timer_Close.vi               |                    | releases semaphore      |             |              |                |
|       | X           | X          |             | X         |                     |              | X              | Timer_Get.vi                 |                    |                         |             |              |                |
|       | X           | X          | X           | X         |                     |              |                | Timer_GetAndReset.vi         |                    |                         |             |              |                |
|       | X           | X          | X           | No        |                     |              |                | Timer_GetInternal.vi         |                    | Internal (private) only |             |              |                |
|       | X           | X          |             | X         |                     |              | X              | Timer_HasPeriodPassed.vi     |                    |                         |             |              |                |
|       | X           | X          | X           | X         |                     |              | X              | Timer_HasPeriodPassedOnce.vi |                    |                         |             |              |                |
|       | X           | X          |             | X         |                     |              | X              | Timer_New.vi                 |                    |                         |             |              |                |
|       | X           | X          |             | X         |                     |              | X              | Timer_Reset.vi               |                    |                         |             |              |                |
|       | X           | X          | X           | No        |                     |              |                | Timer_ResetInternal          |                    | Internal (private) only |             |              |                |
|       | X           | X          | X           |           |                     |              |                | Timer_Restart.vi             |                    |                         |             |              |                |
|       | X           | X          |             | X         |                     |              | X              | Timer_Start.vi               |                    |                         |             |              |                |
|       | X           | X          | X           | No        |                     |              |                | Timer_StartInternal.vi       |                    |                         |             |              |                |
|       | X           | X          |             | X         |                     |              | X              | Timer_Stop.vi                |                    |                         |             |              |                |
|       | X           | X          | X           | No        |                     |              |                | Timer_StopInternal.vi        |                    | Internal (private) only |             |              |                |

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|                             | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                              | Function Prototype | Notes                       | Code Review | Test Program | Error Checking |
|-----------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--------------------------------------|--------------------|-----------------------------|-------------|--------------|----------------|
| TIME INTERPOLATABLE BOOLEAN | X           | X          | X           | X         | I                   |              |                | TimeInterpBoolean_AddSample.vi       |                    | Update to use create matrix |             |              |                |
|                             | X           | X          | X           | No        | I                   |              |                | TimeInterpBoolean_CleanUp.vi         |                    | Update to use create matrix |             |              |                |
|                             | X           | X          | X           | X         | SI                  |              |                | TimeInterpBoolean_Clear.vi           |                    |                             |             |              |                |
|                             | X           | X          | X           | X         | I                   |              |                | TimeInterpBoolean_GetSample.vi       |                    |                             |             |              |                |
|                             |             |            |             |           |                     |              |                | TimeInterpBoolean_GetTimeForValue.vi |                    |                             |             |              |                |
|                             | X           | X          | X           | X         | SI                  |              |                | TimeInterpBoolean_New.vi             |                    |                             |             |              |                |
|                             | X           | X          | X           | X         | SI                  |              |                | TimeInterpBoolean_SetMaxTime.vi      |                    |                             |             |              |                |
|                             |             |            |             |           |                     |              |                |                                      |                    |                             |             |              |                |

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|                            | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                             | Function Prototype | Notes                       | Code Review | Test Program | Error Checking |
|----------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|-------------------------------------|--------------------|-----------------------------|-------------|--------------|----------------|
| TIME INTERPOLATABLE DOUBLE | X           | X          | X           | X         | I                   |              |                | TimeInterpDouble_AddSample.vi       |                    | Update to use create matrix |             |              |                |
|                            | X           | X          | X           | No        | I                   |              |                | TimeInterpDouble_CleanUp.vi         |                    | Update to use create matrix |             |              |                |
|                            | X           | X          | X           | X         | SI                  |              |                | TimeInterpDouble_Clear.vi           |                    |                             |             |              |                |
|                            | X           | X          | X           | X         | I                   |              |                | TimeInterpDouble_GetSample.vi       |                    |                             |             |              |                |
|                            | X           | X          | X           |           |                     |              |                | TimeInterpDouble_GetTimeForValue.vi |                    |                             |             |              |                |
|                            | X           | X          | X           | X         | SI                  |              |                | TimeInterpDouble_New.vi             |                    |                             |             |              |                |
|                            | X           | X          | X           | X         | SI                  |              |                | TimeInterpDouble_SetMaxTime.vi      |                    |                             |             |              |                |
|                            |             |            |             |           |                     |              |                |                                     |                    |                             |             |              |                |

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|                            | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                             | Function Prototype | Notes                       | Code Review | Test Program | Error Checking |
|----------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|-------------------------------------|--------------------|-----------------------------|-------------|--------------|----------------|
| TIME INTERPOLATABLE POSE2D | X           | X          | X           | X         | I                   |              |                | TimeInterpPose2d_AddSample.vi       |                    | Update to use create matrix |             |              |                |
|                            | X           | X          | X           | No        | I                   |              |                | TimeInterpPose2d_CleanUp.vi         |                    | Update to use create matrix |             |              |                |
|                            | X           | X          | X           | X         | SI                  |              |                | TimeInterpPose2d_Clear.vi           |                    |                             |             |              |                |
|                            | X           | X          | X           | X         | I                   |              |                | TimeInterpPose2d_GetSample.vi       |                    |                             |             |              |                |
|                            |             |            |             |           |                     |              |                | TimeInterpPose2d_GetTimeForValue.vi |                    |                             |             |              |                |
|                            | X           | X          | X           | X         | SI                  |              |                | TimeInterpPose2d_New.vi             |                    |                             |             |              |                |
|                            | X           | X          | X           | X         | SI                  |              |                | TimeInterpPose2d_SetMaxTime.vi      |                    |                             |             |              |                |
|                            |             |            |             |           |                     |              |                |                                     |                    |                             |             |              |                |

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|--------------------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|--------------------|--|-------------|--------------|----------------|---|
| TIME INTERPOLATABLE ROTATION2D | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                 | Function Prototype | Notes  | Code Review | Test Program | Error Checking | x |
|                                | X           | X          | X          | X         | I                   |              |                | TimeInterpRotation2d_AddSample.vi       |                    | Update to use create matrix                    |             |              |                | x |
|                                | X           | X          | X          | No        | I                   |              |                | TimeInterpRotation2d_CleanUp.vi         |                    | Update to use create matrix                    |             |              |                | x |
|                                | X           | X          | X          | X         | SI                  |              |                | TimeInterpRotation2d_Clear.vi           |                    |  |             |              |                | x |
|                                | X           | X          | X          | X         | I                   |              |                | TimeInterpRotation2d_GetSample.vi       |                    |  |             |              |                | x |
|                                |             |            |            |           |                     |              |                | TimeInterpRotation2d_GetTimeForValue.vi |                    |  |             |              |                | x |
|                                | X           | X          | X          | X         | SI                  |              |                | TimeInterpRotation2d_New.vi             |                    |  |             |              |                | x |
|                                | X           | X          | X          | X         | SI                  |              |                | TimeInterpRotation2d_SetMaxTime.vi      |                    |  |             |              |                | x |
| TIME INTERPOLATABLE VARIANT    | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                 | Function Prototype | Notes  | Code Review | Test Program | Error Checking | x |
|                                | X           | X          | X          |           | I                   |              |                | TimeInterpVariant_AddSample.vi          |                    | Update to use create matrix                    |             |              |                | x |
|                                | X           | X          | X          | No        | I                   |              |                | TimeInterpVariant_CleanUp.vi            |                    | Update to use create matrix                    |             |              |                | x |
|                                | X           | X          | X          |           | SI                  |              |                | TimeInterpVariant_Clear.vi              |                    |  |             |              |                | x |
|                                | X           | X          | X          |           | I                   |              |                | TimeInterpVariant_GetSample.vi          |                    |  |             |              |                | x |
|                                |             |            |            |           |                     |              |                | TimeInterpVariant_GetTimeForValue.vi    |                    |  |             |              |                | x |
|                                | X           | X          | X          |           | I                   |              |                | TimeInterpVariant_Interpolate.vi        |                    | This is a template for a user created routine. |             |              |                | x |
|                                | X           | X          | X          |           | SI                  |              |                | TimeInterpVariant_New.vi                |                    |  |             |              |                | x |
| WAIT ADJUST                    | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                 | Function Prototype | Notes  | Code Review | Test Program | Error Checking | x |
|                                | X           | X          | X          | X         |                     |              |                | WaitAdjust.vi                           |                    |  |             |              |                | x |
| DIGITAL SEQUENTIAL LOGIC       | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                 | Function Prototype | Notes  | Code Review | Test Program | Error Checking | x |
|                                | X           | X          | X          | X         |                     |              |                | DigSeqLogic_Delay.vi                    |                    |  |             |              |                | x |
|                                | X           | X          | X          | X         |                     |              |                | DigSeqLogic_On_Delay.vi                 |                    |  |             |              |                | x |
|                                | X           | X          | X          | X         |                     |              |                | DigSeqLogic_Off_Delay.vi                |                    |  |             |              |                | x |
|                                | X           | X          | X          | X         |                     |              |                | DigSeqLogic_One_Shot.vi                 |                    |  |             |              |                | x |
|                                | X           | X          | X          | X         |                     |              |                | DigSeqLogic_SR_Flip_Flop.vi             |                    |  |             |              |                | x |
| DEBOUNCER                      | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                 | Function Prototype | Notes  | Code Review | Test Program | Error Checking | x |
|                                | X           | X          |            | X         |                     |              |                | Debouncer_New.vi                        |                    |  |             |              |                | x |
|                                | X           | X          |            | X         |                     |              |                | Debouncer_Calculate.vi                  |                    |  |             |              |                | x |
|                                | X           | X          | X          | X         |                     |              |                | Debouncer_Execute.vi                    |                    |  |             |              |                | x |
|                                | X           | X          |            | No        |                     |              |                | Debouncer_Reset.vi                      |                    |  |             |              |                | x |
|                                | X           | X          |            | No        |                     |              |                | Debouncer_HasElapsed.vi                 |                    |  |             |              |                | x |
|                                |             |            |            |           |                     |              |                |   |                    |  |             |              |                | x |
|                                |             |            |            |           |                     |              |                |   |                    |  |             |              |                | x |

CONTROLLER

|                 | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                           | Function Prototype | Notes   | Code Review | Test Program | Error Checking |
|-----------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|-----------------------------------|--------------------|---|-------------|--------------|----------------|
| ARM FF          | X           | X          |             | X         |                     |              |                | ArmFF_Calculate.vi                |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ArmFF_CalculateVelocityOnly.vi    |                    |   |             |              |                |
|                 |             |            | X           |           |                     |              |                | ArmFF_Execute.vi                  |                    | LabVIEW style single call                               |             |              |                |
|                 |             |            | X           |           |                     |              |                | ArmFF_ExecuteVelocityOnly.vi      |                    | LabVIEW style single call                               |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ArmFF_MaxAchieveAccel.vi          |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ArmFF_MaxAchieveVelocity.vi       |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ArmFF_MinAchieveAccel.vi          |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ArmFF_MinAchieveVelocity.vi       |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ArmFF_New_ZeroGravity.vi          |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ArmFF_New.vi                      |                    |   |             |              |                |
| BANG BANG       | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                           | Function Prototype | Notes   | Code Review | Test Program | Error Checking |
|                 | X           | X          |             | X         | SI                  |              |                | BangBang_AtSetpoint.vi            |                    |   |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | BangBang_Calculate_PV.vi          |                    |   |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | BangBang_Calculate_SP_PV.vi       |                    |   |             |              |                |
|                 | X           | X          | X           | X         | SI                  |              |                | BangBang_Execute.vi               |                    |   |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | BangBang_GetAll.vi                |                    |   |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | BangBang_GetError.vi              |                    |   |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | BangBang_New.vi                   |                    |   |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | BangBang_SetSetpoint.vi           |                    |   |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | BangBang_SetTolerance.vi          |                    |   |             |              |                |
| CONTROLLER UTIL | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                           | Function Prototype | Notes   | Code Review | Test Program | Error Checking |
|                 | X           | X          |             | X         | SI                  |              |                | ControllerUtil_GetModulusError.vi |                    | This was short lived in WPI LIB, but still useful here. |             |              |                |
| ELEV FF         | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                           | Function Prototype | Notes   | Code Review | Test Program | Error Checking |
|                 | X           | X          |             | X         |                     |              |                | ElevFF_Calculate.vi               |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ElevFF_CalculateVelocityOnly.vi   |                    |   |             |              |                |
|                 |             |            | X           |           |                     |              |                | ElevFF_Execute.vi                 |                    | LabVIEW style single call                               |             |              |                |
|                 |             |            | X           |           |                     |              |                | ElevFF_ExecuteVelocityOnly.vi     |                    | LabVIEW style single call                               |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ElevFF_MaxAchieveAccel.vi         |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ElevFF_MaxAchieveVelocity.vi      |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ElevFF_MinAchieveAccel.vi         |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ElevFF_MinAchieveVelocity.vi      |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ElevFF_New_ZeroAccel.vi           |                    |   |             |              |                |
|                 | X           | X          |             | X         |                     |              |                | ElevFF_New.vi                     |                    |   |             |              |                |

[illegible]

|   |   |   |    |    |  |  |   |  |                                 |  |  |  |   |
|---|---|---|----|----|--|--|---|--|---------------------------------|--|--|--|---|
| X | X | X | No |    |  |  | PIDController_SetFeedForward_OBSOLETE_DELETE.vi |  | Advanced PID, Obsolete – DELETE |  |  |  | x |
| X | X | X | No |    |  |  | PIDController_SetFFGain_OBSOLETE_DELETE.vi      |  | Advanced PID, Obsolete – DELETE |  |  |  | x |
| X | X |   | X  | SI |  |  | PIDController_SetI.vi                           |  |                                 |  |  |  | x |
|   |   |   |    |    |  |  | PIDController_SetInputRange.vi                  |  | OBSOLETE – Removed              |  |  |  | x |
| X | X |   | X  | SI |  |  | PIDController_SetIntegratorRange.vi             |  |                                 |  |  |  | x |
| X | X | X | X  | SI |  |  | PIDController_SetOutputLimits.vi                |  | Advanced PID                    |  |  |  | x |
| X | X |   | X  | SI |  |  | PIDController_SetP.vi                           |  |                                 |  |  |  | x |
| X | X | X | X  | SI |  |  | PIDController_SetPeriod.vi                      |  |                                 |  |  |  | x |
| X | X |   | X  | SI |  |  | PIDController_SetPID.vi                         |  |                                 |  |  |  | x |
| X | X | X | X  | SI |  |  | PIDController_SetPIDF.vi                        |  | Advanced PID                    |  |  |  | x |
| X | X |   | X  | SI |  |  | PIDController_SetSetpoint.vi                    |  |                                 |  |  |  | x |
| X | X |   | X  | SI |  |  | PIDController_SetTolerance.vi                   |  |                                 |  |  |  | x |
| X | X |   | X  | SI |  |  | PIDController_SetTolerancePandV.vi              |  |                                 |  |  |  | x |

|                         | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype | Notes                               | Code Review | Test Program | Error Checking |   |
|-------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|--------------------|-------------------------------------|-------------|--------------|----------------|---|
| PROFILED PID CONTROLLER | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_AtGoal.vi                             |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_AtSetpoint.vi                         |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         |                     |              |                | ProfiledPIDController_Calculate_Meas_Goal.vi                |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         |                     |              |                | ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         |                     |              |                | ProfiledPIDController_Calculate_Meas_StateGoal.vi           |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         |                     |              |                | ProfiledPIDController_Calculate_Meas.vi                     |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_DisableContInput.vi                   |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_EnableContInput.vi                    |                    |                                     |             |              |                | x |
|                         | X           | X          | X           | X         | I                   |              |                | ProfiledPIDController_Execute.vi                            |                    | Single call LabVIEW style function. |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_GetGoal.vi                            |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_GetPeriod.vi                          |                    |                                     |             |              |                | x |
|                         | X           | X          | X           | X         | SI                  |              |                | ProfiledPIDController_GetPID.vi                             |                    | WPI LIB has separate getters.       |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_GetPositionError.vi                   |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_GetSetpoint.vi                        |                    |                                     |             |              |                | x |
|                         | X           | X          |             |           | SI                  |              |                | ProfiledPIDController_GetTolerance.vi                       |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_GetVelocityError.vi                   |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | I                   |              |                | ProfiledPIDController_New.vi                                |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | I                   |              |                | ProfiledPIDController_NewPeriod.vi                          |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_Reset_PosOnly.vi                      |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_Reset_PosVel.vi                       |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_Reset.vi                              |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_SetConstraints.vi                     |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_SetGoal_PosOnly.vi                    |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_SetGoal.vi                            |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_SetIntegratorRange.vi                 |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_SetPID.vi                             |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_SetTolerance_PosOnly.vi               |                    |                                     |             |              |                | x |
|                         | X           | X          |             | X         | SI                  |              |                | ProfiledPIDController_SetTolerance_PosVel.vi                |                    |                                     |             |              |                | x |

|         | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                           | Function Prototype   | Notes | Code Review | Test Program | Error Checking |   |
|---------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|-----------------------------------|----------------------|-------|-------------|--------------|----------------|---|
| RAMSETE | X           | X          |             | X         | SI                  |              |                | Ramsete_AtReference.vi            | AtReference          |       |             |              |                | x |
|         | X           | X          |             | X         | X                   |              |                | Ramsete_Calculate_Trajectory.vi   | calculate_trajectory |       |             |              |                | x |
|         | X           | X          |             | X         | X                   |              |                | Ramsete_Calculate.vi              | calculate            |       |             |              |                | x |
|         | X           | X          | X           | X         | X                   |              |                | Ramsete_Diff_DO_Eng.vi            |                      |       |             |              |                | x |
|         | X           | X          | X           | X         | X                   |              |                | Ramsete_Diff_DO_SI.vi             |                      |       |             |              |                | x |
|         | X           | X          | X           | X         | I                   |              |                | Ramsete_Execute_ENG.vi            | Use this one!!       |       |             |              |                | x |
|         | X           | X          | X           | X         | SI                  |              |                | Ramsete_Execute_PackTuning_ENG.vi |                      |       |             |              |                | x |
|         | X           | X          | X           | X         | SI                  |              |                | Ramsete_Execute_PackTuning.vi     |                      |       |             |              |                | x |
|         | X           | X          | X           | X         | I                   |              |                | Ramsete_Execute.vi                |                      |       |             |              |                | x |
|         | X           | X          |             | X         | SI                  |              |                | Ramsete_New_B_Z.vi                | new(b, zeta)         |       |             |              |                | x |

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| X | X |  | X | SI |  |  | Ramsete_New.vi          | new          |          |  |  |  |
| X | X |  | X | SI |  |  | Ramsete_SetEnabled.vi   | SetEnabled   |          |  |  |  |
| X | X |  | X | SI |  |  | Ramsete_SetTolerance.vi | SetTolerance |          |  |  |  |
| X | X |  | X | X  |  |  | Ramsete_SINC.vi         | sinc         | internal |  |  |  |

|                          | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                | Function Prototype  | Notes | Code Review | Test Program | Error Checking |
|--------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--|---|-------|-------------|--------------|----------------|
| SIMPLE MOTOR FEEDFORWARD | X           | X          | X           | X         | SI                  |              |                | SimpleMotorFF_Calculate_CalcAccel.vi   |   |       |             |              |                |
|                          | X           | X          |             | X         |                     |              |                | SimpleMotorFF_Calculate_NextV_Dt.vi    |   |       |             |              |                |
|                          | X           | X          |             | X         | SI                  |              |                | SimpleMotorFF_Calculate.vi             | public double calculate(double velocity, double acceleration)               |       |             |              |                |
|                          | X           | X          |             | X         | SI                  |              |                | SimpleMotorFF_CalculateVelocityOnly.vi | public double calculate(double velocity)                                    |       |             |              |                |
|                          | X           | X          | X           |           |                     |              |                | SimpleMotorFF_Ka_AutoTune.vi           |   |       |             |              |                |
|                          | X           | X          |             | X         | X                   |              |                | SimpleMotorFF_MaxAchieveAccel.vi       | public double maxAchievableAcceleration(double maxVoltage, double velocity) |       |             |              |                |
|                          | X           | X          |             | X         | X                   |              |                | SimpleMotorFF_MaxAchieveVel.vi         | public double maxAchievableVelocity(double maxVoltage, double acceleration) |       |             |              |                |
|                          | X           | X          |             | X         | X                   |              |                | SimpleMotorFF_MinAchieveAccel.vi       | public double minAchievableAcceleration(double maxVoltage, double velocity) |       |             |              |                |
|                          | X           | X          |             | X         | X                   |              |                | SimpleMotorFF_MinAchieveVel.vi         | public double minAchievableVelocity(double maxVoltage, double acceleration) |       |             |              |                |
|                          | X           | X          |             | X         | SI                  |              |                | SimpleMotorFF_New.vi                   | public SimpleMotorFeedforward(double ks, double kv, double ka)              |       |             |              |                |
|                          | X           | X          | X           |           | SI                  |              |                | SimpleMotorFF_Pack_Ka_Tune_Params.vi   |   |       |             |              |                |
|                          |             |            |             |           |                     |              |                |  | public SimpleMotorFeedforward(double ks, double kv)                         |       |             |              |                |

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GEOMETRY

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|                 | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name          | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-----------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|------------------|--------------------|-------|-------------|--------------|----------------|
| COORDINATE AXIS | X           | X          |             | X         | SI                  |              |                | CoordAxis_D.vi   |                    |       |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | CoordAxis_E.vi   |                    |       |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | CoordAxis_N.vi   |                    |       |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | CoordAxis_New.vi |                    |       |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | CoordAxis_S.vi   |                    |       |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | CoordAxis_U.vi   |                    |       |             |              |                |
|                 | X           | X          |             | X         | SI                  |              |                | CoordAxis_W.vi   |                    |       |             |              |                |

|                   | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                              | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--------------------------------------|--------------------|-------|-------------|--------------|----------------|
| COORDINATE SYSTEM | X           | X          |             | X         | SI                  | X            |                | CoordSystem_Convert_Pose3d.vi        |                    |       |             |              |                |
|                   | X           | X          |             | X         | SI                  |              |                | CoordSystem_Convert_Rotation3d.vi    |                    |       |             |              |                |
|                   | X           | X          |             | X         | SI                  |              |                | CoordSystem_Convert_Translation3d.vi |                    |       |             |              |                |
|                   | X           | X          |             | X         | SI                  |              |                | CoordSystem_Convert_Transform3d.vi   |                    |       |             |              |                |
|                   | X           | X          |             | X         | SI                  | X            |                | CoordSystem_EDN.vi                   |                    |       |             |              |                |
|                   | X           | X          |             | X         | SI                  | X            |                | CoordSystem_NED.vi                   |                    |       |             |              |                |
|                   | X           | X          |             | X         | SI                  | X            |                | CoordSystem_New.vi                   |                    |       |             |              |                |
|                   | X           | X          |             | X         | SI                  | X            |                | CoordSystem_NWU.vi                   |                    |       |             |              |                |





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| X | X |  | X | SI |  | Quaternion_Plus.vi             |  |  |  |  |  |
| X | X |  | X | SI |  | Quaternion_Times.vi            |  |  |  |  |  |
| X | X |  | X | SI |  | Quaternion_ToRotationVector.vi |  |  |  |  |  |

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|            | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                            | Function Prototype                       | Notes                                      | Code Review | Test Program | Error Checking |
|------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|------------------------------------|--|--|-------------|--------------|----------------|
| ROTATION2D | X           | X          |             | X         | SI                  |              |                | Rotation2d_CreateAngle.vi          | rotation2d new( double value )           |  |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_CreateAngleDegrees.vi   | rotation2d fromDegrees( double degrees ) | convert to radians then create             |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_CreateAngleRotations.vi |  |  |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_CreateXY.vi             | rotation2d new( double x, double y )     |  |             |              |                |
|            | X           | X          |             |           | SI                  |              |                | Rotation2d_Div.vi                  |  |  |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_Equals.vi               | boolean equals( rotation2d other )       |  |             |              |                |
|            | X           | X          | X           | X         | SI                  |              |                | Rotation2d_GetAngleCosSin.vi       |  | New 1/26/21                                |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_GetCos.VI               | double getCos()                          | use cluster unpack                         |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_GetDegrees.VI           | double getDegrees()                      | use cluster unpack, then convert to degree |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_GetRadians.VI           | double getRadians()                      | use cluster unpack                         |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_GetRotations.vi         |  |  |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_GetSin.VI               | double getSin()                          | use cluster unpack                         |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_GetTan.VI               | double getTan()                          | can calculate                              |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_Interpolate.vi          |  |  |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_Minus.vi                | rotation2d minus( rotation2d other )     |  |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_Plus.vi                 | rotation2d plus( rotation2d other )      |  |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_RotateBy.vi             | rotation2d rotateby( rotation2d other )  |  |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_Times.vi                | rotation2d times( double scalar )        |  |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation2d_UnaryMinus.vi           | rotation2d unaryminus( )                 |  |             |              |                |
|            |             |            |             |           |                     |              |                |                                    | rotation2d new()                         | can use cluster constant                   |             |              |                |

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|            | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                 | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|-------------|--------------|----------------|
| ROTATION3D | X           | X          |             | X         | SI                  |              |                | Rotation3d_Create_AxisAngle.vi          |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_Create_Default.vi            |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_Create_Quaternion.vi         |                    |       |             |              |                |
|            | X           | X          |             | X         | I                   |              |                | Rotation3d_Create_InitialFinalVector.vi |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_Create_RollPitchYaw.vi       |                    |       |             |              |                |
|            | X           | X          |             | X         | I                   |              |                | Rotation3d_Create_RotMatrix.vi          |                    |       |             |              |                |
|            | X           | X          |             |           | SI                  |              |                | Rotation3d_Div.vi                       |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_Equals.vi                    |                    |       |             |              |                |
|            | X           | X          | X           | X         | SI                  |              |                | Rotation3d_GetAxisAngle.vi              |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_GetQuaternion.vi             |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_GetXYZ.vi                    |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_Interpolate.vi               |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_Minus.vi                     |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_Plus.vi                      |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_RotateBy.vi                  |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_Times.vi                     |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_ToRotation2d.vi              |                    |       |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Rotation3d_UnaryMinus.vi                |                    |       |             |              |                |
|            |             |            |             |           |                     |              |                |   |                    |       |             |              |                |
|            |             |            |             |           |                     |              |                |   |                    |       |             |              |                |

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|             | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                        | Function Prototype                | Notes | Code Review | Test Program | Error Checking |
|-------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--------------------------------|-----------------------------------|-------|-------------|--------------|----------------|
| TRANSFORM2D | X           | X          |             | X         | SI                  |              |                | Transform2d_Create_PosePose.vi | transform2d new( pose2d, pose2d ) |       |             |              |                |

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|---|---|---|---|----|--|--|--------------------------------|--|--------------------------|--|--|--|
| X | X |   | X | SI |  |  | Transform2d_Create_TransRot.vi | transform2d new( translation2d, rotation2d ) |                          |  |  |  |
| X | X |   |   | SI |  |  | Transform2d_Div.vi             |  |                          |  |  |  |
| X | X |   | X | SI |  |  | Transform2d_Equals.VI          | boolean equals( other transform2d )          |                          |  |  |  |
| X | X |   | X | SI |  |  | Transform2d_GetRotation.VI     | rotation2d getRotation()                     | use cluster unpack       |  |  |  |
| X | X |   | X | SI |  |  | Transform2d_GetTranslation.VI  | translation2d getTranslation()               | use cluster unpack       |  |  |  |
| X | X | X | X | SI |  |  | Transform2d_GetXY.vi           |  |                          |  |  |  |
| X | X | X | X | SI |  |  | Transform2d_GetXYAngle.vi      |  |                          |  |  |  |
| X | X |   | X | SI |  |  | Transform2d_Inverse.vi         | transform inverse()                          | new                      |  |  |  |
| X | X |   | X | SI |  |  | Transform2d_Plus.vi            |  |                          |  |  |  |
| X | X |   | X | SI |  |  | Transform2d_Times.vi           | transform2d times( double scalar )           |                          |  |  |  |
|   |   |   |   |    |  |  |                                | transform2d new( )                           | can use cluster constant |  |  |  |

| TRANSFORM3D | Implemented | Documented | Not WPI/LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                            | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|------------------------------------|--------------------|-------|-------------|--------------|----------------|
|             |             |            |             |           |                     |              |                |                                    |                    |       |             |              |                |
|             | X           | X          |             | X         | SI                  |              |                | Transform3d_Create_Default.vi      |                    |       |             |              |                |
|             | X           | X          |             | X         | SI                  |              |                | Transform3d_Create_Pose3dPose.3dvi |                    |       |             |              |                |
|             | X           | X          |             | X         | SI                  |              |                | Transform3d_Create_Trans3dRot3d.vi |                    |       |             |              |                |
|             | X           | X          |             |           | SI                  |              |                | Transform3d_Div.vi                 |                    |       |             |              |                |
|             | X           | X          |             | X         | SI                  |              |                | Transform3d_Equals.VI              |                    |       |             |              |                |
|             | X           | X          |             | X         | SI                  |              |                | Transform3d_GetRotation3d.VI       |                    |       |             |              |                |
|             | X           | X          |             | X         | SI                  |              |                | Transform3d_GetTranslation3d.VI    |                    |       |             |              |                |
|             | X           | X          | X           | X         | SI                  |              |                | Transform3d_GetXYZ.vi              |                    |       |             |              |                |
|             | X           | X          |             | X         | SI                  |              |                | Transform3d_Inverse.vi             |                    |       |             |              |                |
|             | X           | X          |             | X         | SI                  |              |                | Transform3d_Plus.vi                |                    |       |             |              |                |
|             | X           | X          |             | X         | SI                  |              |                | Transform3d_Times.vi               |                    |       |             |              |                |
|             |             |            |             |           |                     |              |                |                                    |                    |       |             |              |                |

| TRANSLATION2D | Implemented | Documented | Not WPI/LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                         | Function Prototype                         | Notes                    | Code Review | Test Program | Error Checking |
|---------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------------------------------|--|--------------------------|-------------|--------------|----------------|
|               |             |            |             |           |                     |              |                |                                 |  |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_Create_DistAng.vi |  |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_Create.vi         | translation2d new( double x, double y )    |                          |             |              |                |
|               | X           | X          |             |           | SI                  |              |                | Translation2d_Div.vi            |  |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_Equals.vi         | boolean equals( translation other )        |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_GetAngle.vi       |  |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_GetDistance.vi    | double getDistance( translation2d other )  |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_GetNorm.VI        | double getNorm()                           | can use cluster unpack   |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_GetX.VI           | double getX()                              | can use cluster unpack   |             |              |                |
|               | X           | X          | X           | X         | SI                  |              |                | Translation2d_GetXY.VI          |  |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_GetY.VI           | double getY()                              | can use cluster unpack   |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_Interpolate.vi    |  |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_Minus.vi          | translation2d minus( translation2d other ) |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_Plus.vi           | translation2d plus( translation2d other )  |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_RotateBy.vi       | translation2d rotateBy( rotation2d other ) |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_Times.vi          | translation2d times( double scalar )       |                          |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation2d_UnaryMinus.vi     | translation2d unaryminus( )                |                          |             |              |                |
|               |             |            |             |           |                     |              |                |                                 | translation2d new()                        | can use cluster constant |             |              |                |
|               |             |            |             |           |                     |              |                |                                 | translation2d div( double scalar )         | can multiply by 1/scalar |             |              |                |

| TRANSLATION3D | Implemented | Documented | Not WPI/LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                         | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------------------------------|--------------------|-------|-------------|--------------|----------------|
|               |             |            |             |           |                     |              |                |                                 |                    |       |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation3d_Create.vi         |                    |       |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation3d_Create_Default.vi |                    |       |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation3d_Create_DistAng.vi |                    |       |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation3d_Div.vi            |                    |       |             |              |                |
|               | X           | X          |             | X         | SI                  |              |                | Translation3d_Equals.vi         |                    |       |             |              |                |

|   |   |   |   |    |  |  |                                  |  |  |  |  |  |
|---|---|---|---|----|--|--|----------------------------------|--|--|--|--|--|
| X | X |   | X | SI |  |  | Translation3d_GetDistance.vi     |  |  |  |  |  |
| X | X |   | X | SI |  |  | Translation3d_GetNorm.VI         |  |  |  |  |  |
| X | X | X | X | SI |  |  | Translation3d_GetXYZ.vi          |  |  |  |  |  |
| X | X |   | X | SI |  |  | Translation3d_Interpolate.vi     |  |  |  |  |  |
| X | X |   | X | SI |  |  | Translation3d_Minus.vi           |  |  |  |  |  |
| X | X |   | X | SI |  |  | Translation3d_Plus.vi            |  |  |  |  |  |
| X | X |   | X | SI |  |  | Translation3d_RotateBy.vi        |  |  |  |  |  |
| X | X |   | X | SI |  |  | Translation3d_Times.vi           |  |  |  |  |  |
| X | X |   | X | SI |  |  | Translation3d_ToTranslation2d.vi |  |  |  |  |  |
| X | X |   | X | SI |  |  | Translation3d_UnaryMinus.vi      |  |  |  |  |  |

|         |             |            |             |           |                     |              |                |                   |                             |       |             |              |                |
|---------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|-------------------|-----------------------------|-------|-------------|--------------|----------------|
| TWIST2D | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name           | Function Prototype          | Notes | Code Review | Test Program | Error Checking |
|         | X           | X          |             | X         | SI                  |              |                | Twist2d_Create.vi | twist new( x, y, theta )    |       |             |              |                |
|         | X           | X          |             | X         | SI                  |              |                | Twist2d_Equals.VI | boolean equals( obj other ) |       |             |              |                |
|         | X           | X          | X           | X         | SI                  |              |                | Twist2d_GetAll.VI |                             |       |             |              |                |
|         |             |            |             |           |                     |              |                |                   |                             |       |             |              |                |

|         |             |            |             |           |                     |              |                |                   |                    |       |             |              |                |
|---------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|-------------------|--------------------|-------|-------------|--------------|----------------|
| TWIST3D | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name           | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|         | X           | X          |             | X         | SI                  | X            |                | Twist3d_Create.vi |                    |       |             |              |                |
|         | X           | X          |             | X         | SI                  | X            |                | Twist3d_Equals.VI |                    |       |             |              |                |
|         | X           | X          | X           | X         | SI                  | X            |                | Twist3d_GetAll.VI |                    |       |             |              |                |
|         |             |            |             |           |                     |              |                |                   |                    |       |             |              |                |

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KINEMATICS

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|----------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|---|--------------------------|-------------|--------------|----------------|
| CHASSIS SPEEDS | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype  | Notes                    | Code Review | Test Program | Error Checking |
|                | X           | X          |             |           | SI                  |              |                | ChassisSpeeds_FromFieldRelativeChassisSpeeds.VI |   |                          |             |              |                |
|                | X           | X          |             | X         | SI                  |              |                | ChassisSpeeds_FromFieldRelativeSpeeds.VI        | chassisspeeds fromFieldRelativeSpeeds( double x, double y, double angvel, rotation2d robotangle ) |                          |             |              |                |
|                | X           | X          | X           | X         | SI                  |              |                | ChassisSPeeds_GetXYOmega.vi                     |   |                          |             |              |                |
|                | X           | X          |             | X         | SI                  |              |                | ChassisSpeeds_New.vi                            | chassisspeeds new ( double xvel, double yvel, double angvel )                                     |                          |             |              |                |
|                |             |            |             |           |                     |              |                |   | chassisspeeds new ( )   | can use cluster constant |             |              |                |

|                               |             |            |             |           |                     |              |                |                                  |  |       |             |              |                |
|-------------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|----------------------------------|--|-------|-------------|--------------|----------------|
| DIFFERENTIAL DRIVE KINEMATICS | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                          | Function Prototype                                 | Notes | Code Review | Test Program | Error Checking |
|                               | X           | X          |             | X         | I                   | X            |                | DiffKinematics_New.vi            | diffDriveKine new( double trackWidth )             |       |             |              |                |
|                               | X           | X          |             | X         | X                   | X            |                | DiffKinematics_toChassisSpeed.vi | chassisSpeeds toChassisSpeeds( diffDrWheelSpeeds ) |       |             |              |                |
|                               | X           | X          |             |           | SI                  |              |                | DiffKinematics_ToTwist2d.vi      |  |       |             |              |                |
|                               | X           | X          |             | X         | SI                  | X            |                | DiffKinematics_toWheelSpeed.vi   | diffDriveWheelSpeed toWheelSpeeds( chassisSpeeds ) |       |             |              |                |

|             |            |             |           |                     |              |                |         |                    |       |             |              |                |
|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------|--------------------|-------|-------------|--------------|----------------|
| Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|             |            |             |           |                     |              |                |         |                    |       |             |              |                |

|                                 |             |            |            |           |                     |              |                |   |  |                                      |             |              |                |  |   |
|---------------------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|--|--------------------------------------|-------------|--------------|----------------|--|---|
| DIFFERENTIAL DRIVE ODOMETRY     |             |            | X          |           |                     |              |                | DiffOdometry_Execute.vi                   |  |                                      | DONT NEED   |              |                |  | x |
|                                 | X           | X          |            | X         | X                   |              |                | DiffOdometry_Update.vi                    | pose2d update( rotation2d gyro, double leftdist, double right dist ) | Incorporates enhanced reset          |             |              |                |  | x |
|                                 |             |            |            |           |                     |              |                |   | diffDrOdom new( rotation gyro, pose initial )                        |                                      |             |              |                |  | x |
|                                 |             |            |            |           |                     |              |                |   | diffDrOdom new( rotation gyro )                                      |                                      |             |              |                |  | x |
|                                 |             |            |            |           |                     |              |                |   | void resetPosition( pose2d, rotation2d )                             | incorporated into “update”           |             |              |                |  | x |
|                                 |             |            |            |           |                     |              |                |   | pose2d getPoseMeters()   |                                      |             |              |                |  | x |
|                                 |             |            |            |           |                     |              |                |   |  |                                      |             |              |                |  | x |
|                                 |             |            |            |           |                     |              |                |   |  |                                      |             |              |                |  | x |
| DIFFERENTIAL DRIVE ODOMETRY 2   | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                   | Function Prototype   | Notes                                | Code Review | Test Program | Error Checking |  |   |
|                                 | X           | X          | X          |           | /                   |              |                | DiffDrvOdom2_Execute.vi                   |  | Replacement for orig diff drive odom |             |              |                |  | x |
|                                 | X           | X          |            |           | SI                  |              |                | DiffDrvOdom2_GetPosevi                    |  |                                      |             |              |                |  | x |
|                                 | X           | X          |            |           | /                   |              |                | DiffDrvOdom2_New.vi                       |  |                                      |             |              |                |  | x |
|                                 | X           | X          |            |           | SI                  |              |                | DiffDrvOdom2_Reset.vi                     |  |                                      |             |              |                |  | x |
|                                 | X           | X          |            |           | /                   |              |                | DiffDrvOdom2_Update.vi                    |  |                                      |             |              |                |  | x |
|                                 |             |            |            |           |                     |              |                |   |  |                                      |             |              |                |  | x |
| DIFFERENTIAL DRIVE WHEEL SPEEDS | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                   | Function Prototye  | Notes                                | Code Review | Test Program | Error Checking |  |   |
|                                 |             |            |            |           |                     |              |                |   | diffDrWheelSpeeds new()  |                                      |             |              |                |  | x |
|                                 |             |            |            |           |                     |              |                |   | diffDrWheelSpeeds new( double leftVel, double rightVel )             |                                      |             |              |                |  | x |
|                                 | X           | X          |            | X         | X                   |              |                | DiffWheel_Normalize.vi                    | void normalize( double maxVel )                                      |                                      |             |              |                |  | x |
| MECANUM DRIVE KINEMATICS        | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                   | Function Prototype   | Notes                                | Code Review | Test Program | Error Checking |  |   |
|                                 | X           | X          |            | X         | /                   |              |                | MecaKinematics_New.vi                     |  |                                      |             |              |                |  | x |
|                                 | X           | X          |            | X         | X                   |              |                | MecaKinematics_SetInverseKinematics.vi    |  |                                      |             |              |                |  | x |
|                                 | X           | X          |            | X         | X                   |              |                | MecaKinematics_ToChassisSpeeds.vi         |  |                                      |             |              |                |  | x |
|                                 | X           | X          |            | X         |                     |              |                | MecaKinematics_ToTwist2d.vi               |  |                                      |             |              |                |  | x |
|                                 | X           | X          |            | X         | X                   |              |                | MecaKinematics_ToWheelSpeeds.vi           |  |                                      |             |              |                |  | x |
|                                 | X           | X          |            | X         | X                   |              |                | MecaKinematics_ToWheelSpeedsZeroCenter.vi |  |                                      |             |              |                |  | x |
| MECANUM DRIVE MOTOR VOLTAGE     | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                   | Function Prototype   | Notes                                | Code Review | Test Program | Error Checking |  |   |
|                                 |             |            |            |           |                     |              |                |   |  |                                      |             |              |                |  | x |
|                                 |             |            |            |           |                     |              |                |   |  |                                      |             |              |                |  | x |
|                                 |             |            |            |           |                     |              |                |   |  |                                      |             |              |                |  | x |
|                                 |             |            |            |           |                     |              |                |   |  |                                      |             |              |                |  | x |
| MECANUM DRIVE ODOMETRY          | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                   | Function Prototype   | Notes                                | Code Review | Test Program | Error Checking |  |   |
|                                 |             |            | X          |           |                     |              |                | MecaOdometry_Execute.vi                   |  |                                      |             |              |                |  | x |
|                                 | X           | X          | X          | X         | X                   |              |                | MecaOdometry_GetKinematics.vi             |  |                                      |             |              |                |  | x |
|                                 | X           | X          |            | X         |                     |              |                | MecaOdometry_GetPose.vi                   |  |                                      |             |              |                |  | x |
|                                 | X           | X          |            | X         |                     |              |                | MecaOdometry_New.vi                       |  |                                      |             |              |                |  | x |

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|---|---|--|---|--|--|--------------------------------|--|------------|--|--|--|
| X | X |  | X |  |  | MecaOdometry_NewDefaultPose.vi |  |            |  |  |  |
| X | X |  | X |  |  | MecaOdometry_Reset.VI          |  |            |  |  |  |
| X | X |  | X |  |  | MecaOdometry_Update.vi         |  |            |  |  |  |
|   |   |  |   |  |  | MecaOdometry_UpdateWithTime.vi |  | Removed... |  |  |  |

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|                              | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name             | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|------------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------------------|--------------------|-------|-------------|--------------|----------------|
| MECANUM DRIVE WHEEL POSITION | X           | X          |             | X         | S/                  |              |                | MecaWheelPos_Get.vi |                    |       |             |              |                |
|                              | X           | X          |             | X         | S/                  |              |                | MecaWheelPos_New.vi |                    |       |             |              |                |
|                              | X           | X          |             | X         | S/                  |              |                | MecaWheelPos_Sub.vi |                    |       |             |              |                |
|                              |             |            |             |           |                     |              |                |                     |                    |       |             |              |                |

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|                            | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                | Function Prototype   | Notes | Code Review | Test Program | Error Checking |
|----------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|------------------------|--|-------|-------------|--------------|----------------|
| MECANUM DRIVE WHEEL SPEEDS | X           | X          |             | X         | S/                  |              |                | MecaWheel_New.Vi       | public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond) |       |             |              |                |
|                            | X           | X          | X           | X         | S/                  |              |                | MecaWheel_GetAll.vi    |  |       |             |              |                |
|                            | X           | X          |             | X         | X                   |              |                | MecaWheel_Normalize.vi | public void normalize(double attainableMaxSpeedMetersPerSecond)  |       |             |              |                |
|                            |             |            |             |           |                     |              |                |                        |  |       |             |              |                |

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|                         | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name  | Function Prototype  | Notes  | Code Review | Test Program | Error Checking |
|-------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--|---|--|-------------|--------------|----------------|
| SWERVE DRIVE KINEMATICS | X           | X          | X           | X         |                     |              |                | SwerveKinematics_New4.VI                           |   | For 4 module drives                                    |             |              |                |
|                         | X           | X          | X           | X         |                     |              |                | SwerveKinematics_NewX.VI                           |   | uses array as input                                    |             |              |                |
|                         | X           | X          | X           | X         |                     |              |                | SwerveKinematics_NormalizeWheelSpeeds.vi           | public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) |  |             |              |                |
|                         | X           | X          | X           | X         |                     |              |                | SwerveKinematics_ToChassisSpeeds4.VI               |   | For 4 module drives                                    |             |              |                |
|                         | X           | X          | X           | X         |                     |              |                | SwerveKinematics_ToChassisSpeedsX.VI               |   | uses array as input                                    |             |              |                |
|                         | X           | X          |             | X         |                     |              |                | SwerveKinematics_ToSwerveModuleStates.VI           | public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters)  |  |             |              |                |
|                         | X           | X          |             | X         |                     |              |                | SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI | public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)  |  |             |              |                |
|                         | X           | X          |             | X         |                     |              |                | SwerveKinematics_ToTwist2d4.VI                     |   |  |             |              |                |
|                         | X           | X          |             | X         |                     |              |                | SwerveKinematics_ToTwist2dX.VI                     |   |  |             |              |                |
|                         |             |            |             |           |                     |              |                |  | public SwerveDriveKinematics(Translation2d... wheelsMeters)   | variable parameters (replace with array and "4" calls) |             |              |                |
|                         |             |            |             |           |                     |              |                |  | public ChassisSpeeds toChassisSpeeds(SwerveModuleState... wheelStates)  | variable parameters (replace with array and "4" calls) |             |              |                |
|                         |             |            |             |           |                     |              |                |  |   |  |             |              |                |

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|                       | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                         | Function Prototype   | Notes | Code Review | Test Program | Error Checking |
|-----------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------------------------------|--|-------|-------------|--------------|----------------|
| SWERVE DRIVE ODOMETRY |             |            |             |           |                     |              |                | SwerveOdometry_Execute4.vi      |  |       |             |              |                |
|                       |             |            |             |           |                     |              |                | SwerveOdometry_ExecuteX.vi      |  |       |             |              |                |
|                       | X           | X          |             | X         |                     |              |                | SwerveOdometry_GetPosition.VI   | public Pose2d getPoseMeters()  |       |             |              |                |
|                       | X           | X          |             | X         |                     |              |                | SwerveOdometry_New.VI           | public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle, Pose2d initialPose) |       |             |              |                |
|                       | X           | X          |             | X         |                     |              |                | SwerveOdometry_NewZeroCenter.VI | public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle)                     |       |             |              |                |
|                       | X           | X          |             | X         |                     |              |                | SwerveOdometry_ResetPosition.VI | public void resetPosition(Pose2d pose, Rotation2d gyroAngle)   |       |             |              |                |

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| X | X | X | X |  |  |  | SwerveOdometry_Update4.VI         |  | For 4 module drives                                    |  |  |  |  |
|   |   |   |   |  |  |  | SwerveOdometry_UpdateWithTime4.VI |  | REMOVED  |  |  |  |  |
|   |   |   |   |  |  |  | SwerveOdometry_UpdateWithTimeX.VI |  | REMOVED  |  |  |  |  |
| X | X | X | X |  |  |  | SwerveOdometry_UpdateX.VI         |  | uses array as input                                    |  |  |  |  |
|   |   |   |   |  |  |  |                                   | public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState... moduleStates) | variable parameters (replace with array and “4” calls) |  |  |  |  |
|   |   |   |   |  |  |  |                                   | public Pose2d update(Rotation2d gyroAngle, SwerveModuleState... moduleStates)                                    | variable parameters (replace with array and “4” calls) |  |  |  |  |

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| SWERVE DRIVE MODULE POSITIONS | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                           | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-------------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|-----------------------------------|--------------------|-------|-------------|--------------|----------------|
|                               | X           | X          |             | X         | SI                  |              |                | SwerveModulePosition_CompareTo.vi |                    |       |             |              |                |
|                               | X           | X          |             | X         | SI                  |              |                | SwerveModulePosition_Get.vi       |                    |       |             |              |                |
|                               | X           | X          |             | X         | SI                  |              |                | SwerveModulePosition_New.vi       |                    |       |             |              |                |
|                               |             |            |             |           |                     |              |                |                                   |                    |       |             |              |                |

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| SWERVE DRIVE MODULE STATE | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                        | Function Prototype   | Notes | Code Review | Test Program | Error Checking |
|---------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--------------------------------|--|-------|-------------|--------------|----------------|
|                           | X           | X          |             | X         | SI                  |              |                | SwerveModuleState_CompareTo.vi | public int compareTo(SwerveModuleState o)  |       |             |              |                |
|                           | X           | X          |             | X         | SI                  |              |                | SwerveModuleState_Get.vi       |  |       |             |              |                |
|                           | X           | X          |             | X         | SI                  |              |                | SwerveModuleState_New.vi       | public SwerveModuleState(double speedMetersPerSecond, Rotation2d angle)          |       |             |              |                |
|                           | X           | X          |             | X         | SI                  |              |                | SwerveModuleState_Optimize.vi  | public SwerveModuleState optimize( SwerveModuleState desired, Rotation2d angle ) |       |             |              |                |

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SPLINE

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| CUBIC HERMITE SPLINE | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name  | Function Prototype  | Notes                          | Code Review | Test Program | Error Checking |
|----------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--|---|--------------------------------|-------------|--------------|----------------|
|                      |             |            |             |           |                     |              |                |  | protected SimpleMatrix getCoefficients()  | not needed, use cluster unpack |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | CubicHermiteSpline_getControlVectorFromArrays.vi | private SimpleMatrix getControlVectorFromArrays( double[] initialVector, double[] finalVector)  |                                |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | CubicHermiteSpline_makeHermiteBasis.vi           | private SimpleMatrix makeHermiteBasis()   |                                |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | CubicHermiteSpline_New.vi                        | public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) |                                |             |              |                |

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| POSE WITH CURVATURE | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name              | Function Prototype   | Notes                          | Code Review | Test Program | Error Checking |
|---------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|----------------------|--|--------------------------------|-------------|--------------|----------------|
|                     | X           | X          |             | X         | SI                  |              |                | PoseWithCurve_New.vi | public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter) |                                |             |              |                |
|                     |             |            |             |           |                     |              |                |                      | public PoseWithCurvature()   | can use cluster constant       |             |              |                |
|                     |             |            |             |           |                     |              |                |                      | public Pose2d poseMeters   | not needed, use cluster unpack |             |              |                |
|                     |             |            |             |           |                     |              |                |                      | public double curvatureRadPerMeter..                                     | not needed, use cluster unpack |             |              |                |

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|-------------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|---|--------------------------------|-------------|--------------|----------------|---|
| QUINTIC HERMITE SPLINE  | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype  | Notes                          | Code Review | Test Program | Error Checking | x |
|                         | X           | X          |            | X         |                     |              |                | QuinticHermiteSpline_getControlVectorFromArrays.vi    | private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector)   |                                |             |              |                | x |
|                         | X           | X          |            | X         |                     |              |                | QuinticHermiteSpline_makeHermiteBasis.vi              | private SimpleMatrix makeHermiteBasis()   |                                |             |              |                | x |
|                         | X           | X          |            | X         |                     |              |                | QuinticHermiteSpline_New.vi                           | public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) |                                |             |              |                | x |
|                         |             |            |            |           |                     |              |                |   | protected SimpleMatrix getCoefficients()  | not needed, use cluster unpack |             |              |                | x |
| SPLINE (Abstract class) | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype  | Notes                          | Code Review | Test Program | Error Checking | x |
|                         | X           | X          |            | X         |                     |              |                | Spline_getPoint.vi                                    | public PoseWithCurvature getPoint(double t)   |                                |             |              |                | x |
|                         |             |            |            |           |                     |              |                |   | Spline(int degree)  |                                |             |              |                | x |
|                         |             |            |            |           |                     |              |                |   | public static class ControlVector   |                                |             |              |                | x |
|                         |             |            |            |           |                     |              |                |   | public ControlVector(double[] x, double[] y)  | implemented as data structure  |             |              |                | x |
| SPLINE HELPER           | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype  | Notes                          | Code Review | Test Program | Error Checking | x |
|                         | X           | X          |            | X         | SI                  |              |                | SplineHelp_GetCubicCtrlVector.vi                      | private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point)  |                                |             |              |                | x |
|                         | X           | X          |            | X         |                     | X            |                | SplineHelp_GetCubicCtrlVectorsFromWayPts.vi           | public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints( Pose2d start, Translation2d[] interiorWaypoints, Pose2d end )                 |                                |             |              |                | x |
|                         | X           | X          | X          | X         |                     |              |                | SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi   |   |                                |             |              |                | x |
|                         | X           | X          | X          | No        |                     |              |                | SplineHelp_GetCubicSpline_Calc1.vi                    |   | internal                       |             |              |                | x |
|                         | X           | X          | X          | No        |                     |              |                | SplineHelp_GetCubicSpline_Calc2.vi                    |   | internal                       |             |              |                | x |
|                         | X           | X          | X          | No        |                     |              |                | SplineHelp_GetCubicSpline_Calc3.vi                    |   | internal                       |             |              |                | x |
|                         | X           | X          |            | X         |                     | X            |                | SplineHelp_getCubicSplinesFromControlVectors.vi       | public static CubicHermiteSpline[] getCubicSplinesFromControlVectors( Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end)  |                                |             |              |                | x |
|                         | X           | X          |            | X         | SI                  |              |                | SplineHelp_GetQuinticCtrlVector.vi                    | private static Spline.ControlVector getQuinticControlVector(double scalar, Pose2d point)  |                                |             |              |                | x |
|                         |             |            |            |           |                     |              |                | SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi         | public static List<Spline.ControlVector> getQuinticControlVectorsFromWaypoints( List<Pose2d> waypoints )  | REMOVED 2762                   |             |              |                | x |
|                         |             |            |            |           |                     |              |                | SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi |   | REMOVED 2762                   |             |              |                | x |
|                         | X           | X          |            | X         |                     |              |                | SplineHelp_getQuinticSplinesFromControlVectors.vi     | public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors( Spline.ControlVector[] controlVectors)  |                                |             |              |                | x |
|                         | X           | X          | X          | X         |                     |              |                | SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi     |   | New 2762                       |             |              |                | x |
|                         | X           | X          |            | X         |                     |              |                | SplineHelp_GetQuinticSplinesFromWayPts.vi             |   | New 2762                       |             |              |                | x |
|                         | X           | X          |            | No        |                     |              |                | SplineHelp_ThomasAlgorithm.vi                         | private static void thomasAlgorithm(double[] a, double[] b, double[] c, double[] d, double[] solutionVector)  | internal                       |             |              |                | x |
| SPLINE PARAMETERIZER    | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype  | Notes                          | Code Review | Test Program | Error Checking | x |
|                         | X           | X          |            | X         |                     |              |                | SplineParam_Spline_T0_T1.vi                           | public static List<PoseWithCurvature> parameterize(Spline spline, double t0, double t1)   |                                |             |              |                | x |
|                         | X           | X          |            | X         |                     | X            |                | SplineParam_Spline.vi                                 | public static List<PoseWithCurvature> parameterize(Spline spline)   |                                |             |              |                | x |
|                         | X           | X          | X          | No        |                     |              |                | SplineParam_StackGet.vi                               |   | internal                       |             |              |                | x |



|   |   |   |    |  |  |  |                          |  |          |  |  |  |  |
|---|---|---|----|--|--|--|--------------------------|--|----------|--|--|--|--|
| X | X | X | No |  |  |  | SplineParam_StackPop.vi  |  | internal |  |  |  |  |
| X | X | X | No |  |  |  | SplineParam_StackPush.vi |  | internal |  |  |  |  |

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TRAJECTORY

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|            | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                     | Function Prototype   | Notes                                   | Code Review | Test Program | Error Checking |
|------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|-----------------------------|--|---|-------------|--------------|----------------|
| TRAJECTORY | X           | X          |             | X         |                     |              |                | Trajectory_Concatenate.vi   |  |   |             |              |                |
|            | X           | X          |             | X         |                     |              |                | Trajectory_equals.vi        | boolean equals( other obj )  | FUTURE                                  |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Trajectory_GetStates.vi     | public List<State> getStates()   | not needed, use unpack                  |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Trajectory_GetTotalTime.vi  | public double getTotalTimeSeconds()                                      | not needed, use unpack                  |             |              |                |
|            | X           | X          |             | No        | SI                  |              |                | Trajectory_lerp_double.vi   | private static double lerp(double startValue, double endValue, double t) | internal                                |             |              |                |
|            | X           | X          |             | No        | SI                  |              |                | Trajectory_lerp_Pose.vi     | private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t) | internal                                |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Trajectory_New_Empty.vi     |  |   |             |              |                |
|            | X           | X          |             | X         | SI                  |              |                | Trajectory_New.vi           | public Trajectory(final List<State> states)                              |   |             |              |                |
|            | X           | X          |             | X         |                     |              |                | Trajectory_RelativeTo.vi    | public Trajectory relativeTo(Pose2d pose)                                |   |             |              |                |
|            | X           | X          |             | X         |                     |              |                | Trajectory_Sample.vi        | public State sample(double timeSeconds)                                  |   |             |              |                |
|            | X           | X          | X           | X         |                     |              |                | Trajectory_SampleReverse.vi |  | Sample in reverse order. Negate sample. |             |              |                |
|            | X           | X          |             | X         |                     |              |                | Trajectory_TransformBy.vi   | public Trajectory transformBy(Transform2d transform)                     |   |             |              |                |
|            |             |            |             |           |                     |              |                |                             | public Pose2d getInitialPose()   | can use cluster unpack, array index     |             |              |                |

|                  | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                        | Function Prototype   | Notes | Code Review | Test Program | Error Checking |
|------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--------------------------------|--|-------|-------------|--------------|----------------|
| TRAJECTORY_STATE | X           | X          |             | X         | SI                  |              |                | TrajectoryState_Equals.vi      | boolean equals( other obj )  |       |             |              |                |
|                  | X           | X          | X           | X         | SI                  |              |                | TrajectoryState_GetAll.vi      |  |       |             |              |                |
|                  | X           | X          |             | X         | SI                  |              |                | TrajectoryState_GetPose.vi     |  |       |             |              |                |
|                  | X           | X          |             | X         |                     |              |                | TrajectoryState_Interpolate.vi | State interpolate(State endValue, double i)  |       |             |              |                |
|                  | X           | X          |             | X         | SI                  |              |                | TrajectoryState_New.vi         | public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter) |       |             |              |                |
|                  |             |            |             |           |                     |              |                |                                | public State()   |       |             |              |                |

|                   | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name  | Function Prototype  | Notes                                     | Code Review | Test Program | Error Checking |
|-------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--|---|---|-------------|--------------|----------------|
| TRAJECTORY CONFIG | X           | X          |             | X         |                     |              |                | TrajectoryConfig_AddConstraint.vi              | public TrajectoryConfig addConstraint(TrajectoryConstraint constraint)                              | Implemented differently, can't duplicate. |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | TrajectoryConfig_AddConstraints.vi             | public TrajectoryConfig addConstraints(List<? extends TrajectoryConstraint> constraints)            | Implemented differently, can't duplicate. |             |              |                |
|                   | X           | X          |             | X         | SI                  |              |                | TrajectoryConfig_Create.vi                     | public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq) |   |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | TrajectoryConfig_GetCentripetalAccel.vi        |   |   |             |              |                |
|                   | X           | X          | X           | X         |                     |              |                | TrajectoryConfig_GetConstraints.vi             | public List<TrajectoryConstraint> getConstraints()  | Implemented differently, can't duplicate. |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | TrajectoryConfig_GetEndVelocity.vi             | public double getEndVelocity()  | can use cluster unpack                    |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | TrajectoryConfig_GetKinematicsDiffDrive.vi     |   |   |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | TrajectoryConfig_GetKinematicsMecanumfDrive.vi |   |   |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | TrajectoryConfig_GetKinematicsSwerveDrive.vi   |   |   |             |              |                |
|                   | X           | X          | X           | X         |                     |              |                | TrajectoryConfig_GetMaxVelAccel.vi             |   |   |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | TrajectoryConfig_GetStartVelocity.vi           | public double getStartVelocity()  | can use cluster unpack                    |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | TrajectoryConfig_GetVoltageDiffDrive.vi        |   |   |             |              |                |

|   |   |   |   |    |  |  |  |   |                                 |  |  |  |  |   |
|---|---|---|---|----|--|--|--|---|---------------------------------|--|--|--|--|---|
| X | X |   | X |    |  |  | TrajectoryConfig_IsReversed.vi                 | public boolean isReversed()   | can use cluster unpack          |  |  |  |  | x |
| X | X | X | X | SI |  |  | TrajectoryConfig_setCentripetalAccel.vi        |   |                                 |  |  |  |  | x |
| X | X |   | X |    |  |  | TrajectoryConfig_SetEndVelocity.vi             | public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond)                                     |                                 |  |  |  |  | x |
| X | X |   | X | SI |  |  | TrajectoryConfig_setKinematicsDiffDrive.vi     | public TrajectoryConfig setKinematics(DifferentialDriveKinematics kinematics)                                 |                                 |  |  |  |  | x |
| X | X |   | X | SI |  |  | TrajectoryConfig_setKinematicsMecanumfDrive.vi | public TrajectoryConfig setKinematics(MecanumDriveKinematics kinematics)                                      |                                 |  |  |  |  | x |
| X | X |   | X | SI |  |  | TrajectoryConfig_setKinematicsSwerveDrive.vi   | public TrajectoryConfig setKinematics(SwerveDriveKinematics kinematics)                                       |                                 |  |  |  |  | x |
| X | X |   | X | SI |  |  | TrajectoryConfig_setReversed.vi                | public TrajectoryConfig setReversed(boolean reversed)   |                                 |  |  |  |  | x |
| X | X |   | X |    |  |  | TrajectoryConfig_SetStartVelocity.vi           | public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond)                                 |                                 |  |  |  |  | x |
| X | X | X | X | SI |  |  | TrajectoryConfig_setVoltageDiffDrive.vi        |   |                                 |  |  |  |  | x |
|   |   |   |   |    |  |  |  | public double getMaxVelocity()  | Created function to return both |  |  |  |  | x |
|   |   |   |   |    |  |  |  | public double getMaxAcceleration()  | Created function to return both |  |  |  |  | x |
|   |   |   |   |    |  |  |  | NOTE ADD OTHER "SET" ROUTINES FOR OTHER CONSTRAINTS HERE, SINCE NEW CONSTRAINTS ARE SPECIFIC AND NOT GENERIC. |                                 |  |  |  |  | x |

|                     | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                       | Function Prototype  | Notes                | Code Review | Test Program | Error Checking |   |
|---------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|---|----------------------|-------------|--------------|----------------|---|
| TRAJECTORY GENERATE | X           | X          |             | X         |                     |              |                | TrajectoryGenerate_Make_Cubic_CtrlVect.vi     | public static Trajectory generateTrajectory( Spline.ControlVector initial, List<Translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config ) | uses cubic splines   |             |              |                | x |
|                     | X           | X          |             | X         |                     |              |                | TrajectoryGenerate_Make_Cubic.vi              | public static Trajectory generateTrajectory( Pose2d start, List<Translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config )                               | uses cubic splines   |             |              |                | x |
|                     | X           | X          | X           | X         |                     |              |                | TrajectoryGenerate_Make_Generic.vi            | Helper to bring these all together....  | Use this one!!!      |             |              |                | x |
|                     | X           | X          |             | X         |                     |              |                | TrajectoryGenerate_Make_Quintic_CtrlVect.vi   | public static Trajectory generateTrajectory( ControlVectorList controlVectors, TrajectoryConfig config)   | uses quintic splines |             |              |                | x |
|                     | X           | X          | X           | X         |                     |              |                | TrajectoryGenerate_Make_Quintic_Weighted.vi   |   | New 2762             |             |              |                | x |
|                     | X           | X          |             | X         |                     |              |                | TrajectoryGenerate_Make_Quintic.vi            | public static Trajectory generateTrajectory(List<Pose2d> waypoints, TrajectoryConfig config)  | uses quintic splines |             |              |                | x |
|                     | X           | X          |             | X         |                     |              |                | TrajectoryGenerate_splinePointsFromSplines.vi | public static List<PoseWithCurvature> splinePointsFromSplines(Spline[] splines)   |                      |             |              |                | x |

|                                      | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype  | Notes                   | Code Review | Test Program | Error Checking |   |
|--------------------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------|---|-------------------------|-------------|--------------|----------------|---|
| TRAJECTORY GENERATE (Control Vector) |             |            |             |           |                     |              |                |         | public ControlVectorList(int initialCapacity)                                   | may not need, just data |             |              |                | x |
|                                      |             |            |             |           |                     |              |                |         | public ControlVectorList()  | may not need, just data |             |              |                | x |
|                                      |             |            |             |           |                     |              |                |         | public ControlVectorList(Collection<? extends Spline.ControlVector> collection) | may not need, just data |             |              |                | x |

|                         | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                            | Function Prototype   | Notes   | Code Review | Test Program | Error Checking |   |
|-------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|------------------------------------|--|---|-------------|--------------|----------------|---|
| TRAJECTORY PARAMETERIZE | X           | X          | X           | No        |                     |              |                | TrajectoryParam_calcStuffFwd.vi    |  |   |             |              |                | x |
|                         | X           | X          | X           | No        |                     |              |                | TrajectoryParam_calcStuffRev.vi    |  |   |             |              |                | x |
|                         | X           | X          |             | No        |                     |              |                | TrajectoryParam_enforceAccel.vi    | private static void enforceAccelerationLimits(boolean reverse, List<TrajectoryConstraint> constraints, ConstrainedState state) | This routines needs to be changed when new constraints are added. |             |              |                | x |
|                         | X           | X          | X           | No        |                     |              |                | TrajectoryParam_enforceVelocity.vi |  | This routines needs to be changed when new constraints are added. |             |              |                | x |



CENTRIPETAL ACCELERATION CONSTRAINT

|   |   |  |   |    |  |  |  |   |                              |
|---|---|--|---|----|--|--|--|---|------------------------------|
| X | X |  | X |    |  |  | CentripetalAccelConstraint_getMaxVelocity.vi | public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)             |                              |
| X | X |  | X |    |  |  | CentripetalAccelConstraint_getMinMaxAccel.vi | public MinMax<br>getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) |                              |
| X | X |  | X | SI |  |  | CentripetalAccelConstraint_New.vi            | public CentripetalAccelerationConstraint(double maxCentripetalAccelerationMetersPerSecondSq)  | Can use cluster pack for now |

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DIFF DRIVE KINEMATIC CONSTRAINT

| Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype  | Notes |
|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|---|-------|
| X           | X          |             | X         |                     |              |                | DiffDriveKinematicsConstraint_getMaxVelocity.vi | public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)             |       |
| X           | X          |             | X         |                     |              |                | DiffDriveKinematicsConstraint_getMinMaxAccel.vi | public MinMax<br>getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) |       |
| X           | X          |             | X         | SI                  |              |                | DiffDriveKinematicsConstraint_New.vi            | public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond)              |       |

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DIFF DRIVE VOLTAGE CONSTRAINT

| Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                      | Function Prototype  | Notes |
|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--|---|-------|
| X           | X          |             | X         |                     |              |                | DiffDriveVoltageConstraint_getMaxVelocity.vi | public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)                 |       |
| X           | X          |             | X         |                     |              |                | DiffDriveVoltageConstraint_getMinMaxAccel.vi | public MinMax<br>getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)     |       |
| X           | X          |             | X         | SI                  |              |                | DiffDriveVoltageConstraint_New.vi            | public<br>DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage) |       |

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ELLIPTICAL REGION CONSTRAINT

| Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                 | Function Prototype | Notes |
|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|
| X           | X          |             | X         |                     |              |                | EllipRegionConstraint_getMaxVelocity.vi |                    |       |
| X           | X          |             | X         |                     |              |                | EllipRegionConstraint_getMinMaxAccel.vi |                    |       |
| X           | X          |             | X         |                     |              |                | EllipRegionConstraint_IsPoseInRegion.vi |                    |       |
| X           | X          |             | X         |                     |              |                | EllipRegionConstraint_New.vi            |                    |       |

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JERK CONSTRAINT

| Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                          | Function Prototype                 | Notes  |
|-------------|------------|-------------|-----------|---------------------|--------------|----------------|----------------------------------|------------------------------------|--------|
| /           |            | X           |           |                     |              |                | JerkConstraint_getMaxVelocity.vi | Routine exists, it is just a shell | FUTURE |
| /           |            | X           |           |                     |              |                | JerkConstraint_getMinMaxAccel.vi | Routine exists, it is just a shell | FUTURE |
| /           |            | X           |           | SI                  |              |                | JerkConstraint_New.vi            | Routine exists, it is just a shell | FUTURE |

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|                         | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                 | Function Prototype | Notes |   |
|-------------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|---|
| MAX VELOCITY CONSTRAINT | X           | X          |            | X         | SI                  |              |                | MaxVelocityConstraint_getMaxVelocity.vi |                    |       | x |
|                         | X           | X          |            | X         | SI                  |              |                | MaxVelocityConstraint_getMinMaxAccel.vi |                    |       | x |
|                         | X           | X          |            | X         | SI                  |              |                | MaxVelocityConstraint_New.vi            |                    |       | x |
|                         |             |            |            |           |                     |              |                |   |                    |       | x |

|                                     | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype | Notes |   |
|-------------------------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|---|
| MECANUM DRIVE KINEMATICS CONSTRAINT | X           | X          |            | X         |                     |              |                | MecaDriveKinematicsConstraint_getMaxVelocity.vi |                    |       | x |
|                                     | X           | X          |            | X         |                     |              |                | MecaDriveKinematicsConstraint_getMinMaxAccel.vi |                    |       | x |
|                                     | X           | X          |            | X         | SI                  |              |                | MecaDriveKinematicsConstraint_New.vi            |                    |       | x |
|                                     |             |            |            |           |                     |              |                |   |                    |       | x |

|                               | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                | Function Prototype | Notes |   |
|-------------------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|--|--------------------|-------|---|
| RECTANGULAR REGION CONSTRAINT | X           | X          |            | X         |                     |              |                | RectRegionConstraint_getRectRegion.vi  |                    |       | x |
|                               | X           | X          |            | X         |                     |              |                | RectRegionConstraint_getMinMaxAccel.vi |                    |       | x |
|                               | X           | X          |            | X         |                     |              |                | RectRegionConstraint_IsPosInRegion.vi  |                    |       | x |
|                               | X           | X          |            | X         |                     |              |                | RectRegionConstraint_New.vi            |                    |       | x |

|                                    | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype   | Notes                        |   |
|------------------------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|--|------------------------------|---|
| SWERVE DRIVE KINEMATICS CONSTRAINT | X           | X          |            | X         |                     |              |                | SwerveDriveKinematicsConstraint_getMaxVelocity.vi | public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)          |                              | x |
|                                    | X           | X          |            | X         |                     |              |                | SwerveDriveKinematicsConstraint_getMinMaxAccel.vi | public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) |                              | x |
|                                    | X           | X          |            | X         | SI                  |              |                | SwerveDriveKinematicsConstraint_New.vi            | Newpublic SwerveDriveKinematicsConstraint(final SwerveDriveKinematics kinematics, double maxSpeedMetersPerSecond)                    | Can use cluster pack for now | x |
|                                    |             |            |            |           |                     |              |                |   |  |                              | x |

|                       | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                          | Function Prototype | Notes |   |
|-----------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|----------------------------------|--------------------|-------|---|
| TRAJECTORY CONSTRAINT | X           | X          | X          | X         |                     |              |                | TrajConstraint_GetMaxVelocity.vi |                    |       | x |
|                       | X           | X          | X          | X         |                     |              |                | TrajConstraint_GetMinMaxAccel.vi |                    |       | x |
|                       | X           | X          | X          | X         |                     |              |                | TrajConstraint_GetType.vi        |                    |       | x |
|                       |             |            |            |           |                     |              |                |                                  |                    |       | x |

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TRAJECTORY CONSTRAINT (Min Max)

| Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                        | Function Prototype    | Notes |
|-------------|------------|------------|-----------|---------------------|--------------|----------------|--------------------------------|-----------------------|-------|
| X           | X          |            | X         | SI                  |              |                | Constraint_MinMax_New.vi       | Constraint_MinMax_New |       |
| X           | X          |            | X         | SI                  |              |                | Constraint_MinMax_NewMinMax.VI | Constraint_MinMax_New |       |

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UTILITY

THESE ROUTINES ARE SPECIFIC TO LABVIEW. THEY DO NOT HAVE A  
JAVA / C++ WPILIB EQUIVALENT

|      | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype | Notes   |
|------|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|--------------------|---|
| UTIL | X           | X          | X          | X         | SI                  |              |                | Util_ApproxEqual.vi                               |                    |   |
|      | X           | X          | X          | X         |                     |              |                | Util_Array_PoseWCurv_to_XY.vi                     |                    |   |
|      | X           | X          | X          | X         | SI                  |              |                | Util_CalcDist.vi                                  |                    |   |
|      | X           | X          | X          | X         | SI                  |              |                | Util_GetLibraryVersion.vi                         |                    |   |
|      | X           | X          | X          | X         | SI                  |              |                | Util_GetLibUsage.vi                               |                    |   |
|      | X           | X          | X          | X         |                     |              |                | Util_GetTime.vi                                   |                    | Once tested completely, this should be optimized! |
|      | X           | X          | X          | No        | I                   |              |                | Util_GetTime_U32.vi                               |                    |   |
|      | X           | X          | X          | No        | I                   |              |                | Util_GetTime_U64.vi                               |                    |   |
|      | X           | X          | X          | No        | N/A                 |              |                | Util_LibraryGlobals.vi                            |                    | Global Variables – no block diag.                 |
|      | X           | X          | X          | X         |                     |              |                | Util_Trajectory_Absolute_To_Relative.vi           |                    |   |
|      | X           | X          | X          | X         |                     |              |                | Util_Trajectory_ReadFile.vi                       |                    |   |
|      | X           | X          | X          | X         |                     |              |                | Util_Trajectory_to_XY.vi                          |                    |   |
|      | X           | X          | X          | No        |                     |              |                | Util_Trajectory_WriteFile_Config.vi               |                    | internal  |
|      | X           | X          | X          | No        |                     |              |                | Util_Trajectory_WriteFile_OneState.vi             |                    | internal  |
|      | X           | X          | X          | X         |                     |              |                | Util_Trajectory_WriteFile_PathFinder.vi           |                    |   |
|      | X           | X          | X          | No        |                     |              |                | Util_Trajectory_WriteFile_PathFinderConfig.vi     |                    | internal  |
|      | X           | X          | X          | X         |                     |              |                | Util_Trajectory_WriteFile_Pathweaver.vi           |                    |   |
|      | X           | X          | X          | No        |                     |              |                | Util_Trajectory_WriteFile_States.vi               |                    | internal  |
|      | X           | X          | X          | No        |                     |              |                | Util_Trajectory_WriteFile_WayPoints.vi            |                    | internal  |
|      | X           | X          | X          | X         |                     |              |                | Util_Trajectory_WriteFile.vi                      |                    |   |
|      | X           | X          | X          | X         |                     |              |                | Util_TrajectoryState_Meters_To_Inches.vi          |                    |   |
|      | X           | X          | X          | X         |                     |              |                | Util_TrajState_to_DiffDrive_WheelPos.vi           |                    |   |
|      | X           | X          | X          | X         |                     |              |                | Util_DispWaypoint_Eng_To_SI.vi                    |                    |   |
|      | X           | X          | X          | X         |                     |              |                | Util_DispWaypoint_To_CubicInput.vi                |                    |   |
|      | X           | X          | X          | X         |                     |              |                | Util_DispWaypoint_To_QuinticInput.vi              |                    |   |
|      | X           | X          | X          | X         |                     |              |                | Util_DispWeightedWaypiont_Eng_To_WeightedWaypoint |                    |   |
|      | X           | X          | X          | No        |                     |              |                | Util_DispWeightedWayPoint_To_WeightedWayPoint.vi  |                    | Sorry about the confusing name..                  |

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CONVERSIONS

THESE ROUTINES ARE SPECIFIC TO LABVIEW. THEY DO NOT HAVE A  
JAVA / C++ WPILIB EQUIVALENT

|      | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                      | Function Prototype | Notes |
|------|-------------|------------|------------|-----------|---------------------|--------------|----------------|------------------------------|--------------------|-------|
| CONV | X           | X          | X          | X         | SI                  |              |                | Conv_AngleDegrees_Heading.vi |                    |       |
|      | X           | X          | X          | X         | SI                  |              |                | Conv_AngleRadians_Heading.vi |                    |       |
|      | X           | X          | X          | X         | SI                  |              |                | Conv_Centimeters_Meters.vi   |                    |       |
|      | X           | X          | X          | X         | SI                  |              |                | Conv_Deg_Radians.vi          |                    |       |
|      | X           | X          | X          | X         | SI                  |              |                | Conv_Deg_Rotations.vi        |                    |       |
|      | X           | X          | X          | X         | SI                  |              |                | Conv_Feet_Meters.vi          |                    |       |

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|---|---|---|---|----|--|--|------------------------------|--|--|
| X | X | X | X | SI |  |  | Conv_GyroDegrees_Heading.vi  |  |  |
| X | X | X | X | SI |  |  | Conv_Heading_AngleRadians.vi |  |  |
| X | X | X | X | SI |  |  | Conv_Inches_Meters.vi        |  |  |
| X | X | X | X | SI |  |  | Conv_Kilograms_Pounds.vi     |  |  |
| X | X | X | X | SI |  |  | Conv_Meters_Feet.vi          |  |  |
| X | X | X | X | SI |  |  | Conv_Meters_Inches.vi        |  |  |
| X | X | X | X | SI |  |  | Conv_Pose2d_SI_Eng.vi        |  |  |
| X | X | X | X | SI |  |  | Conv_Pounds_Kilograms.vi     |  |  |
| X | X | X | X | SI |  |  | Conv_Radians_Deg.vi          |  |  |
| X | X | X | X | SI |  |  | Conv_Radians_Rotations.vi    |  |  |
| X | X | X | X | SI |  |  | Conv_Rotations_Deg.vi        |  |  |
| X | X | X | X | SI |  |  | Conv_Rotations_Radians.vi    |  |  |
| X | X | X | X | SI |  |  | Conv_Yards_Meters.vi         |  |  |

| UNITS | Implemented | Documented | Not WPI/LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                       | Function Prototype | Notes |
|-------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|
|       |             |            |             |           |                     |              |                |   |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_DegreesToRadians.vi                     |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_DegreesToRotations.vi                   |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_FeetToMeters.vi                         |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_InchesToMeters.vi                       |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_MetersToFeet.vi                         |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_MetersToInches.vi                       |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_MillisecondsToSeconds.vi                |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_RadiansPerSecondToRotationsPerMinute.vi |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_RadiansToDegrees.vi                     |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_RadiansToRotations.vi                   |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_RotationsPerMinuteToRadiansPerSecond.vi |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_RotationsToDegrees.vi                   |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_RotationsToRadians.vi                   |                    |       |
|       | X           | X          |             | X         | SI                  |              |                | Units_SecondsToMilliseconds.vi                |                    |       |

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PATHFINDER UTIL

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THESE ROUTINES ARE SPECIFIC TO LABVIEW. THEY DO NOT HAVE A  
JAVA / C++ WPILIB EQUIVALENT

| PATHFINDERUTIL | Implemented | Documented | Not WPI/LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype | Notes |
|----------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|
|                |             |            |             |           |                     |              |                |   |                    |       |
|                | X           | X          | X           | X         |                     |              |                | PathfinderUtil_Continuous_Heading_Difference.vi |                    |       |
|                | X           | X          | X           | X         |                     |              |                | PathfinderUtil_OptimizeTrajectoryStates.vi      |                    |       |
|                | X           | X          | X           | X         |                     |              |                | PathfinderUtil_ToTrajectory.vi                  |                    |       |
|                | X           | X          | X           | X         |                     |              |                | PathfinderUtil_ToTrajectoryStates.vi            |                    |       |

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STATE SPACE MODEL

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| DC MOTOR | Implemented | Documented | Not WPI/LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                         | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|----------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------------------------------|--------------------|-------|-------------|--------------|----------------|
|          |             |            |             |           |                     |              |                |                                 |                    |       |             |              |                |
|          | X           | X          |             | X         | SI                  |              |                | DCMotor_GetAndymark9015.vi      |                    |       |             |              |                |
|          | X           | X          |             |           | SI                  |              |                | DCMotor_GetAndymarkAM2235A.vi   |                    |       |             |              |                |
|          | X           | X          |             |           | SI                  |              |                | DCMotor_GetAndymarkAM3493.vi    |                    |       |             |              |                |
|          | X           | X          |             | X         | SI                  |              |                | DCMotor_GetAndymarkRs775_125.vi |                    |       |             |              |                |
|          | X           | X          |             | X         | SI                  |              |                | DCMotor_GetBag.vi               |                    |       |             |              |                |



|   |   |  |   |    |  |  |                             |  |  |  |  |  |
|---|---|--|---|----|--|--|-----------------------------|--|--|--|--|--|
| X | X |  | X | SI |  |  | DCMotor_GetBanebotsRs550.vi |  |  |  |  |  |
| X | X |  | X | SI |  |  | DCMotor_GetBanebotsRs775.vi |  |  |  |  |  |
| X | X |  | X | SI |  |  | DCMotor_GetCIM.vi           |  |  |  |  |  |
| X | X |  | X | SI |  |  | DCMotor_GetCurrent.vi       |  |  |  |  |  |
| X | X |  | X | SI |  |  | DCMotor_GetFalcon500.vi     |  |  |  |  |  |
| X | X |  | X | SI |  |  | DCMotor_GetMiniCIM.vi       |  |  |  |  |  |
| X | X |  | X | SI |  |  | DCMotor_GetNEO.vi           |  |  |  |  |  |
| X | X |  | X | SI |  |  | DCMotor_GetNEO550.vi        |  |  |  |  |  |
| X | X |  | X | SI |  |  | DCMotor_GetRomiBuiltIn.vi   |  |  |  |  |  |
| X | X |  | X | SI |  |  | DCMotor_GetVex775Pro.vi     |  |  |  |  |  |
| X | X |  | X | SI |  |  | DCMotor_New.vi              |  |  |  |  |  |
| X | X |  | X | SI |  |  | DCMotor_PickMotor.vi        |  |  |  |  |  |
|   |   |  |   |    |  |  |                             |  |  |  |  |  |

| LINEAR SYSTEM ID | Implemented | Documented | Not WPI/LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name  | Function Prototype | Notes                       | Code Review | Test Program | Error Checking |
|------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--|--------------------|-----------------------------|-------------|--------------|----------------|
|                  |             |            |             |           |                     |              |                |  |                    |                             |             |              |                |
|                  | X           | X          |             | X         |                     |              |                | LinearSystemId_CreateDCMotorSystem.vi            |                    |                             |             |              |                |
|                  | X           | X          |             | X         |                     |              |                | LinearSystemId_CreateDriveTrainVelocitySystem.vi |                    | Update to use create matrix |             |              |                |
|                  | X           | X          |             | X         |                     |              |                | LinearSystemId_CreateElevatorSystem.vi           |                    | Update to use create matrix |             |              |                |
|                  | X           | X          |             | X         |                     |              |                | LinearSystemId_CreateFlywheelSystem.vi           |                    | Update to use create matrix |             |              |                |
|                  | X           | X          |             | X         |                     |              |                | LinearSystemId_CreateSingleJointedArmSystem.vi   |                    | Update to use create matrix |             |              |                |
|                  | X           | X          |             | X         |                     |              |                | LinearSystemId_IdentifyDriveTrainSystem.vi       |                    | Update to use create matrix |             |              |                |
|                  | X           | X          |             | X         |                     |              |                | LinearSystemId_IdentifyPositionSystem.vi         |                    | Update to use create matrix |             |              |                |
|                  | X           | X          |             | X         |                     |              |                | LinearSystemId_IdentifyVelocitySystem.vi         |                    | Update to use create matrix |             |              |                |
|                  |             |            |             |           |                     |              |                |  |                    |                             |             |              |                |

STATE SPACE ESTIMATION

| DIFFERENTIAL DRIVE POSE ESTIMATOR | Implemented | Documented | Not WPI/LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-----------------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|-------------|--------------|----------------|
|                                   |             |            |             |           |                     |              |                |   |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_AddVisionMeasurement.vi            |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_FillStateVector.vi                 |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_GetEstimatedPosition.vi            |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_Kalman_F_Callback.vi               |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_Kalman_H_Callback.vi               |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_New.vi                             |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_ResetPosition.vi                   |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi     |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_Update.vi                          |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_UpdateWithTime.vi                  |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_VisionCorrect_Callback.vi          |                    |       |             |              |                |
|                                   | X           | X          |             | X         |                     |              |                | DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi |                    |       |             |              |                |

| DIFFERENTIAL DRIVE POSE ESTIMATOR 2 | Implemented | Documented | Not WPI/LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name  | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-------------------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--|--------------------|-------|-------------|--------------|----------------|
|                                     |             |            |             |           |                     |              |                |  |                    |       |             |              |                |
|                                     | X           |            |             |           |                     |              |                | DiffDrivePoseEst2_AddVisionMeasurement.vi        |                    |       |             |              |                |
|                                     | X           |            |             |           |                     |              |                | DiffDrivePoseEst2_GetEstimatedPosition.vi        |                    |       |             |              |                |
|                                     | X           |            | X           |           |                     |              |                | DiffDrivePoseEst2_InterpRecord_ExtractFromVar.vi |                    |       |             |              |                |
|                                     | X           |            |             |           |                     |              |                | DiffDrivePoseEst2_InterpRecord_Interp.vi         |                    |       |             |              |                |
|                                     | X           |            |             |           |                     |              |                | DiffDrivePoseEst2_InterpRecord_New.vi            |                    |       |             |              |                |
|                                     | X           |            |             |           |                     |              |                | DiffDrivePoseEst2_New.vi                         |                    |       |             |              |                |
|                                     | X           |            |             |           |                     |              |                | DiffDrivePoseEst2_ResetPosition.vi               |                    |       |             |              |                |



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|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| X |  |  |  |  |  |  | DiffDrivePoseEst2_SetVisionMeasurementStdDevs.vi |  |  |  |  |  |  |  |
| X |  |  |  |  |  |  | DiffDrivePoseEst2_Update.vi                      |  |  |  |  |  |  |  |
| X |  |  |  |  |  |  | DiffDrivePoseEst2_UpdateWithTime.vi              |  |  |  |  |  |  |  |
|   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|                        |             |            |            |           |                     |              |                |  |                    |                               |             |              |                |
|------------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|--|--------------------|-------------------------------|-------------|--------------|----------------|
| EXTENDED KALMAN FILTER | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                | Function Prototype | Notes                         | Code Review | Test Program | Error Checking |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_Correct_OnlyUY.vi |                    |                               |             |              |                |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_Correct.vi        |                    | Just a shell, not functional! |             |              |                |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_GetP_Single.vi    |                    |                               |             |              |                |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_GetP.vi           |                    |                               |             |              |                |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_GetXHat_Single.vi |                    |                               |             |              |                |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_GetXHat.vi        |                    |                               |             |              |                |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_New.vi            |                    |                               |             |              |                |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_Predict.vi        |                    |                               |             |              |                |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_Reset.vi          |                    |                               |             |              |                |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_SetP.vi           |                    |                               |             |              |                |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_SetXHat_Single.vi |                    |                               |             |              |                |
|                        | X           | X          |            | X         |                     |              |                | ExtendedKalmanFilter_SetXHat.vi        |                    |                               |             |              |                |
|                        |             |            |            |           |                     |              |                |  |                    |                               |             |              |                |
|                        |             |            |            |           |                     |              |                |  |                    |                               |             |              |                |

|               |             |            |            |           |                     |              |                |                             |                    |       |             |              |                |
|---------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|-----------------------------|--------------------|-------|-------------|--------------|----------------|
| KALMAN FILTER | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                     | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|               | X           | X          |            | X         |                     | X            |                | KalmanFilter_Correct.vi     |                    |       |             |              |                |
|               | X           | X          |            | X         |                     |              |                | KalmanFilter_GetK           |                    |       |             |              |                |
|               | X           | X          |            | X         |                     |              |                | KalmanFilter_GetK_Single.vi |                    |       |             |              |                |
|               | X           | X          |            | X         |                     |              |                | KalmanFilter_GetXHat        |                    |       |             |              |                |
|               | X           | X          |            | X         |                     | X            |                | KalmanFilter_GetXHAT_Single |                    |       |             |              |                |
|               | X           | X          |            | X         |                     | X            |                | KalmanFilter_New.vi         |                    |       |             |              |                |
|               | X           | X          |            | X         |                     | X            |                | KalmanFilter_Predict.vi     |                    |       |             |              |                |
|               | X           | X          |            | X         |                     |              |                | KalmanFilter_Reset.vi       |                    |       |             |              |                |
|               | X           | X          |            | X         |                     |              |                | KalmanFilter_SetXHat        |                    |       |             |              |                |
|               | X           | X          |            | X         |                     | X            |                | KalmanFilter_SetXHat_Single |                    |       |             |              |                |
|               |             |            |            |           |                     |              |                |                             |                    |       |             |              |                |

|                                   |             |            |            |           |                     |              |                |   |                    |       |             |              |                |
|-----------------------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|-------------|--------------|----------------|
| KALMAN FILTER LATENCY COMPENSATOR | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name   | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|                                   | X           | X          |            | X         |                     |              |                | KalmanFilterLatencyComp_AddObserverState.vi               |                    |       |             |              |                |
|                                   | X           | X          |            | X         |                     |              |                | KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi  |                    |       |             |              |                |
|                                   | X           | X          |            | X         |                     |              |                | KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi |                    |       |             |              |                |
|                                   | X           | X          |            | X         |                     |              |                | KalmanFilterLatencyComp_FindClosestMeasurement.vi         |                    |       |             |              |                |
|                                   | X           | X          |            | X         |                     |              |                | KalmanFilterLatencyComp_New.vi                            |                    |       |             |              |                |
|                                   | X           | X          |            | X         |                     |              |                | KalmanFilterLatencyComp_Observer_New.vi                   |                    |       |             |              |                |
|                                   | X           | X          |            | X         |                     |              |                | KalmanFilterLatencyComp_Reset.vi                          |                    |       |             |              |                |

|             |            |            |           |                     |              |                |         |                    |       |             |              |                |
|-------------|------------|------------|-----------|---------------------|--------------|----------------|---------|--------------------|-------|-------------|--------------|----------------|
| Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-------------|------------|------------|-----------|---------------------|--------------|----------------|---------|--------------------|-------|-------------|--------------|----------------|



|  |             |            |            |           |                     |              |                |   |                    |                 |             |              |                |   |
|--|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|--------------------|-----------------|-------------|--------------|----------------|---|
| CONTROL AFFINE PLANT INVERSION FEEDFORWARD | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                     | Function Prototype | Notes           | Code Review | Test Program | Error Checking | x |
|  |             |            |            |           |                     |              |                |   |                    |                 |             |              |                | x |
|  |             |            |            |           |                     |              |                |   |                    |                 |             |              |                | x |
| DIFFERENTIAL DRIVE ACCELERATION LIMITER    | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                     | Function Prototype | Notes           | Code Review | Test Program | Error Checking | x |
|  | X           | X          |            | X         |                     | X            |                | DiffDrvAccelLimit_Calculate.vi              |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     | X            |                | DiffDrvAccelLimit_New.vi                    |                    |                 |             |              |                | x |
| IMPLICIT MODEL FOLLOWER                    | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                     | Function Prototype | Notes           | Code Review | Test Program | Error Checking | x |
|  | X           | X          |            | X         |                     | X            |                | ImplModelFollow_Calculate.vi                |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     | X            |                | ImplModelFollow_GetU.vi                     |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     | X            |                | ImplModelFollow_GetU_Single.vi              |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     | X            |                | ImplModelFollow_New.vi                      |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     | X            |                | ImplModelFollow_New_Plant.vi                |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     | X            |                | ImplModelFollow_Reset.vi                    |                    |                 |             |              |                | x |
| LINEAR PLANT INVERSION FEEDFORWARD         | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                     | Function Prototype | Notes           | Code Review | Test Program | Error Checking | x |
|  | X           | X          |            | X         |                     |              |                | LinearPlntInvFF_Calculate_NextR.vi          |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearPlntInvFF_Calculate.vi                |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearPlntInvFF_GetR_Single.vi              |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearPlntInvFF_GetR.vi                     |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearPlntInvFF_GetUff_Single.vi            |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearPlntInvFF_GetUff.vi                   |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearPlntInvFF_New_Plant.vi                |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearPlntInvFF_New.vi                      |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearPlntInvFF_Reset_Initial.vi            |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearPlntInvFF_Reset_Zero.vi               |                    |                 |             |              |                | x |
| LINEAR QUADRATIC REGULATOR                 | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                     | Function Prototype | Notes           | Code Review | Test Program | Error Checking | x |
|  | X           | X          |            | X         |                     |              |                | LinearQuadraticRegulator_Calculate_NextR.vi |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearQuadraticRegulator_Calculate.vi       |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearQuadraticRegulator_GetK_Single.vi     |                    | NOT ORIGINAL... |             |              |                | x |
|  | X           | X          |            | X         |                     | X            |                | LinearQuadraticRegulator_GetK.vi            |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearQuadraticRegulator_GetR_Single.vi     |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearQuadraticRegulator_GetR.vi            |                    |                 |             |              |                | x |
|  | X           | X          |            | X         |                     |              |                | LinearQuadraticRegulator_GetU_Single.vi     |                    |                 |             |              |                | x |

|   |   |  |   |  |   |  |   |  |   |  |  |  |  |   |
|---|---|--|---|--|---|--|---|--|---|--|--|--|--|---|
| X | X |  | X |  | X |  | LinearQuadraticRegulator_LatencyCompensate.vi |  | Routine exists, but it only has<br>integer raise matrix to power. |  |  |  |  | x |
| X | X |  | X |  |   |  | LinearQuadraticRegulator_New_ELMS.vi          |  |   |  |  |  |  | x |
| X | X |  | X |  |   |  | LinearQuadraticRegulator_New_N.vi             |  |   |  |  |  |  | x |
|   |   |  |   |  |   |  | LinearQuadraticRegulator_New_Raw.vi           |  |   |  |  |  |  | x |
| X | X |  | X |  | X |  | LinearQuadraticRegulator_New_SystemELMS.vi    |  |   |  |  |  |  | x |
| X | X |  | X |  |   |  | LinearQuadraticRegulator_New.vi               |  |   |  |  |  |  | x |
| X | X |  | X |  |   |  | LinearQuadraticRegulator_Reset.vi             |  |   |  |  |  |  | x |
|   |   |  |   |  |   |  |   |  |   |  |  |  |  | x |
|   |   |  |   |  |   |  |   |  |   |  |  |  |  | x |

| LINEAR SYSTEM | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                     | Function Prototype | Notes | Code Review | Test Program | Error Checking |   |
|---------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|-----------------------------|--------------------|-------|-------------|--------------|----------------|---|
|               |             |            |             |           |                     |              |                |                             |                    |       |             |              |                |   |
|               | X           | X          |             | X         | I                   |              |                | LinearSystem_CalculateX.vi  |                    |       |             |              |                | x |
|               | X           | X          |             | X         | I                   |              |                | LinearSystem_CalculateY.vi  |                    |       |             |              |                | x |
|               | X           | X          |             | X         | SI                  |              |                | LinearSystem_GetA.vi        |                    |       |             |              |                | x |
|               | X           | X          |             | X         | SI                  |              |                | LinearSystem_GetAElement.vi |                    |       |             |              |                | x |
|               | X           | X          |             | X         | SI                  |              |                | LinearSystem_GetB.vi        |                    |       |             |              |                | x |
|               | X           | X          |             | X         | SI                  |              |                | LinearSystem_GetBElement.vi |                    |       |             |              |                | x |
|               | X           | X          |             | X         | SI                  |              |                | LinearSystem_GetC.vi        |                    |       |             |              |                | x |
|               | X           | X          |             | X         | SI                  |              |                | LinearSystem_GetCElement.vi |                    |       |             |              |                | x |
|               | X           | X          |             | X         | SI                  |              |                | LinearSystem_GetD.vi        |                    |       |             |              |                | x |
|               | X           | X          |             | X         | SI                  |              |                | LinearSystem_GetDElement.vi |                    |       |             |              |                | x |
|               | X           | X          |             | X         | SI                  |              |                | LinearSystem_New.vi         |                    |       |             |              |                | x |
|               |             |            |             |           |                     |              |                |                             |                    |       |             |              |                | x |
|               |             |            |             |           |                     |              |                |                             |                    |       |             |              |                | x |
|               |             |            |             |           |                     |              |                |                             |                    |       |             |              |                | x |
|               |             |            |             |           |                     |              |                |                             |                    |       |             |              |                | x |

| LINEAR SYSTEM LOOP | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                       | Function Prototype | Notes | Code Review | Test Program | Error Checking |   |
|--------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|-------------|--------------|----------------|---|
|                    |             |            |             |           |                     |              |                |   |                    |       |             |              |                |   |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_ClampInput.vi                |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_Correct.vi                   |                    |       |             |              |                | x |
|                    |             |            |             |           |                     |              |                | LinearSystemLoop_GetClampFunction.vi          |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_GetController.vi             |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_GetError_Single.vi           |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_GetError.vi                  |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_GetFeedForward.vi            |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_GetNextR_Single.vi           |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_GetNextR.vi                  |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_GetObserver.vi               |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_GetU_Row.vi                  |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_GetU.vi                      |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_GetXHat_Single.vi            |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_GetXHat.vi                   |                    |       |             |              |                | x |
|                    |             |            |             |           |                     |              |                | LinearSystemLoop_New_BBB                      |                    |       |             |              |                | x |
|                    |             |            |             |           |                     |              |                | LinearSystemLoop_New_LinearSystem_ClampFunc   |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_New_LinearSystem_ClampVal.vi |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_New.vi                       |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_Predict.vi                   |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_Reset.vi                     |                    |       |             |              |                | x |
|                    |             |            |             |           |                     |              |                | LinearSystemLoop_SetClampFunction.vi          |                    |       |             |              |                | x |
|                    |             |            |             |           |                     |              |                | LinearSystemLoop_SetNextR_Some.vi             |                    |       |             |              |                | x |
|                    | X           | X          |             | X         |                     |              |                | LinearSystemLoop_SetNextR.vi                  |                    |       |             |              |                | x |
|                    |             |            |             |           |                     |              |                | LinearSystemLoop_SetXHat_Single.vi            |                    |       |             |              |                | x |
|                    |             |            |             |           |                     |              |                | LinearSystemLoop_SetXHat.vi                   |                    |       |             |              |                | x |
|                    |             |            |             |           |                     |              |                |   |                    |       |             |              |                | x |

|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                |   |
|-----------------------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|--|--------------------|------------------|-------------|--------------|----------------|---|
| LTV DIFFERENTIAL DRIVE CONTROLLER | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                    | Function Prototype | Notes            | Code Review | Test Program | Error Checking | x |
|                                   | X           | X          |            | X         |                     |              |                | LTVDiffDriveCtrl_Calculate.vi              |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     |              |                | LTVDiffDriveCtrl_New.vi                    |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     |              |                | LTVDiffDriveCtrl_Calculate_TrajState.vi    |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     |              |                | LTVDiffDriveCtrl_Calculate_SetTolerance.vi |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     |              |                | LTVDiffDriveCtrl_Calculate_AtReference.vi  |                    |                  |             |              |                | x |
|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                | x |
| LTV UNICYCLE CONTROLLER           | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                    | Function Prototype | Notes            | Code Review | Test Program | Error Checking | x |
|                                   | X           | X          |            | X         |                     | X            |                | LTVUnicycleCtrl_AtReference.vi             |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     | X            |                | LTVUnicycleCtrl_Calculate_TrajState.vi     |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     | X            |                | LTVUnicycleCtrl_Calculate.vi               |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     | X            |                | LTVUnicycleCtrl_New.vi                     |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     | X            |                | LTVUnicycleCtrl_SetEnabled.vi              |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     | X            |                | LTVUnicycleCtrl_SetTolerance.vi            |                    |                  |             |              |                | x |
| STATE SPACE UTILITIES             | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                    | Function Prototype | Notes            | Code Review | Test Program | Error Checking | x |
|                                   | X           | X          |            | X         |                     |              |                | StateSpaceUtil_Check_Stabalizable.vi       |                    | Internal routine |             |              |                | x |
|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                |   |
|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                |   |
|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                |   |
|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                |   |
|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                |   |
| CALLBACK HELPER                   | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                    | Function Prototype | Notes            | Code Review | Test Program | Error Checking | x |
|                                   | X           | X          | X          | X         |                     |              |                | CallbackHelp_MatrixMinus.vi                |                    |                  |             |              |                | x |
|                                   | X           | X          | X          | X         |                     |              |                | CallbackHelp_MatrixMult_CoerceSizeB.vi     |                    |                  |             |              |                | x |
|                                   | X           | X          | X          | X         |                     |              |                | CallbackHelp_MatrixMult.vi                 |                    |                  |             |              |                | x |
|                                   | X           | X          | X          | X         |                     |              |                | CallbackHelp_MatrixPlus.vi                 |                    |                  |             |              |                | x |
| DISCRETIZATION                    | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                    | Function Prototype | Notes            | Code Review | Test Program | Error Checking | x |
|                                   | X           | X          |            | X         |                     | X            |                | Discretization_DiscretizeA.vi              |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     | X            |                | Discretization_DiscretizeAB.vi             |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     | X            |                | Discretization_DiscretizeABTaylor.vi       |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     | X            |                | Discretization_DiscretizeAQ.vi             |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     | X            |                | Discretization_DiscretizeAQTaylor.vi       |                    |                  |             |              |                | x |
|                                   | X           | X          |            | X         |                     |              |                | Discretization_DiscretizeR.vi              |                    |                  |             |              |                | x |
| STATE SPACE UTIL                  | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                    | Function Prototype | Notes            | Code Review | Test Program | Error Checking | x |
|                                   | X           | X          | X          | No        |                     |              |                | StateSpaceUtil_Check_Stabalizable.vi       |                    | Internal routine |             |              |                | x |
|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                |   |
|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                |   |
|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                |   |
|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                |   |
|                                   |             |            |            |           |                     |              |                |  |                    |                  |             |              |                |   |

|   |   |  |   |  |   |  |  |                                    |  |  |  |
|---|---|--|---|--|---|--|--|------------------------------------|--|--|--|
| X | X |  | X |  |   | StateSpaceUtil_ClampInputMaxMagnitude.vi |  | Routine exists, it is just a shell |  |  |  |
| X | X |  | X |  |   | StateSpaceUtil_IsDetectable.vi           |  |                                    |  |  |  |
| X | X |  | X |  |   | StateSpaceUtil_IsStabalizable.vi         |  |                                    |  |  |  |
| X | X |  | X |  | X | StateSpaceUtil_MakeCostMatrix.vi         |  |                                    |  |  |  |
| X | X |  | X |  | X | StateSpaceUtil_MakeCovarianceMatrix.vi   |  |                                    |  |  |  |
| X | X |  | X |  |   | StateSpaceUtil_MakeWhiteNoiseVector.vi   |  |                                    |  |  |  |
| X | X |  | X |  |   | StateSpaceUtil_NomalizeInputVector.vi    |  |                                    |  |  |  |
| X | X |  | X |  |   | StateSpaceUtil_PoseTo3dVector.vi         |  |                                    |  |  |  |
| X | X |  | X |  |   | StateSpaceUtil_PoseTo4dVector.vi         |  |                                    |  |  |  |
| X | X |  | X |  |   | StateSpaceUtil_PoseToVector.vi           |  |                                    |  |  |  |
|   |   |  |   |  |   |  |  |                                    |  |  |  |

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SIMULATION

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|                              | Implemented | Documented | Not WPI/LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name  | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|------------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--|--------------------|-------|-------------|--------------|----------------|
| BATTERY SIM                  | X           | X          |             | X         | SI                  |              |                | BatterySim_CalculateDefaultBatteryLoadedVoltage.vi   |                    |       |             |              |                |
|                              | X           | X          |             | X         | SI                  |              |                | BatterySim_CalculateLoadedVoltage.vi                 |                    |       |             |              |                |
| DC MOTOR SIM                 | X           | X          |             | X         |                     |              |                | DCMotorSim_getAngularPositionRad.vi                  |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DCMotorSim_getAngularPositionRotations.vi            |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DCMotorSim_getAngularVelocityRadPerSec.vi            |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DCMotorSim_getAngularVelocityRPM.vi                  |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DCMotorSim_GetCurrentDrawAmps.vi                     |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DCMotorSim_New_MOI.vi                                |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DCMotorSim_New_Plant.vi                              |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DCMotorSim_SetInputVoltage.vi                        |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DCMotorSim_Update.vi                                 |                    |       |             |              |                |
|                              |             |            |             |           |                     |              |                |  |                    |       |             |              |                |
| DIFFERENTIAL DRIVE TRAIN SIM | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_ClampInput.vi                      |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_CreateKitbotSim_EstMass.vi         |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi      |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_CreateKitbotSim.vi                 |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetCurrentDrawAmps.vi              |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetCurrentGearing.vi               |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetDynamics.vi                     |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetHeading.vi                      |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi          |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetLeftPositionMeters.vi           |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi  |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetOutput_Single.vi                |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetPose.vi                         |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetRightCurrentDrawAmps.vi         |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetRightPositionMeters.vi          |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetState_Single.vi                 |                    |       |             |              |                |
|                              | X           | X          |             | X         |                     |              |                | DiffDriveTrainSim_GetState.vi                        |                    |       |             |              |                |
|                              |             |            |             |           |                     |              |                |  |                    |       |             |              |                |
|                              |             |            |             |           |                     |              |                |  |                    |       |             |              |                |
|                              |             |            |             |           |                     |              |                |  |                    |       |             |              |                |

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|---|---|--|---|--|--|--|--|--|--|--|--|
| X | X |  | X |  |  | DiffDriveTrainSim_KitBotWheelSize.vi       |  |  |  |  |  |
| X | X |  | X |  |  | DiffDriveTrainSim_New_Mass_MOI.vi          |  |  |  |  |  |
| X | X |  | X |  |  | DiffDriveTrainSim_New.vi                   |  |  |  |  |  |
| X | X |  | X |  |  | DiffDriveTrainSim_SetCurrentGearing.vi     |  |  |  |  |  |
| X | X |  | X |  |  | DiffDriveTrainSim_SetInputs.vi             |  |  |  |  |  |
| X | X |  | X |  |  | DiffDriveTrainSim_SetPose.vi               |  |  |  |  |  |
| X | X |  | X |  |  | DiffDriveTrainSim_SetState.vi              |  |  |  |  |  |
| X | X |  | X |  |  | DiffDriveTrainSim_ToughBoxMiniGearRatio.vi |  |  |  |  |  |
| X | X |  | X |  |  | DiffDriveTrainSim_ToughBoxMiniMotor.vi     |  |  |  |  |  |
| X | X |  | X |  |  | DiffDriveTrainSim_Update.vi                |  |  |  |  |  |
|   |   |  |   |  |  |  |  |  |  |  |  |

| ELEVATOR SIM | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                   | Function Prototype | Notes                               | Code Review | Test Program | Error Checking |
|--------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|--------------------|-------------------------------------|-------------|--------------|----------------|
|              |             |            |             |           |                     |              |                |   |                    |                                     |             |              |                |
|              | X           | X          |             | X         |                     |              |                | ElevatorSim_GetCurrentDraw.vi             |                    |                                     |             |              |                |
|              | X           | X          |             | X         |                     |              |                | ElevatorSim_GetPositionMeters.vi          |                    |                                     |             |              |                |
|              | X           | X          |             | X         |                     |              |                | ElevatorSim_GetVelocityMetersPerSecond.vi |                    |                                     |             |              |                |
|              | X           | X          |             | X         |                     |              |                | ElevatorSim_HasHitLowerLimit.vi           |                    |                                     |             |              |                |
|              | X           | X          |             | X         |                     |              |                | ElevatorSim_HasHitUpperLimit.vi           |                    |                                     |             |              |                |
|              |             |            |             |           |                     |              |                | ElevatorSim_New_LinSys_NoNoise.vi         |                    |                                     |             |              |                |
|              |             |            |             |           |                     |              |                | ElevatorSim_New_LinSys.vi                 |                    |                                     |             |              |                |
|              |             |            |             |           |                     |              |                | ElevatorSim_New_NoNoise.vi                |                    |                                     |             |              |                |
|              | X           | X          |             | X         |                     |              |                | ElevatorSim_New.vi                        |                    |                                     |             |              |                |
|              | X           | X          | X           | No        |                     |              |                | ElevatorSim_RKF45_Func.vi                 |                    |                                     |             |              |                |
|              | X           | X          |             | X         |                     |              |                | ElevatorSim_SetInputVoltage.vi            |                    |                                     |             |              |                |
|              | X           | X          |             | X         |                     |              |                | ElevatorSim_SetState.vi                   |                    |                                     |             |              |                |
|              | X           | X          | X           | X         |                     |              |                | ElevatorSim_Update.vi                     |                    | Needed because this doesn't extend. |             |              |                |
|              | X           | X          |             | X         |                     |              |                | ElevatorSim_UpdateX.vi                    |                    |                                     |             |              |                |
|              | X           | X          |             | X         |                     |              |                | ElevatorSim_WouldHitLowerLimit.vi         |                    |                                     |             |              |                |
|              | X           | X          |             | X         |                     |              |                | ElevatorSim_WouldHitUpperLimit.vi         |                    |                                     |             |              |                |

| FLYWHEEL SIM | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                    | Function Prototype | Notes  | Code Review | Test Program | Error Checking |
|--------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--|--------------------|--------|-------------|--------------|----------------|
|              |             |            |             |           |                     |              |                |  |                    |        |             |              |                |
|              | X           | X          |             | X         |                     |              |                | FlyWheelSim_GetAngularVelocityRadPerSec.vi |                    |        |             |              |                |
|              | X           | X          |             | X         |                     |              |                | FlyWheelSim_GetAngularVelocityRPM.vi       |                    |        |             |              |                |
|              | X           | X          |             | X         |                     |              |                | FlyWheelSim_GetCurrentDrawAmps             |                    |        |             |              |                |
|              |             |            |             |           |                     |              |                | FlyWheelSim_New_LinSys                     |                    | Future |             |              |                |
|              |             |            |             |           |                     |              |                | FlyWheelSim_New_LinSys_MOI_NoNoise         |                    | Future |             |              |                |
|              |             |            |             |           |                     |              |                | FlyWheelSim_New_LinSys_NoNoise             |                    | Future |             |              |                |
|              | X           | X          |             | X         |                     |              |                | FlyWheelSim_New_MOI.vi                     |                    |        |             |              |                |
|              | X           | X          |             | X         |                     |              |                | FlyWheelSim_SetInput.vi                    |                    |        |             |              |                |
|              | X           | X          |             | X         |                     |              |                | FlyWheelSim_SetState.vi                    |                    |        |             |              |                |
|              | X           | X          |             | X         |                     |              |                | FlyWheelSim_Update.vi                      |                    |        |             |              |                |
|              |             |            |             |           |                     |              |                |  |                    |        |             |              |                |

| LINEAR SYSTEM SIM | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                               | Function Prototype | Notes             | Code Review | Test Program | Error Checking |
|-------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------------------------------------|--------------------|-------------------|-------------|--------------|----------------|
|                   |             |            |             |           |                     |              |                |                                       |                    |                   |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | LinearSystemSim_ClampInput.vi         |                    |                   |             |              |                |
|                   |             |            |             |           |                     |              |                | LinearSystemSim_GetCurrentDrawAmps.vi |                    | DONT IMPLEMENT... |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | LinearSystemSim_GetOutput_Single.vi   |                    |                   |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | LinearSystemSim_GetOutput.vi          |                    |                   |             |              |                |
|                   | X           | X          |             | X         |                     |              |                | LinearSystemSim_New                   |                    |                   |             |              |                |
|                   |             |            |             |           |                     |              |                | LinearSystemSim_New_NoNoise.vi        |                    |                   |             |              |                |



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|---|---|---|----|--|--|------------------------------------|--|---------------------|--|--|--|
| X | X |   | X  |  |  | LinearSystemSim_SetInput_Array.vi  |  | Doesn't use clamp ? |  |  |  |
| X | X |   | X  |  |  | LinearSystemSim_SetInput_Single.vi |  |                     |  |  |  |
| X | X |   | X  |  |  | LinearSystemSim_SetInput.vi        |  |                     |  |  |  |
| X | X |   | X  |  |  | LinearSystemSim_Setstate.vi        |  |                     |  |  |  |
| X | X |   | X  |  |  | LinearSystemSim_Update.vi          |  |                     |  |  |  |
| X | X |   | No |  |  | LinearSystemSim_UpdateX.vi         |  |                     |  |  |  |
| X | X | X | No |  |  | LinearSystemSim_UpdateY.vi         |  |                     |  |  |  |

|                      | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                               | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|----------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------------------------------------|--------------------|-------|-------------|--------------|----------------|
| SINGLE JOINT ARM SIM | X           | X          |             | X         |                     |              |                | SngJntArmSim_EsitmateMOI.vi           |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_GetAngleRads.vi          |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_GetCurrentDraw.vi        |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_GetVelocityRadsPerSec.vi |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_HasHitLowerLimit.vi      |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_HasHitUpperLimit.vi      |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_New.vi                   |                    |       |             |              |                |
|                      | X           | X          |             | No        |                     |              |                | SngJntArmSim_Rkf45_Func.vi            |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_SetInputVoltage.vi       |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_SetState.vi              |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_Update.vi                |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_UpdateX.vi               |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_WouldHitLowerLimit.vi    |                    |       |             |              |                |
|                      | X           | X          |             | X         |                     |              |                | SngJntArmSim_WouldHitUpperLimit.vi    |                    |       |             |              |                |

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MATRIX UTILITIES

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|             | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name              | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|----------------------|--------------------|-------|-------------|--------------|----------------|
| MAT BUILDER | X           | X          |             | X         | SI                  |              |                | MatBuilder_Create.vi |                    |       |             |              |                |
|             | X           | X          |             | X         | SI                  |              |                | MatBuilder_Fill.vi   |                    |       |             |              |                |

|        | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                         | Function Prototype | Notes                | Code Review | Test Program | Error Checking |
|--------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------------------------------|--------------------|----------------------|-------------|--------------|----------------|
| MATRIX | X           | X          |             | X         | SI                  |              |                | Matrix_AssignBlock.vi           |                    |                      |             |              |                |
|        | X           | X          |             | X         | SI                  |              |                | Matrix_Block.vi                 |                    |                      |             |              |                |
|        |             |            |             |           |                     |              |                | Matrix_ChangeBoundsUnchecked.vi |                    |                      |             |              |                |
|        | X           | X          |             | X         | SI                  |              |                | Matrix_Create.vi                |                    |                      |             |              |                |
|        |             |            |             |           |                     |              |                | Matrix_Det.vi                   |                    |                      |             |              |                |
|        | X           | X          |             | X         | SI                  |              |                | Matrix_Diag.vi                  |                    |                      |             |              |                |
|        |             |            |             |           |                     |              |                | Matrix_Div_Scalar.vi            |                    | labview has function |             |              |                |
|        |             |            |             |           |                     |              |                | Matrix_ElementPower.vi          |                    |                      |             |              |                |
|        | X           | X          |             | X         | SI                  |              |                | Matrix_ElementSum.vi            |                    |                      |             |              |                |
|        |             |            |             |           |                     |              |                | Matrix_ElementTimes.vi          |                    |                      |             |              |                |
|        |             |            |             |           |                     |              |                | Matrix_Equals.vi                |                    |                      |             |              |                |
|        | X           | X          |             | X         | I                   |              |                | Matrix_Exp.vi                   |                    |                      |             |              |                |
|        | X           | X          |             | X         | SI                  |              |                | Matrix_ExtractColumnVector.vi   |                    |                      |             |              |                |
|        | X           | X          |             | X         | SI                  |              |                | Matrix_ExtractFrom.vi           |                    |                      |             |              |                |
|        |             |            |             |           |                     |              |                | Matrix_ExtractMatrix.vi         |                    |                      |             |              |                |
|        | X           | X          |             | X         | SI                  |              |                | Matrix_ExtractRowVector.vi      |                    |                      |             |              |                |





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|---|---|---|---|----|--|--|----------------------------|--|--|--|--|--|
|   |   |   |   |    |  |  | VecBuilder_10x1Fill.vi     |  |  |  |  |  |
| X | X | X | X | SI |  |  | VecBuilder_ArrayBy1Fill.vi |  |  |  |  |  |
|   |   |   |   |    |  |  |                            |  |  |  |  |  |

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| VECTOR | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name        | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|--------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|----------------|--------------------|-------|-------------|--------------|----------------|
|        | X           | X          |             | X         | SI                  |              |                | Vector_Dot.vi  |                    |       |             |              |                |
|        | X           | X          |             | X         | SI                  |              |                | Vector_Norm.vi |                    |       |             |              |                |
|        |             |            |             |           |                     |              |                |                |                    |       |             |              |                |

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MATH

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| ANGLE STATISTICS | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                  | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--|--------------------|-------|-------------|--------------|----------------|
|                  | X           | X          | X           | X         | X                   |              |                | AngleStats_AngleAdd_CallbackHelp.vi      |                    |       |             |              |                |
|                  | X           | X          |             | X         | I                   | X            |                | AngleStats_AngleAdd.vi                   |                    |       |             |              |                |
|                  | X           | X          | X           | X         | X                   |              |                | AngleStats_AngleMean_CallbackHelp.vi     |                    |       |             |              |                |
|                  | X           | X          |             | X         | I                   | X            |                | AngleStats_AngleMean.vi                  |                    |       |             |              |                |
|                  | X           | X          | X           | X         | X                   |              |                | AngleStats_AngleResidual_CallbackHelp.vi |                    |       |             |              |                |
|                  | X           | X          |             | X         | I                   | X            |                | AngleStats_AngleResidual.vi              |                    |       |             |              |                |
|                  |             |            |             |           |                     |              |                |  |                    |       |             |              |                |

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| MATH UTILITY | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                   | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|--------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------------------------|--------------------|-------|-------------|--------------|----------------|
|              | X           | X          |             | X         | SI                  |              |                | MathUtil_AngleModulus.vi  |                    |       |             |              |                |
|              | X           | X          |             | X         | SI                  |              |                | MathUtil_ApplyDeadband.vi |                    |       |             |              |                |
|              | X           | X          |             | X         | SI                  |              |                | MathUtil_Clamp_Int.vi     |                    |       |             |              |                |
|              | X           | X          |             | X         | SI                  |              |                | MathUtil_Clamp.vi         |                    |       |             |              |                |
|              | X           | X          |             | X         | SI                  |              |                | MathUtil_InputModulus.vi  |                    |       |             |              |                |
|              | X           | X          |             | X         | SI                  |              |                | MathUtil_Interpolate.vi   |                    |       |             |              |                |
|              |             |            |             |           |                     |              |                |                           |                    |       |             |              |                |

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| MERWE SCALED SIGMA POINTS | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                         | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------------------------------|--------------------|-------|-------------|--------------|----------------|
|                           | X           | X          |             | X         | I                   |              |                | MerweScSigPts_ComputeWeights.vi |                    |       |             |              |                |
|                           | X           | X          |             | X         | SI                  |              |                | MerweScSigPts_GetNumSigmas.vi   |                    |       |             |              |                |
|                           | X           | X          |             | X         | SI                  |              |                | MerweScSigPts_GetWc_Single.vi   |                    |       |             |              |                |
|                           | X           | X          |             | X         | SI                  |              |                | MerweScSigPts_GetWc.vi          |                    |       |             |              |                |
|                           | X           | X          |             | X         | SI                  |              |                | MerweScSigPts_GetWm_Single.vi   |                    |       |             |              |                |
|                           | X           | X          |             | X         | SI                  |              |                | MerweScSigPts_GetWm.vi          |                    |       |             |              |                |
|                           | X           | X          |             | X         | I                   |              |                | MerweScSigPts_New_Default.vi    |                    |       |             |              |                |
|                           | X           | X          |             | X         | I                   |              |                | MerweScSigPts_New.vi            |                    |       |             |              |                |
|                           | X           | X          |             | X         | I                   |              |                | MerweScSigPts_SigmaPoints.vi    |                    |       |             |              |                |
|                           |             |            |             |           |                     |              |                |                                 |                    |       |             |              |                |

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|                       | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                         | Function Prototype | Notes  | Code Review | Test Program | Error Checking |
|-----------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---------------------------------|--------------------|--|-------------|--------------|----------------|
| NUMERICAL INTEGRATION | X           | X          |             | X         | I                   |              |                | NumIntegrate_Func_Ax_Bu_K.vi    |                    | NOT USED. Should this be used or abandoned???  |             |              |                |
|                       | X           | X          |             | X         |                     |              |                | NumIntegrate_Rk4_Dbl_X_U.vi     |                    |  |             |              |                |
|                       | X           | X          |             | X         |                     |              |                | NumIntegrate_Rk4_Dbl_X.vi       |                    |  |             |              |                |
|                       | X           | X          |             | X         |                     |              |                | NumIntegrate_Rk4_Mat_X_U.vi     |                    |  |             |              |                |
|                       | X           | X          |             | X         |                     |              |                | NumIntegrate_Rk4_Mat_X.vi       |                    |  |             |              |                |
|                       | X           | X          |             | No        | SI                  |              |                | NumIntegrate_Rkdp_Func_A.vi     |                    |  |             |              |                |
|                       | X           | X          |             | No        | SI                  |              |                | NumIntegrate_Rkdp_Func_B1.vi    |                    |  |             |              |                |
|                       | X           | X          |             | No        | SI                  |              |                | NumIntegrate_Rkdp_Func_B1B2.vi  |                    |  |             |              |                |
|                       | X           | X          |             | No        | SI                  |              |                | NumIntegrate_Rkdp_Func_B2.vi    |                    |  |             |              |                |
|                       | X           | X          |             | No        | I                   |              |                | Numintegrate_Rkdp_Impl.vi       |                    |  |             |              |                |
|                       | X           | X          |             | X         |                     |              |                | NumIntegrate_RKDP_Mat_X_U.vi    |                    | New replacement for RKF45  |             |              |                |
|                       | X           | X          |             | No        | SI                  |              |                | NumIntegrate_Rkf45_Func_A.vi    |                    |  |             |              |                |
|                       | X           | X          |             | No        | SI                  |              |                | NumIntegrate_Rkf45_Func_B1.vi   |                    |  |             |              |                |
|                       | X           | X          |             | No        | SI                  |              |                | NumIntegrate_Rkf45_Func_B1B2.vi |                    |  |             |              |                |
|                       | X           | X          |             | No        | SI                  |              |                | NumIntegrate_Rkf45_Func_B2.vi   |                    |  |             |              |                |
|                       |             |            |             |           |                     |              |                | NumIntegrate_RKf45_Func_Bs.vi   |                    | Removed. Replaced with newer functions.  |             |              |                |
|                       |             |            |             |           |                     |              |                | NumIntegrate_RKf45_Func_Ch.vi   |                    | Removed. Replaced with newer functions.  |             |              |                |
|                       |             |            |             |           |                     |              |                | NumIntegrate_RKf45_Func_Ct.vi   |                    | Removed. Replaced with newer functions.  |             |              |                |
|                       | X           | X          |             | No        | I                   |              |                | NumIntegrate_Rkf45_Impl.vi      |                    |  |             |              |                |
|                       | X           | X          |             | X         |                     |              |                | NumIntegrate_Rkf45_Mat_X_U.vi   |                    | Note that this Feinberg method has been changed and a Dormand Price method has been implemented.... TODO |             |              |                |
|                       |             |            |             |           |                     |              |                | NumIntegrate_RKf45_New.vi       |                    | Removed. Never used.   |             |              |                |
|                       | X           | X          | X           | X         | SI                  |              |                | NumIntegrate_Trap_Dbl.vi        |                    |  |             |              |                |
|                       | X           | X          | X           | X         | I                   |              |                | NumIntegrate_Trap_Mat.vi        |                    |  |             |              |                |

|                          | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                              | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|--------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--------------------------------------|--------------------|-------|-------------|--------------|----------------|
| RUNGE KUTTA TIME VARYING | X           | X          |             | No        |                     |              |                | RungeKuttaTimeVarying_RK4_Mat_T_Y.vi |                    |       |             |              |                |
|                          |             |            |             |           |                     |              |                |                                      |                    |       |             |              |                |

|                    | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name          | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|--------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|------------------|--------------------|-------|-------------|--------------|----------------|
| NUMERICAL JACOBIAN | X           | X          |             | X         |                     |              |                | NumJacobian_U.vi |                    |       |             |              |                |
|                    | X           | X          |             | X         |                     |              |                | NumJacobian_X.vi |                    |       |             |              |                |
|                    |             |            |             |           |                     |              |                |                  |                    |       |             |              |                |

|         | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                       | Function Prototype | Notes                                  | Code Review | Test Program | Error Checking |
|---------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|-------------------------------|--------------------|--|-------------|--------------|----------------|
| RICCATI | X           | X          |             | X         |                     |              |                | Riccati_Check_Detectable.vi   |                    | Routine exists, it is just a shell     |             |              |                |
|         | X           | X          |             | X         |                     |              |                | Riccati_Check_Stabilizable.vi |                    | Not really done !!!                    |             |              |                |
|         |             |            |             |           |                     |              |                | Riccati_DARE_Choose.vi        |                    | Intended to allow DARE method testing. |             |              |                |

|   |   |   |   |  |   |  |                                |  |  |  |  |  |
|---|---|---|---|--|---|--|--------------------------------|--|--|--|--|--|
| X | X | X | X |  | X |  | Riccati_DARE_Iterate.vi        |  |  |  |  |  |
| X | X | X | X |  | X |  | Riccati_DARE_StructDoubling.vi |  |  |  |  |  |
| X | X |   | X |  |   |  | Riccati_DARE_N.vi              |  |  |  |  |  |
| X | X |   | X |  | X |  | Riccati_DARE.vi                |  |  |  |  |  |
| X | X |   | X |  |   |  | Riccati_Input_Check.vi         |  |  |  |  |  |

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VISION

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|                           | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                     | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|-------------|--------------|----------------|
| COMPUTER VISION UTILITIES | X           | X          |             | X         |                     |              |                | CompVisionUtil_CalculateDistanceToTarget.vi |                    |       |             |              |                |
|                           | X           | X          |             | X         |                     |              |                | CompVisionUtil_EstimateCameraToTarget.vi    |                    |       |             |              |                |
|                           | X           | X          |             | X         |                     |              |                | CompVisionUtil_EstimateFieldToCamera.vi     |                    |       |             |              |                |
|                           | X           | X          |             | X         |                     |              |                | CompVisionUtil_EstimateFieldToRobot.vi      |                    |       |             |              |                |
|                           | X           | X          |             | X         |                     |              |                | CompVisionUtil_EstimateFieldToRobot_Alt.vi  |                    |       |             |              |                |
|                           | X           | X          |             | X         |                     |              |                | CompVisionUtil_ObjectToRobotPose.vi         |                    |       |             |              |                |
|                           |             |            |             |           |                     |              |                |   |                    |       |             |              |                |

|           | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name            | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-----------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--------------------|--------------------|-------|-------------|--------------|----------------|
| APRIL TAG | X           | X          |             | X         | SI                  |              |                | AprilTag_Equals.vi |                    |       |             |              |                |
|           | X           | X          | X           | X         | SI                  |              |                | AprilTag_GetAll.vi |                    |       |             |              |                |
|           | X           | X          |             | X         | SI                  |              |                | AprilTag_New.vi    |                    |       |             |              |                |
|           |             |            |             |           |                     |              |                |                    |                    |       |             |              |                |

|                        | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                   | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|-------------|--------------|----------------|
| APRIL TAG FIELD LAYOUT | X           | X          |             | X         | SI                  |              |                | AprilTagFieldLayout_GetField.vi           |                    |       |             |              |                |
|                        | X           | X          |             | X         | SI                  |              |                | AprilTagFieldLayout_GetOriginPosition.vi  |                    |       |             |              |                |
|                        | X           | X          |             | X         | SI                  |              |                | AprilTagFieldLayout_GetTagPose.vi         |                    |       |             |              |                |
|                        | X           | X          |             | X         | SI                  |              |                | AprilTagFieldLayout_GetTags.vi            |                    |       |             |              |                |
|                        | X           | X          |             | X         | SI                  |              |                | AprilTagFieldLayout_New.vi                |                    |       |             |              |                |
|                        | X           | X          |             | X         | SI                  |              |                | AprilTagFieldLayout_New2022.vi            |                    |       |             |              |                |
|                        | X           | X          |             | X         | SI                  |              |                | AprilTagFieldLayout_New2023.vi            |                    |       |             |              |                |
|                        | X           | X          |             | X         | SI                  |              |                | AprilTagFieldLayout_NewSelect.vi          |                    |       |             |              |                |
|                        | X           | X          |             | X         | SI                  |              |                | AprilTagFieldLayout_SetOrigin.vi          |                    |       |             |              |                |
|                        | X           | X          |             | X         | SI                  |              |                | AprilTagFieldLayout_SetOrigin_Position.vi |                    |       |             |              |                |

|                         | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                              | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-------------------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--------------------------------------|--------------------|-------|-------------|--------------|----------------|
| APRIL TAG POSE ESTIMATE | X           | X          |             | X         | SI                  |              |                | AprilTagPoseEstimate_GetAll.vi       |                    |       |             |              |                |
|                         | X           | X          |             | X         | SI                  |              |                | AprilTagPoseEstimate_GetAmbiguity.vi |                    |       |             |              |                |
|                         | X           | X          |             | X         | SI                  |              |                | AprilTagPoseEstimate_New.vi          |                    |       |             |              |                |
|                         |             |            |             |           |                     |              |                |                                      |                    |       |             |              |                |

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COMMUNICATIONS

|             | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name               | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-------------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|-----------------------|--------------------|-------|-------------|--------------|----------------|
| NETWORK UDP | X           | X          | X           | X         | SI                  |              |                | NetworkUDP_Close.vi   |                    |       |             |              |                |
|             | X           | X          | X           | X         | I                   |              |                | NetworkUDP_Receive.vi |                    |       |             |              |                |
|             | X           | X          | X           | X         | I                   |              |                | NetworkUDP_Send.vi    |                    |       |             |              |                |
|             |             |            |             |           |                     |              |                |                       |                    |       |             |              |                |

TYPE DEFINITIONS

| TypeDef | Implemented | Documented | Not WPI LIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name                                      | Function Prototype | Notes  | Code Review | Test Program | Error Checking |
|---------|-------------|------------|-------------|-----------|---------------------|--------------|----------------|--|--------------------|--|-------------|--------------|----------------|
|         | Z           | Z          | X           | X         | N/A                 |              |                | AprilTag.ctf                                 |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | AprilTagFieldLayout.ctf                      |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | AprilTagFieldLayoutOriginPosition_ENUM.ctf   |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | AprilTagFields_ENUM.ctf                      |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | AprilTagPoseEstimate.ctf                     |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | ARM_FF.CTL                                   |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | BANG_BANG.CTL                                |                    |  |             |              |                |
|         | I           |            | X           | X         | N/A                 |              |                | BIcon-Matrix_FUNC_TYPE.CTL                   |                    | NOT USED. Should this be deleted or abandoned??? |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | CALLBACK_FUNC_TYPE.CTL                       |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | CHASSIS_SPEEDS.CTL                           |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | CONSTRAINED_STATE.CTL                        |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | COORDINATE_AXIS.CTL                          |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | COORDINATE_SYSTEM.CTL                        |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DCMOTOR_SIM.CTL                              |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DCMOTOR_TYPES_ENUM.CTL                       |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DCMOTOR.CTL                                  |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DEBOUNCER_TYPE_ENUM.ctf                      |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DEBOUNCER.CTL                                |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DIFF_DRIVE_ACCEL_LIMIT.CTL                   |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DIFF_DRIVE_KINEMATICS.CTL                    |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctf         |                    |  |             |              |                |
|         | Z           | Z          | X           |           | N/A                 |              |                | DIFF_DRIVE_ODOM2.ctf                         |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DIFF_DRIVE_Pose_EST.ctf                      |                    |  |             |              |                |
|         | Z           |            | X           |           | N/A                 |              |                | DIFF_DRIVE_POSE_EST2.ctf                     |                    |  |             |              |                |
|         | Z           |            | X           |           | N/A                 |              |                | DIFF_DRIVE_POSE_EST2_INTERP_RECORD.CTL       |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctf  |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctf |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DIFF_DRIVE_TRAIN_SIM_STATE_ENUM.CTL          |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | DIFF_DRIVE_TRAIN_SIM.ctf                     |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | NA                  |              |                | DISPLAY_WAYPOINT.ctf                         |                    | Was UTIL_WAYPOINT.VI                             |             |              |                |
|         | Z           | Z          | X           | X         | NA                  |              |                | DISPLAY_WEIGHTED_WAYPOINT.ctf                |                    | New V1.5. was UTIL_WEIGHTED_WAYPOINT.VI          |             |              |                |
|         |             |            |             |           |                     |              |                |  |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | ELEV_FF.CTL                                  |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | ELEVATOR_SIM.CTL                             |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL       |                    |  |             |              |                |
|         | Z           |            | X           | X         | N/A                 |              |                | EXTENDED_KALMAN_FILTER.CTL                   |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | FLYWHEEL_SIM.ctf                             |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | FUNCTION_GENERATOR_MATRIX.ctf                |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | FUNCTION_GENERATOR.ctf                       |                    |  |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | HOLONOMIC_DRV_CTRL.CTL                       |                    | New 1/26/21                                      |             |              |                |
|         | Z           | Z          | X           | X         | N/A                 |              |                | KALMAN_FILTER_LATENCY_COMP_FUNC_GROUP.CTL    |                    |  |             |              |                |

WPI Lib LabVIEW Math Library – VI Implementation List

Revision 3.X 1/11/2023 – renamed library. Added additional documentation.

|     |   |     |   |     |  |   |  |                                    |
|-----|---|-----|---|-----|--|---|--|------------------------------------|
| Z   | Z | X   | X | N/A |  | KALMAN_FILTER_LATENCY_COMP.CTL              |  |                                    |
| Z   | Z | X   | X | N/A |  | KALMAN_FILTER.ctf                           |  |                                    |
| Z   | Z | X   | X | N/A |  | LINEAR_FILTER.CTL                           |  |                                    |
| Z   | Z | X   | X | N/A |  | LINEAR_PLANT_INV_FF.ctf                     |  |                                    |
| Z   | Z | X   | X | N/A |  | LINEAR_QUADRATIC_REGULATOR.ctf              |  |                                    |
| Z   | Z | X   | X | N/A |  | LINEAR_SYSTEM_LOOP.ctf                      |  |                                    |
| Z   | Z | X   | X | N/A |  | LINEAR_SYSTEM_SIM.ctf                       |  |                                    |
| Z   | Z | X   | X | N/A |  | LINEAR_SYSTEM.ctf                           |  |                                    |
| Z   | Z | X   | X | N/A |  | LTV_DIFF_DRIVE_CTRL_STATE_ENUM.ctf          |  |                                    |
| Z   | Z | X   | X | N/A |  | LTV_DIFF_DRIVE_CTRL.ctf                     |  |                                    |
| N/A |   | N/A |   | N/A |  | LTV_UNICYCLE_CONTROLLER_INPUT_ENUM.ctf      |  | OBSOLETE – Removed                 |
| Z   | Z | X   | X | N/A |  | LTV_UNICYCLE_CONTROLLER_STATE_ENUM.ctf      |  |                                    |
| Z   | Z | X   | X | N/A |  | LTV_UNICYCLE_CONTROLLER.CTL                 |  |                                    |
| Z   | Z | X   | X | N/A |  | MECA_DRIVE_KINEMATICS.CTL                   |  |                                    |
| Z   | Z | X   | X | N/A |  | MECA_DRIVE_ODOMETRY.CTL                     |  |                                    |
| Z   | Z | X   | X | N/A |  | MECA_DRIVE_POSE_EST.CTL                     |  |                                    |
| Z   | Z | X   | X | N/A |  | MECA_WHEEL_POSITIONS.CTL                    |  |                                    |
| Z   | Z | X   | X | N/A |  | MECA_WHEEL_SPEEDS.CTL                       |  |                                    |
| Z   | Z | X   | X | N/A |  | MEDIAN_FILTER.CTL                           |  |                                    |
| Z   | Z | X   | X | N/A |  | MERWE_SCALED_SIGMA_PTS.ctf                  |  |                                    |
| Z   | Z | X   | X | N/A |  | OBSERVER_SNAP_LIST_ITEM.CTL                 |  |                                    |
| Z   | Z | X   | X | N/A |  | OBSERVER_SNAPSHOT.CTL                       |  |                                    |
| Z   | Z | X   | X | N/A |  | PARAM_STACK_ITEM.CTL                        |  |                                    |
| Z   | Z | X   | X | N/A |  | PARAM_STACK.CTL                             |  |                                    |
| Z   | Z | X   | X | N/A |  | PID_ADV_LIMITS.CTL                          |  |                                    |
| Z   | Z | X   | X | N/A |  | PID_ADV_TUNING.CTL                          |  |                                    |
| Z   | Z | X   | X | N/A |  | PID_CONTROLLER.CTL                          |  |                                    |
| Z   | Z | X   | X | N/A |  | PID_ERROR_TOLERANCE.CTL                     |  |                                    |
| Z   | Z | X   | X | N/A |  | PID_INPUT_LIMITS.CTL                        |  |                                    |
| Z   | Z | X   | X | N/A |  | PID_TUNING.CTL                              |  |                                    |
| Z   | Z | X   | X | N/A |  | POSE2D.CTL                                  |  |                                    |
| Z   | Z | X   | X | N/A |  | POSE3D.CTL                                  |  |                                    |
| Z   | Z | X   | X | N/A |  | POSEwCURVATURE.CTL                          |  |                                    |
| Z   | Z | X   | X | N/A |  | PROFIED_PID_CONTROLLER.CTL                  |  |                                    |
| Z   | Z | X   | X | N/A |  | QUATERNION.CTL                              |  |                                    |
| Z   | Z | X   | X | N/A |  | RAMSETE_EXE_TUNING.CTL                      |  |                                    |
| Z   | Z | X   | X | N/A |  | RAMSETE.CTL                                 |  |                                    |
| Z   | Z | X   | X | N/A |  | ROTATION2D.CTL                              |  |                                    |
| Z   | Z | X   | X | N/A |  | ROTATION3D.CTL                              |  |                                    |
| Z   | Z | X   |   | N/A |  | SIMPLE_MOTOR_FF_KA_TUNE_PARAMS.CTL          |  |                                    |
| Z   | Z | X   | X | N/A |  | SIMPLE_MOTOR_FF.CTL                         |  |                                    |
| Z   | Z | X   | X | N/A |  | SINGLE_JOINT_ARM_SIM.CTL                    |  |                                    |
| Z   | Z | X   | X | N/A |  | SLEW_RATE_LIMITER.CTL                       |  |                                    |
| Z   | Z | X   | X | N/A |  | SPLINE_CTRL_VECTOR.CTL                      |  |                                    |
| Z   | Z | X   | X | N/A |  | SPLINE.CTL                                  |  |                                    |
| Z   | Z | X   | X | N/A |  | SWERVE_DRIVE_KINEMATICS.CTL                 |  |                                    |
| Z   | Z | X   | X | N/A |  | SWERVE_DRIVE_MODULE_POSITION.CTL            |  |                                    |
| Z   | Z | X   | X | N/A |  | SWERVE_DRIVE_MODULE_STATE.CTL               |  |                                    |
| Z   | Z | X   | X | N/A |  | SWERVE_DRIVE_ODOMETRY.CTL                   |  |                                    |
| Z   | Z | X   | X | N/A |  | SWERVE_DRIVE_Pose_EST.CTL                   |  |                                    |
| Z   | Z | X   | X | N/A |  | TIME_INTERPOLATABLE_BOOLEAN.CTL             |  |                                    |
| Z   | Z | X   | X | N/A |  | TIME_INTERPOLATABLE_DOUBLE.CTL              |  |                                    |
| Z   | Z | X   | X | N/A |  | TIME_INTERPOLATABLE_POSE2D.CTL              |  |                                    |
| Z   | Z | X   | X | N/A |  | TIME_INTERPOLATABLE_ROTATION2D.CTL          |  |                                    |
| Z   | Z | X   |   | N/A |  | TIME_INTERPOLATABLE_VARIANT.CTL             |  |                                    |
| Z   | Z | X   | X | N/A |  | TIMER.CTL                                   |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJ_CONFIG.CTL                             |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL       |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJ_CONSTRAINT_DIIF_DRIVE_KINEMATICS.CTL   |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJ_CONSTRAINT_DIIF_DRIVE_VOLTAGE.CTL      |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJ_CONSTRAINT_ELLIP_REGION.CTL            |  |                                    |
| I   |   |     | X | N/A |  | TRAJ_CONSTRAINT_JERK.CTL                    |  | Routine exists, it is just a shell |
| Z   | Z | X   | X | N/A |  | TRAJ_CONSTRAINT_MAX_VELOCITY.CTL            |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL   |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJ_CONSTRAINT_MINMAX.CTL                  |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJ_CONSTRAINT_RECT_REGION.CTL             |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJ_STATE.CTL                              |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJECTORY_SPLINE_TYPE_ENUM.CTL             |  |                                    |
| Z   | Z | X   | X | N/A |  | TRAJECTORY.CTL                              |  |                                    |

## WPILib LabVIEW Math Library – VI Implementation List

Revision 3.X 1/11/2023 – renamed library. Added additional documentation.

| Configuration: |   |     |   |     |  |   |  |  |                   |
|----------------|---|-----|---|-----|--|---|--|--|-------------------|
| Z              | Z | X   | X | N/A |  | TRANSFORM2D.CTL                         |  |  |                   |
| Z              | Z | X   | X | N/A |  | TRANSFORM3D.CTL                         |  |  |                   |
| Z              | Z | X   | X | N/A |  | TRANSLATION2D.CTL                       |  |  |                   |
| Z              | Z | X   | X | N/A |  | TRANSLATION3D.CTL                       |  |  |                   |
| Z              | Z | X   | X | N/A |  | TRAPEZOID_PROFILE_CONSTRAINT.CTL        |  |  |                   |
| Z              | Z | X   | X | N/A |  | TRAPEZOID_PROFILE_STATE.CTL             |  |  |                   |
| Z              | Z | X   | X | N/A |  | TRAPEZOID_PROFILE.CTL                   |  |  |                   |
| Z              | Z | X   | X | N/A |  | TWIST2D.CTL                             |  |  |                   |
| Z              | Z | X   | X | N/A |  | TWIST3D.CTL                             |  |  |                   |
| Z              | Z | X   | X | N/A |  | UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL |  |  |                   |
| Z              | Z | X   | X | N/A |  | UNSCENTED_KALMAN_FILTER.ctf             |  |  |                   |
| Z              | Z | X   | X | N/A |  | UNSCENTED_KALMAN_NEW_FUNC_GROUP.CTL     |  |  |                   |
| Z              | Z | X   | X | N/A |  | UTIL_PATHFINDER_CONFIG.CTL              |  |  |                   |
| N/A            |   | N/A |   | N/A |  | WAYPOINTS.CTL                           |  |  | Delete – obsolete |
| Z              | Z | X   | X | NA  |  | WEIGHTED_WAYPOINT.CTL                   |  |  | New V1.5          |
| N/A            |   | N/A |   | N/A |  | X_Y_HEADINGS.CTL                        |  |  | Delete – obsolete |
| Z              | Z | X   | X | N/A |  | X_Y_PAIR.CTL                            |  |  |                   |

[illegible]