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...

VI / CTL Totals
VI Total (X)
CTL Total (Z)
VI Shell Total (/)
TRL Shell Total (\)

VI Total (X)
CTL Total (Z)
VI Shell Total (/)
TRL Shell Total (\)

VI Total (X)
CTL Total (Z)
VI Shell Total (/)
TRL Shell Total (\)

Doc completed Pct 84.38% Optimization Pct 41.08%

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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| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
| LINEAR FILTER | | X | | X | SI | | | LinearFilter Calculate.vi | | |
| | X | X | X | X | Χ | | | LinearFilter_CutoffFrequency.vi | | |
| | X | Χ | X | X | I | | X | LinearFilter_Execute.vi | | Labview style helper |
| | X | Χ | | X | Χ | | | LinearFilter_HighPass.vi | | |
| | Χ | | X | Χ | Χ | | | LinearFilter_HighPassBW1.vi | | |
| | X | X | Χ | Χ | Χ | | | LinearFilter_HighPassBW2.vi | | |
| | X | X | Χ | Χ | Χ | | | LinearFilter_LowPassBW1.vi | | |
| | X | X | Χ | X | Χ | | | LinearFilter_LowPassBW2.vi | | |
| | X | X | | X | X | | | LinearFilter_MovingAverage.vi | | |
| | Χ | X | | X | 1 | | | LinearFilter_New.vi | | |
| | X | X | | X | SI | | | LinearFilter_Reset.vi | | |
| | X | X | X | X | SI | | | LinearFilter_ResetToValue.vi | | |
| | X | X | | X | X | | | LinearFilter_SinglePoleIIR.vi | | |
| | X | Χ | Χ | Χ | Χ | | | LinearFilter_TimeConst.vi | | |
| | | | | | Ø | | | | | |
| | | | | | Execution Optimized | | | | | |
| | | | | | ţį | | Sample Program | | | |
| | þe | Ď | m | | Ö | <u>e</u> | gc | | | |
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| | | | ž | | | ٦ | လိ | VI Name | Function Prototype | Notes |
| MEDIAN FILTER | | X | | X | Χ | | | MedianFilter_Calculate.vi | | |
| | X | X | X | X | 1 | | X | MedianFilter_Execute.vi | | Labview style helper |
| | X | X | | X | SI | | | MedianFilter_New.vi | | |
| | X | X | 14 | X | SI | | | MedianFilter_Reset.vi | | |
| | X | X | X | X | SI | | | MedianFilter_ResetToValue.vi | | |

| Revision 2.X | 11/12/2021 – State Space Items – (This list is still missing one VI) Added additional columns for test and sample. |
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| | e e |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimize | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|------------------|-------------|------------|------------|-----------|--------------------|--------------|----------------|-----------------------------------|--------------------|----------------------|
| SLEW RATE FILTER | X | X | | X | 1 | | | SlewRateLimiter_Calculate.vi | | |
| | X | X | X | X | SI | | | SlewRateLimiter_Close.vi | | |
| | X | X | X | X | 1 | | X | SlewRateLimiter_Execute.vi | | Labview style helper |
| | X | X | X | X | SI | | | SlewRateLimiter_GetRate.vi | | |
| | X | X | | X | 1 | | | SlewRateLimiter_New.vi | | |
| | X | X | | X | 1 | | | SlewRateLimiter_NewInitialZero.vi | | |
| | X | X | | X | 1 | | | SlewRateLimiter_Reset.vi | | |
| | X | X | | X | SI | | | SlewRateLimiter_SetRate.vi | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimize | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|-------|-------------|------------|------------|-----------|--------------------|--------------|----------------|------------------------------|--------------------|-------------------------|
| TIMER | | X | Χ | X | | | | Timer_Close.vi | | releases semaphore |
| | Χ | X | | X | | | Χ | Timer_Get.vi | | |
| | Χ | X | X | X | | | | Timer_GetAndReset.vi | | |
| | Χ | X | X | No | | | | Timer_GetInternal.vi | | Internal (private) only |
| | X | X | | X | | | X | Timer_HasPeriodPassed.vi | | |
| | X | X | X | X | | | Χ | Timer_HasPeriodPassedOnce.vi | | |
| | Χ | X | | X | | | | Timer_New.vi | | |
| | X | X | | X | | | X | Timer_Reset.vi | | |
| | X | X | X | No | | | | Timer_ResetInternal | | Internal (private) only |
| | Χ | X | | X | | | | Timer_Start.vi | | |
| | X | X | | X | | | X | Timer_Stop.vi | | |
| | Χ | X | X | No | | | | Timer_StopInternal.vi | | Internal (private) only |

'===== CONTROLLER '======

| ADM CC | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|--------|-------------|------------|------------|-----------|---------------------|--------------|----------------|--------------------------------|--------------------|---------------------------|
| ARM FF | | X | | Χ | | | | ArmFF_Calculate.vi | | |
| | X | X | | Χ | | | | ArmFF_CalculateVelocityOnly.vi | | |
| | | | X | | | | | ArmFF_Execute.vi | | LabVIEW style single call |
| | | | X | | | | | ArmFF_ExecuteVelocityOnly.vi | | LabVIEW style single call |
| | X | Χ | | Χ | | | | ArmFF_MaxAchieveAccel.vi | | |
| | X | Χ | | X | | | | ArmFF_MaxAchieveVelocity.vi | | |
| | X | Χ | | X | | | | ArmFF_MinAchieveAccel.vi | | |
| | X | Χ | | X | | | | ArmFF_MinAchieveVelocity.vi | | |
| | X | X | | X | | | | ArmFF_New.vi | | |
| | X | X | | X | | | | ArmFF New ZeroGravitv.vi | | |

| ibrary – VI Implementatio | n Lis | st | | | | | | _ | |
|--------------------------------|---------------------|------------|---------------------------------------|-----------|-------------------------------------|----------------|---|----------------------|---|
| te Space Items – (This list is | still m | nissin | g one | VI) |) Added ا | additi | ional columns for test and sample. | | |
| | | | | | mize | 8 | • | | |
| | þ | þ | m | | Optimiz | Sample Program | | | |
| | Implementea | Documented | Not WPILIB | em | Execution Op Test Routine | Pro | | | |
| | lem | ŭn | Ŋ | Menu Item | Execution Test Routi | e/ac | | | |
| | dul | 000 | Not | Mer | Exe | San | VI Name | Function Prototype | Notes |
| CONTROLLER UTIL | . X | | | X | SI | Τ. | ControllerUtil_GetModulusError.vi | 71 | This was short lived in WPILIB, but |
| | | | | | | | | | still useful here. |
| | | | | | þ | | | | |
| | | | | | Execution Optimizea Test Routine | 8 | | | |
| | þ | g | ~ | |)pti | Sample Program | | | |
| | Implementea | Documented | Not WPILIB | Menu Item | Execution Op Test Routine | Ą | - | | |
| | lem, | ŭ | Μ | iu It | cutii t Ro | e/ac | | | |
| | ďш, | ဝို | Vot | Mer | Exe | San | VI Name | Function Prototype | Notes |
| ELEV FF | X | X | | X | | | ElevFF_Calculate.vi | 71 | |
| | X | Χ | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | X | | | ElevFF_CalculateVelocityOnly.vi | | Lab VIETAV at da air ala anti |
| | | | X | | | + | ElevFF_Execute.vi ElevFF ExecuteVelocityOnly.vi | | LabVIEW style single call LabVIEW style single call |
| | X | X | ^ | X | | | ElevFF MaxAchieveAccel.vi | | East IEW Style Single Sail |
| | Χ | | | X | | | ElevFF_MaxAchieveVelocity.vi | | |
| | X | X | | X | | | ElevFF_MinAchieveAccel.vi ElevFF_MinAchieveVelocity.vi | | |
| | X | X | | X | | | ElevFF New.vi | | |
| | X | X | | X | | | ElevFF_New_ZeroAccel.vi | | |
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| | | | | | iize | _ | | | |
| | 7 | ~ | | | Optimiz ine | rar | | | |
| | nte | ntec | riB | Ë | n O Itine | Pro | | | |
| | эше | ıme | Μ | ı Ite | utio | a/e | | | |
| | Implemented | Documented | Not WPILIB | Menu Item | Execution Op Test Routine | Sample Program | VI Name | Function Prototype | Notes |
| HOL_DRV_CTRL | . X | X | | X | <u> </u> | | HolDrvCtrl AtReference.vi | 1 unction 1 rototype | Added 1/26/21 |
| | X | X | | X | | | HolDrvCtrl_Calculate.vi | | Added 1/26/21 |
| | X | Χ | | Χ | | | HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute.vi | | Added 1/26/21 |
| | | | X | | | + | HolDrvCtrl_Execute_Vi HolDrvCtrl_Execute_Trajectory.vi | | Future Future |
| | Χ | Х | | X | | | HolDrvCtrl_New.vi | | Added 1/26/21 |
| | X | X | | X | | | HolDrvCtrl_SetEnabled.vi | | Added 1/26/21 |
| | X | X | | X | | | HolDrvCtrl_SetTolerance.vi | | Added 1/26/21 |
| | | | | | pə | | | | |
| | | | | | Optimize | 2 | | | |
| | þ | þ | ~ | | Opti e | Program | | | |
| | ente | ente | ILIE | em | | P | | | |
| | lem | ŭ | Ŋ | iu It | cuti t Ro | e/ac | 2 | | |
| | Implemented | Documented | Not WPILIB | Menu Item | Execution Op Test Routine | Sample | VI Name | Function Prototype | Notes |
| PID CONTROLLER | X | X | X | X | | | PIDController_AdvCalculate_FF_Sp_Pv.vi | | Advanced PID |
| | X | X | X | X | | | PIDController_AdvCalculate_FF_Sp_Pv_Per.vi | | Advanced PID |
| | X | X | X | X | | X | PIDController_AdvExecute.vi | | Labview style helper. Advanced PID |
| | X | X | | X | | | PIDController_AtSetpoint.vi | | |
| | X | X | | X | | 4 | PIDController_Calculate_PV.vi | | |
| | X | X | | X | | + | PIDController Calculate SP PV.vi PIDController DisableContinousInput.vi | | |
| | $\frac{\lambda}{X}$ | X | | X | | + | PIDController_EnableContinuousInput.vi | | |
| | Χ | Χ | Χ | Χ | | Х | PIDController_Execute.vi | | Labview style helper |
| | | | | | | | PIDController GetContinuousError.vi | | OBSOLETE – Removed |
| | ~ | Х | | Х | | | PIDController GetPeriod.vi | | OBSOLLTE - Removed |

| s still m | issing | one \ | VI) |) Add | ed additional columns for test and sample. | |
|-----------|--------|-------|-----|-------|--|------------------------------------|
| X | X | | X | | PIDController_GetPID.vi | |
| X | X | | X | | PIDController_GetPositionError.vi | |
| X | X | | Χ | | PIDController_GetSetpoint.vi | |
| X | X | | Χ | | PIDController_GetVelocityError.vi | |
| X | X | | X | | PIDController_IsContinuousInputEnabled.vi | |
| X | X | | X | | PIDController_New.vi | |
| X | Χ | | X | | PIDController_NewPeriod.vi | |
| Χ | | Χ | X | SI | PIDController_Pack_AdvLimits.vi | |
| Χ | | Χ | X | SI | PIDController_Pack_AdvTuning.vi | |
| X | | Χ | X | SI | PIDController_Pack_ErrorTolerance.vi | |
| X | | Χ | X | SI | PIDController_Pack_InputLimits.vi | |
| X | | Χ | Χ | SI | PIDController_Pack_Tuning.vi | |
| X | X | | Χ | | PIDController_Reset.vi | |
| X | Χ | | X | | PIDController_SetD.vi | |
| X | X | X | Χ | | PIDController_SetDerivativeFilter.vi | Advanced PID |
| X | X | X | No | | PIDController_SetFeedForward.vi | Advanced PID, Obsolete – |
| | | | | | | DELETE |
| X | X | X | No | | PIDController_SetFFGain.vi | Advanced PID, Obsolete – DELETE |
| X | X | | Х | | PIDController Setl.vi | <u> </u> |
| | | | | | PIDController SetInputRange.vi | OBSOLETE – Removed |
| Х | Х | | Х | | PIDController_SetIntegratorRange.vi | OBOCETE TROMOVED |
| X | X | X | X | | PIDController_SetOutputLimits.vi | Advanced PID |
| X | X | | X | | PIDController SetP.vi | / tavarious i ib |
| X | X | X | X | | PIDController SetPeriod.vi | |
| X | X | | X | | PIDController SetPID.vi | |
| X | X | X | X | | PIDController SetPIDF.vi | Advanced PID |
| X | X | - 1 | X | | PIDController_SetSetpoint.vi | , availou i ib |
| X | X | | X | | PIDController SetTolerance.vi | |
| X | X | | X | | PIDController SetTolerancePandV.vi | |
| | | | | | IDOOHIONG_Octrolerancer and v. vi | |

| PROFILED PID CONTROLLER | | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name Function Prototype | Notes |
|--|-------------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|---------------------------------|------------------------------|
| X | PROFILED PID CONTROLLER | X | Χ | | Χ | | | | ProfiledPIDController_AtGoal.vi | |
| X | | | | | | | | | | |
| X X X ProfiledPIDController_Calculate_Meas_StateGoal.vi X X X ProfiledPIDController_DisableController_ | | | | | | | | | | |
| X | | | | | | | | | | |
| X X X ProfiledPIDController_DisableContInput.vi X X X X ProfiledPIDController_EnableContInput.vi X X X X ProfiledPIDController_GetGoal vi X X X X ProfiledPIDController_GetPeriod.vi X X X X ProfiledPIDController_GetPeriod.vi X X X X ProfiledPIDController_GetPoint.vi X X X X ProfiledPIDController_GetVelocityError.vi X X X X ProfiledPIDController_GetVelocityError.vi X X X X ProfiledPIDController_New.vi X X X X ProfiledPIDController_Reset.vi X X X X ProfiledPIDController_Reset.vi X X X X ProfiledPIDController_Reset.poonly.vi X X X X ProfiledPIDController_Reset.poonly.vi X X X X ProfiledPIDController_Reset.poonly.vi X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X ProfiledPIDController_SetGoal.vi X X X ProfiledPIDController_SetGoal.vi X X X ProfiledPIDController_SetGoal.vi X X X ProfiledPIDController_SetGoal.posOnly.vi X X X ProfiledPIDController_SetGoal.posOnly.vi X X X ProfiledPIDController_SetGoal.posOnly.vi X X X ProfiledPIDController_SetGoal.posOnly.vi | | | | | | | | | | |
| X X X X ProfiledPIDController_GetGoal.vi X X X X ProfiledPIDController_GetPeriod.vi X X X X ProfiledPIDController_GetSetpoint.vi X X X X ProfiledPIDController_GetVelocityError.vi X X X X ProfiledPIDController_New vi X X X X ProfiledPIDController_New Vi X X X X ProfiledPIDController_Reset.vi X X X X ProfiledPIDController_Reset.posOnly.vi X X X X ProfiledPIDController_Reset_PosOnly.vi X X X X ProfiledPIDController_SetCoal.vi X X X X ProfiledPIDController_SetGoal.vi | | - | | | | | | | | |
| X X X X ProfiledPIDController GetGoal.vi X X X X ProfiledPIDController GetPiD.vi X X X X ProfiledPIDController GetPiD.vi X X X X ProfiledPIDController GetPiD.vi X X X X ProfiledPIDController GetPositionError.vi X X X X ProfiledPIDController GetSetpoint.vi X X X X ProfiledPIDController GetVelocityError.vi X X X X ProfiledPIDController GetVelocityError.vi X X X X ProfiledPIDController New.vi X X X X ProfiledPIDController NewPeriod.vi X X X X ProfiledPIDController Reset.vi X X X X ProfiledPIDController Reset.vi X X X X ProfiledPIDController Reset.vi X X X X ProfiledPIDController Reset.posVel.vi X X X X ProfiledPIDController Reset PosConly.vi X X X X ProfiledPIDController Reset PosConly.vi X X X X ProfiledPIDController SetConstraints.vi X X X X ProfiledPIDController SetGoal.vi X X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal PosConly.vi X X X ProfiledPIDController SetGoal PosConly.vi X X X ProfiledPIDController SetGoal PosConly.vi | | | | | | | | | | |
| X Y Y ProfiledPIDController GetSetpoint.vi X X X X X X ProfiledPIDController GetVelocityError.vi X X X X X Y ProfiledPIDController New.vi Y Y Y Y Y Y ProfiledPIDController New.vi Y Y Y Y Y Y ProfiledPIDController New.vi Y Y Y Y Y ProfiledPIDController New.vi Y Y Y Y Y ProfiledPIDController New.vi Y Y Y Y Y Y ProfiledPIDController Reset PosOnly.vi Y Y Y Y Y ProfiledPIDController SetConstraints.vi Y Y Y Y ProfiledPIDController SetGoal.vi Y Y Y Y ProfiledPIDController SetIntegratorRange.vi Y Y Y Y | | | | | | | | | | |
| X X X X WPILIB has separate getters. X X X X X WPILIB has separate getters. X X X X X ProfiledPIDController GetSetpoint.vi X X X X ProfiledPIDController GetVelocityError.vi X X X X ProfiledPIDController New.vi X X X ProfiledPIDController New.vi X X X ProfiledPIDController Reset.vi X X X ProfiledPIDController Reset.posOnly.vi X X X ProfiledPIDController Reset.posVel.vi X X X ProfiledPIDController SetConstraints.vi X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal.PosOnly.vi X X X ProfiledPIDController SetGoal.PosOnly.vi | | | | | | | | | | |
| X X X ProfiledPIDController_GetSetpoint.vi X X X X ProfiledPIDController_GetVelocityError.vi X X X X ProfiledPIDController_New.vi X X X ProfiledPIDController_NewPeriod.vi X X X ProfiledPIDController_Reset.vi X X X ProfiledPIDController_Reset_PosOnly.vi X X X ProfiledPIDController_Reset_PosVel.vi X X X ProfiledPIDController_SetGoal.vi X X X ProfiledPIDController_SetGoal.vi X X X ProfiledPIDController_SetGoal.posOnly.vi X X X ProfiledPIDController_SetGoal.posOnly.vi X X X X ProfiledPIDController_SetGoal.posOnly.vi | | | | | | | | | | |
| X X X ProfiledPIDController_GetSetpoint.vi X X X X ProfiledPIDController_New.vi X X X X ProfiledPIDController_NewPeriod.vi X X X X ProfiledPIDController_Reset.vi X X X ProfiledPIDController_Reset_PosOnly.vi X X X ProfiledPIDController_Reset_PosVel.vi X X X ProfiledPIDController_SetConstraints.vi X X X ProfiledPIDController_SetGoal.vi X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X ProfiledPIDController_SetGoal_PosOnly.vi | | | | X | | | | | | WPILIB has separate getters. |
| X X X ProfiledPIDController GetVelocityError.vi X X X X ProfiledPIDController New.vi X X X X ProfiledPIDController Reset.vi X X X X ProfiledPIDController Reset PosOnly.vi X X X X ProfiledPIDController Reset PosVel.vi X X X ProfiledPIDController SetConstraints.vi X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal PosOnly.vi X X X ProfiledPIDController SetIntegratorRange.vi | | | | | | | | | | |
| X X X ProfiledPIDController New.vi X X X X ProfiledPIDController Reset.vi X X X ProfiledPIDController Reset PosOnly.vi X X X ProfiledPIDController Reset PosVel.vi X X X ProfiledPIDController SetConstraints.vi X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal PosOnly.vi X X X ProfiledPIDController SetIntegratorRange.vi | | | | | | | | | | |
| X X X ProfiledPIDController Reset.vi X X X X ProfiledPIDController Reset PosOnly.vi X X X X ProfiledPIDController Reset PosVel.vi X X X ProfiledPIDController SetConstraints.vi X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal PosOnly.vi X X X ProfiledPIDController SetIntegratorRange.vi | | | | | | | | | | |
| X X X X ProfiledPIDController_Reset.vi X X X X X ProfiledPIDController_Reset_PosOnly.vi X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X ProfiledPIDController_SetIntegratorRange.vi | | | | | | | | | _ | |
| X X X ProfiledPIDController_Reset_PosOnly.vi X X X X ProfiledPIDController_Reset_PosVel.vi X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X ProfiledPIDController_SetIntegratorRange.vi | | | | | | | | _ | | |
| X X X X ProfiledPIDController_Reset_PosVel.vi X X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi | | | | | | | | | | |
| X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi | | | | | | | | | | |
| X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi | | | | | | | | | | |
| X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi | | | | | ~ | | | | | |
| X X ProfiledPIDController SetIntegratorRange.vi | | | | | | | | | | |
| | | | | | | | | | | |
| | | - | | | | | | | | |
| X X X ProfiledPIDController_SetTolerance_PosOnly.vi | | | | | | | | | | |
| X X X ProfiledPIDController SetTolerance PosVel.vi | | | | | X | | | | | |

| Revision 2.X | 11/12/2021 – State | Space Items – | (This list is still missing | ng one VI |) Added additional | columns for test and sample. |
|--------------|--------------------|---------------|-----------------------------|-----------|--------------------|------------------------------|
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| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | VI Name | Function Prototype | Notes |
|---------|-------------|------------|------------|-----------|---------------------|--------------|-----------------------------------|----------------------|----------|
| RAMSETE | Χ | Χ | | X | SI | | Ramsete_New.vi | new | |
| | X | X | | X | SI | | Ramsete_New_B_Z.vi | new(b, zeta) | |
| | X | X | | X | X | | Ramsete_Calculate.vi | calculate | |
| | X | Χ | | X | X | | Ramsete_Calculate_Trajectory.vi | calculate_trajectory | |
| | Χ | | Χ | X | | | Ramsete_Execute.vi | | |
| | Χ | | Χ | Χ | | | Ramsete_Execute_ENG.vi | Use this one!! | |
| | Χ | | Χ | X | | | Ramsete_Execute_PackTuning.vi | | |
| | Χ | | Χ | X | | | Ramsete_Execute_PackTuning_ENG.vi | | |
| | Χ | Χ | | Χ | SI | | Ramsete_AtReference.vi | AtReference | |
| | Χ | Χ | | X | SI | | Ramsete_SetEnabled.vi | SetEnabled | |
| | Χ | Χ | | Χ | SI | | Ramsete_SetTolerance.vi | SetTolerance | |
| | Χ | Χ | | X | X | | Ramsete_SINC.vi | sinc | internal |
| | Χ | X | X | Χ | Χ | | Ramsete_Diff_DO_Eng.vi | | |
| | Χ | X | X | X | X | | Ramsete_Diff_DO_SI.vi | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimizea | Test Routine | Sample Program | Function Prototype | Notes |
|--------------------------|-------------|------------|------------|-----------|---------------------|--------------|--|---|---------------------------|
| SIMPLE MOTOR FEEDFORWARD | X | Χ | | Χ | SI | | SimpleMotorFF_New.vi | public SimpleMotorFeedforward(double ks, double kv, double ka) | |
| | | | | | | | | public SimpleMotorFeedforward(double ks, double kv) | |
| | X | Χ | | Χ | SI | | SimpleMotorFF_Calculate.vi | public double calculate(double velocity, double acceleration) | |
| | X | | | Χ | | | SimpleMotorFF_Calculate_NextV_Dt.vi | | |
| | X | X | | X | SI | | SimpleMotorFF_CalculateVelocityOnly.vi | public double calculate(double velocity) | |
| | | | X | | | | SimpleMotorFF_Execute.vi | | LabVIEW style single call |
| | | | X | | | | SimpleMotorFF_ExecuteVelocityOnly.vi | | LabVIEW style single call |
| | X | X | | X | X | | | public double maxAchievableVelocity(double maxVoltage, double acceleration) | |
| | X | X | | X | X | | | public double minAchievableVelocity(double maxVoltage, double acceleration) | |
| | X | Χ | | Χ | X | | | public double maxAchievableAcceleration(double maxVoltage, double velocity) | |
| | X | Χ | | Χ | X | | | public double minAchievableAcceleration(double maxVoltage, double velocity) | |

'===== GEOMETRY '=======

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program Manual IV | Function Prototype | Notes |
|------|-------------|------------|------------|-----------|---------------------|--------------|---------------------------|--|-----------------------------|
| POSE | | | | | | | | pose2d new() | can use cluster constant |
| | Χ | Χ | | Χ | SI | | Pose_New_TRRO.vi | pose2d new(translation2d, rotation2d) | |
| | Χ | Χ | | Χ | SI | | Pose_New.vi | pose2d new(double x, double y, rotation2d) | |
| | Χ | Χ | | X | SI | | Pose_Plus.vi | pose2d plus(transform2d other) | |
| | Χ | Χ | | Χ | SI | | Pose_Minus.vi | transform2d minus(pose2d other) | |
| | Χ | X | | Χ | SI | | Pose_getTranslation.vi | translation2d getTranslation() | can also use cluster unpack |
| | Χ | Χ | | Χ | SI | | Pose_getRotation.vi | rotation2d getRotation() | can also use cluster unpack |

| Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI) Added additional columns for test and | Revision 2.X 11/12/2021 | State Space Items – | (This list is still missing one VI) | Added additional columns for test and sar | nple. |
|---|-------------------------|---|-------------------------------------|---|-------|
|---|-------------------------|---|-------------------------------------|---|-------|

| . 13 31111 1 | 1113311 | 19 011 | C VI. | , | / luul | su auu | IIIOI | iai columno for test and sample. | |
|--------------|---------|----------|-------|---|--------|--------|-------|----------------------------------|---|
| X | X | ´ X | | X | SI | | | Pose_getXY.vi | |
| X | X | <i>X</i> | | X | SI | | | Pose_getXYAngle.vi | |
| X | X | | (| X | SI | | | Pose_TransformBy.vi | pose2d transformby(transform2d other) |
| X | X | | (| X | SI | | | Pose_RelativeTo.vi | pose2d relativeto(pose2d other) |
| X | X | | (| X | X | | | Pose_Exp.vi | pose2d exp(twist2d twist) |
| X | X | |) | X | X | | | Pose_Log.vi | twist2d log(pose2d end) |
| X | X | | (| Χ | SI | | | Pose_Equals.VI | boolean equals(other obj) |
| | | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|----------|-------------|------------|------------|-----------|---------------------|--------------|----------------|--------------------------------|--|--|
| ROTATION | | | | | | | | | rotation2d new() | can use cluster constant |
| | X | Χ | | Χ | SI | | | Rotation_CreateAngle.vi | rotation2d new(double value) | |
| | X | Χ | | X | SI | | | Rotation_CreateXY.vi | rotation2d new(double x, double y) | |
| | X | Χ | | Χ | SI | | | Rotation_CreateAngleDegrees.vi | rotation2d fromDegrees(double degrees) | convert to radians then create |
| | Χ | Χ | | Χ | SI | | | Rotation_Plus.vi | rotation2d plus(rotation2d other) | |
| | Χ | Χ | | Χ | SI | | | Rotation_Minus.vi | rotation2d minus(rotation2d other) | |
| | Χ | Χ | | Χ | SI | | | Rotation_UnaryMinus.vi | rotation2d unaryminus() | |
| | X | Χ | | Χ | SI | | | Rotation_Times.vi | rotation2d times(double scalar) | |
| | X | X | | X | SI | | | Rotation_RotateBy.vi | rotation2d rotateby(rotation2d other) | |
| | X | Χ | Χ | Χ | SI | | | Rotation_GetAngleCosSin.vi | | New 1/26/21 |
| | Χ | Χ | | Χ | SI | | | Rotation_GetRadians.VI | double getRadians() | use cluster unpack |
| | X | X | | X | SI | | | | double getDegrees() | use cluster unpack, then convert to degree |
| | X | X | | X | SI | | | Rotation_GetCos.VI | double getCos() | use cluster unpack |
| | X | Χ | | Χ | SI | | | Rotation_GetSin.VI | double getSin() | use cluster unpack |
| | X | Χ | | Χ | SI | | | Rotation_GetTan.VI | double getTan() | can calculate |
| | Χ | Χ | | Χ | SI | | | Rotation_Equals.vi | boolean equals(rotation2d other) | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimize | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|-----------|-------------|------------|------------|-----------|--------------------|--------------|----------------|------------------------------|--|--------------------------|
| TRANSFORM | X | Χ | | Χ | SI | | | Transform_Create_PosePose.vi | transform2d new(pose2d, pose2d) | |
| | Χ | X | | Χ | SI | | | Transform_Create_TransRot.vi | transform2d new(translation2d, rotation2d) | |
| | | | | | | | | | transform2d new() | can use cluster constant |
| | Χ | X | | Χ | SI | | | Transform_Times.vi | transform2d times(double scalar) | |
| | Χ | X | | Χ | SI | | | Transform_GetTranslation.VI | translation2d getTranslation() | use cluster unpack |
| | Χ | X | | Χ | SI | | | Transform_GetRotation.VI | rotation2d getRotation() | use cluster unpack |
| | Χ | X | X | Χ | SI | | | Transform_GetXY.vi | | |
| | X | X | X | Χ | SI | | | Transform_GetXYAngle.vi | | |
| | X | X | | Χ | SI | | | Transform_Inverse.vi | transform inverse() | new |
| | X | X | | Χ | SI | | | Transform_Equals.VI | boolean equals(other transform2d) | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Nample Program | Function Prototype | Notes |
|-------------|-------------|------------|------------|-----------|---------------------|--------------|-------------------------------|---|--------------------------|
| TRANSLATION | | | | | | | | translation2d new() | can use cluster constant |
| | Χ | X | | Χ | SI | | Translation_Create.vi | translation2d new(double x, double y) | |
| | X | X | | Χ | SI | | Translation_Create_DistAng.vi | | |
| | Χ | Χ | | Χ | SI | | Translation_GetDistance.vi | double getDistance(translation2d other) | |
| | Χ | Χ | | Χ | SI | | Translation_GetX.VI | double getX() | can use cluster unpack |

| FRC LabVIEW Trajectory Library – VI Implementation | n Lis | t | | | | | | |
|---|---|-----------------------------|--------------|---------------------------|--|---|--|---|
| Revision 2.X 11/12/2021 – State Space Items – (This list is s | | | one ' | | | | nal columns for test and sample. | |
| | | X | | X | SI | | Translation_GetY.VI double getY() | can use cluster unpack |
| | | | X | | SI | | Translation_GetXY.VI | |
| | X | X | | | SI | | Translation_GetNorm.VI double getNorm() | can use cluster unpack |
| | X | X | | | SI | | Translation_RotateBy.vi translation2d rotateBy(rotation2d other) | |
| | X | | | | SI | | Translation_Plus.vi translation2d plus(translation2d other) | |
| | X | X | | X | SI | | Translation_Minus.vi translation2d minus(translation2d other) | |
| | | X | | | SI | | Translation_UnaryMinus.vi translation2d unaryminus() | |
| | X | Χ | | Χ | SI | | Translation_Times.vi translation2d times(double scalar) | |
| | | Х | | X | | | translation2d div(double scalar) Translation_Equals.vi boolean equals(translation other) | can multiply by 1/scalar |
| TWIST | | | Not WPILIB | X Menu Item | SI | | VI Name Function Prototype Twist_Create.vi twist new(x, y, theta) | Notes |
| | X | X | Χ | | SI SI | | Twist_Equals.VI boolean equals(obj other) Twist_GetAll.VI | |
| ======== (INEMATICS ========= | | | | | pə | | | |
| | Implemented | Documented | Not WPILIB | Wenu Item | Execution Optimizea | Test Routine Sample Program | | |
| CHASSIS SPEEDS | | Docr | Not 1 | Menr | Exec | Test Sam _l | VI Name Function Prototype chassisspeeds new () | Notes can use cluster constant |
| CHASSIS SPEEDS | | | Not 1 | | | | chassisspeeds new () | can use cluster constant |
| CHASSIS SPEEDS | X | X | | X | SI | | chassisSpeeds new () ChassisSpeeds_New.vi chassisspeeds new (double xvel, double x | can use cluster constant |
| CHASSIS SPEEDS | X | X | X Not 1 | X | SI SI | | chassisSpeeds new () ChassisSpeeds_New.vi chassisspeeds new (double xvel, double y ChassisSPeeds_GetXYOmega.vi | can use cluster constant yvel, double angvel) |
| CHASSIS SPEEDS | X | X | | X | SI | | chassisSpeeds new () ChassisSpeeds_New.vi chassisspeeds new (double xvel, double x | can use cluster constant yvel, double angvel) |
| CHASSIS SPEEDS | X | X | | X | SI S | st Routine mple Program | chassisspeeds new () ChassisSpeeds_New.vi chassisspeeds new (double xvel, double yellow chassisSpeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI chassisspeeds fromFieldRelativeSpeeds(| can use cluster constant yvel, double angvel) |
| CHASSIS SPEEDS DIFFERENTIAL DRIVE KINEMATICS | X X X X X X X X X X | X X X X | X | X X X | Execution Optimized 19 19 19 | Test Routine Sample Program | ChassisSpeeds_New.vi | can use cluster constant yvel, double angvel) double x, double y, |
| | X X X X X | X X Documented | X | X X X X | N Execution Optimized S S S | X X Test Routine Sample Program | chassisSpeeds new () ChassisSpeeds_New.vi chassisspeeds new (double xvel, double younged) ChassisSpeeds_GetXYOmega.vi chassisSpeeds fromFieldRelativeSpeeds(double angvel, rotation2d robotangle) VI Name ChassisSpeeds new (double xvel, double younged) ChassisSpeeds fromFieldRelativeSpeeds(double angvel, rotation2d robotangle) | can use cluster constant yvel, double angvel) double x, double y, Notes |
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| DIFFERENTIAL DRIVE KINEMATICS | Implemented X X X X X X X X X X X X X X X X X X X | X X Documented | X | X X X X | otimized 9 X - Execution Optimized 9 9 9 9 | st Routine X X X Test Routine mple Program Sample Program | chassisSpeeds new () ChassisSpeeds New.vi chassisSpeeds new (double xvel, double angvel, rotation2d robotangle) VI Name Function Prototype DiffKinematics New.vi diffDriveKine new(double trackWidth) DiffKinematics toChassisSpeed.vi chassisSpeeds (diffDrW DiffKinematics toWheelSpeed.vi diffDriveWheelSpeed toWheelSpeeds(chase) VI Name Function Prototype | can use cluster constant yvel, double angvel) double x, double y, Notes /heelSpeeds) assisSpeeds) Notes |
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| DIFFERENTIAL DRIVE KINEMATICS | Implemented X X X X X X X X X X X X X X X X X X X | X X Documented | X Not WPILIB | X X X X X X | otimized 9 X - Execution Optimized 9 9 9 9 | Itine X X X Test Routine Program Sample Program | ChassisSpeeds_New.vi | Can use cluster constant |
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| 1/12/2021 - State Space Items - (This list is s | | | | | | | | | | |
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| DIFFERENTIAL DRIVE WHEEL SPEEDS | | | | | | | | | diffDrWheelSpeeds new() | |
| | | | | | | | | | diffDrWheelSpeeds new(double leftVel, double rightVel) | |
| | X | Χ | | X | Χ | | | DiffWheel_Normalize.vi | void normalize(double maxVel) | |
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| MECANUM DRIVE KINEMATICS | | X | | X | - 1 | | | MecaKinematics_New.vi | | |
| | Χ | Χ | | X | Χ | | | MecaKinematics_SetInverseKinematics.vi | | |
| | X | Χ | | X | Χ | | | MecaKinematics_ToChassisSpeeds.vi | | |
| | X | X | | X | X | | | MecaKinematics_ToWheelSpeeds.vi | | |
| | Χ | X | | Χ | X | | | MecaKinematics_ToWheelSpeedsZeroCenter.vi | | |
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| notř | ning o | Documented X | Not WPILIB | X Menu Item | imized | Routine | Sample Program | VI Name MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi | | |
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| notř | ning d | done None None X X X X X | Not WPILIB | X X Menu Item | imized | Routine | Sample Program | VI Name MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Execute.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi | | |
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| MECANUM DRIVE ODOMETRY | unplemented X X X X X X X X X X X X X X X X X X X | Documented X X X Documented | Not WPILIB | Menu Item | Execution Optimized | Routine | Sample Program | VI Name MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Execute.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi | Function Prototype Function Prototype | |
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| MECANUM DRIVE ODOMETRY | unplemented X X X X X X X X X X X X X X X X X X X | Documented X X X Documented | X Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Execute.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi | Function Prototype Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double | Notes |
| MECANUM DRIVE ODOMETRY | uning d | X X Documented X X X | X Not WPILIB | X X X X X X X X X X X X X X X X X X X | 2 Execution Optimized | Test Routine | Sample Program Sample Program | VI Name MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Execute.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi | Function Prototype Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double | Notes |
| MECANUM DRIVE ODOMETRY | unplemented X X X X X X X X X X X X X X X X X X X | X X Documented X X X | X Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program Sample Program | VI Name MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Execute.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi | Function Prototype Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, | Notes |

| 021 – State Space items – (This list is s | , | 1331116 | y Onc | V 1 | <i>,</i> Add | cu au | union | ar columns for test and sample. | | |
|---|---|------------|---------------------|-----------|---------------------|--------------|----------------|--|---|--|
| | | | | | izea | | _ | | | |
| | | | | | Execution Optimized | | ram | | | |
| | ted | ted | 18 | - | õ | ine | rog | | | |
| | Implementea | Documented | Not WPILIB | Menu Item | tion | Test Routine | e P | /I Name | | |
| | ole, | cnu | <i>t N</i> | nu | ecn | St F | шb | | | |
| | _ | ದ್ದಿ | 8 | Ме | Ë | Je Je | Sa, | /I Name | Function Prototype | Notes |
| SWERVE DRIVE KINEMATICS | | | | | | | | | public SwerveDriveKinematics(Translation2d wheelsMeters) | variable parameters (replace with array and "4" calls) |
| | X | Χ | X | X | | | 5 | SwerveKinematics NewX.VI | | uses array as input |
| | X | X | X | X | | | | SwerveKinematics_New4.VI | | For 4 module drives |
| | X | X | | X | | | (| SwerveKinematics_ToSwerveModuleStates.VI | public SwerveModuleState[] | |
| | | | | | | | | | toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) | |
| | X | X | | X | | | | SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI | public SwerveModuleState[] | |
| | | | | | | | | | toSwerveModuleStates(ChassisSpeeds chassisSpeeds) | veniele a secretare (secolo e vitte |
| | | | | | | | | | public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates) | variable parameters (replace with array and "4" calls) |
| | Χ | | | Χ | | | | SwerveKinematics_ToChassisSpeedsX.VI | | uses array as input |
| | X | | | X | | | | SwerveKinematics_ToChassisSpeeds4.VI | | For 4 module drives |
| | X | X | X | X | | | | SwerveKinematics_NormalizeWheelSpeeds.vi | public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) | |
| | | | | | 75 | | | | | |
| | | | | | ize(| | _ | | | |
| | _ | | | | tim | | ran | | | |
| | ited | ted | 18 | 2 | Ŏ | ine | rog | | | |
| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | | | |
| | plei | cur | ₹ | nu | noe | St F | шb | | | |
| | | | ຸ ≥ | | _ <u>~</u> | | | /I Name | | Notes |
| SWERVE DRIVE ODOMETRY | X | X | | X | | | (| SwerveOdometry_New.VI | public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle, Pose2d initialPose) | |
| | X | Χ | | X | | | | SwerveOdometry_NewZeroCenter.VI | public SwerveDriveOdometry(SwerveDriveKinematics kinematics, | |
| | X | X | | X | | | | SwerveOdometry ResetPosition.VI | Rotation2d gyroAngle) public void resetPosition(Pose2d pose, Rotation2d gyroAngle) | |
| | X | | | X | | | | SwerveOdometry_GetPosition.VI | public Pose2d getPoseMeters() | |
| | | | | | | | | | public Pose2d updateWithTime(double currentTimeSeconds, | variable parameters (replace with |
| | Y | Y | X | Χ | | | 9 | SwerveOdometry_UpdateWithTimeX.VI | Rotation2d gyroAngle, SwerveModuleState moduleStates) | array and "4" calls) uses array as input |
| | \overline{X} | X | $\frac{\lambda}{X}$ | X | | | | SwerveOdometry UpdateWithTime4.VI | | For 4 module drives |
| | | | | | | | | | public Pose2d update(Rotation2d gyroAngle, | variable parameters (replace with |
| | | | | | | | | SwerveOdometry_Execute4.vi | SwerveModuleState moduleStates) | array and "4" calls) |
| | | | | 1 | | | | SwerveOdometry_Execute4.vi | | |
| | Х | | X | X | | | | SwerveOdometry_UpdateX.VI | | uses array as input |
| | X | X | X | X | | | (| SwerveOdometry_Update4.VI | | For 4 module drives |
| | | | | | 7 | | | | | |
| | | | | | Optimized | | _ | | | |
| | | | | | tim | | ran | | | |
| | ted | ted | 18 | u | | ine | Progr | | | |
| | nen | nen | PIL | Iten | tion | ont | e D | | | |
| | Implementea | Documented | Not WPILIB | Menu Item | Execution | Test Routine | Sample | | | |
| | | | _ 8_ | | | Je Je | | /I Name | | Notes |
| SWERVE DRIVE MODULE STATE | X | X | | X | SI | | | SwerveModuleState_New.vi | public SwerveModuleState(double speedMetersPerSecond, | |
| | X | X | | X | SI | | | SwerveModuleState_CompareTo.vi | Rotation2d angle) public int compareTo(SwerveModuleState o) | |
| | X | | | X | SI | | | SwerveModuleState_Optimize.vi | public SwerveModuleState optimize(SwerveModuleState desired, | |
| | | | | | | | | - : | Rotation2d angle) | |

'========= SPLINE '========

| - State Space Items – (This list is s | still mi | issing | one | VI) | Add | ed ad | ditior | nal columns for test and sample. | _ | |
|---------------------------------------|-----------------|--------------|------------|---------------------------------------|-----------------------|--------------|----------------|--|--|---|
| CUBIC HERMITE SPLINE | X /mplemented | X Nocumented | Not WPILIB | X X X X X X X X X X | Execution Optimize | Test Routine | | VI Name CubicHermiteSpline_New.vi CubicHermiteSpline_makeHermiteBasis.vi CubicHermiteSpline_getControlVectorFromArrays.vi | Function Prototype public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) protected SimpleMatrix getCoefficients() private SimpleMatrix makeHermiteBasis() private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) | Notes not needed, use cluster unpack |
| POSE WITH CURVATURE | X Implemented | X Documented | Not WPILIB | X Menu Item | 9 Execution Optimized | Test Routine | | VI Name PoseWithCurve_New.vi | Function Prototype public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter) public PoseWithCurvature() public Pose2d poseMeters public double curvatureRadPerMeter | Notes can use cluster constant not needed, use cluster unpack not needed, use cluster unpack |
| QUINTIC HERMITE SPLINE | X X Implemented | X Documented | Not WPILIB | X Wenu Item | Execution Optimized | Test Routine | | VI Name QuinticHermiteSpline_New.vi QuinticHermiteSpline_makeHermiteBasis.vi QuinticHermiteSpline_getControlVectorFromArrays.vi | Function Prototype public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) protected SimpleMatrix getCoefficients() private SimpleMatrix makeHermiteBasis() private SimpleMatrix getControlVectorFromArrays(double[] | Notes not needed, use cluster unpack |
| SPLINE (Abstract class) | X Implemented | X Documented | Not WPILIB | X Menu Item | Execution Optimized | Test Routine | | VI Name Spline_getPoint.vi | Function Prototype Spline(int degree) public PoseWithCurvature getPoint(double t) public static class ControlVector public ControlVector(double[] x, double[] y) | Notes implemented as data structure |
| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes |

Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample.

SPLINE HELPER X X X SplineHelp GetCubicCtrlVectorsFrom

| stil | l missin | g one | VI) |) Add | ed ac | ditional columns for test and sample. | | |
|------|------------|-------|-----|-------|-------|---|--|----------|
| R | XX | | X | | X | SplineHelp_GetCubicCtrlVectorsFromWayPts.vi | public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints(Pose2d start, Translation2d[] interiorWaypoints, Pose2d end) | |
| | X X | X | X | | | SplineHelp GetCubicCtrlVectorsFromWeightedWayPts.vi | 71 , , | |
| | XX | | X | | | SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi | public static List <spline.controlvector> getQuinticControlVectorsFromWaypoints(List<pose2d> waypoints)</pose2d></spline.controlvector> | |
| | $X \mid X$ | X | X | | | SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi | , | |
| | XX | | X | | X | SplineHelp_getCubicSplinesFromControlVectors.vi | public static CubicHermiteSpline[] getCubicSplinesFromControlVectors(Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end) | |
| | $X \mid X$ | X | No | | | SplineHelp_GetCubicSpline_Calc1.vi | | internal |
| | $X \mid X$ | X | No | | | SplineHelp_GetCubicSpline_Calc2.vi | | internal |
| | $X \mid X$ | X | No | | | SplineHelp_GetCubicSpline_Calc3.vi | | internal |
| | X X | | X | | | SplineHelp_getQuinticSplinesFromControlVectors.vi | public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors(Spline.ControlVector[] controlVectors) | |
| | XX | | No | | | SplineHelp_ThomasAlgorithm.vi | private static void thomasAlgorithm(double[] a, double[] b, double[] c, double[] d, double[] solutionVector) | internal |
| | XX | | X | SI | | SplineHelp_GetCubicCtrlVector.vi | private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point) | |
| | XX | | X | SI | | SplineHelp_GetQuinticCtrlVector.vi | private static Spline.ControlVector getQuinticControlVector(double scalar, Pose2d point) | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program ameN IA | | | Notes |
|----------------------|-------------|------------|------------|-----------|---------------------|--------------|------------------------|-------------------|--|----------|
| SPLINE PARAMETERIZER | X | X | | X | | X | SplineParan | m_Spline.vi | public static List <posewithcurvature> parameterize(Spline spline)</posewithcurvature> | |
| | X | X | | X | | | SplineParan | m_Spline_T0_T1.vi | public static List <posewithcurvature> parameterize(Spline spline, double t0, double t1)</posewithcurvature> | |
| | X | Χ | X | No | | | SplineParan | m_StackGet.vi | | internal |
| | X | X | X | No | | | SplineParan | m_StackPop.vi | | internal |
| | X | X | X | No | | | SplineParan | m StackPush.vi | | internal |

'===== TRAJECTORY '======

> VI Name Function Prototype Notes TRAJECTORY X X public Trajectory(final List<State> states) X SI Trajectory New.vi XX X SI Trajectory_New_Empty.vi public Pose2d getInitialPose() can use cluster unpack, array index public double getTotalTimeSeconds() not needed, use unpack public List<State> getStates() not needed, use unpack X X X X X public State sample(double timeSeconds) Trajectory Sample.vi Trajectory_SampleReverse.vi Sample in reverse order. Negate sample. XX Trajectory_Concatenate.vi Χ public Trajectory transformBy(Transform2d transform) $X \mid X$ Trajectory_TransformBy.vi $X \mid X$ X Trajectory_RelativeTo.vi public Trajectory relativeTo(Pose2d pose) XX boolean equals(other obj) FUTURE Χ Trajectory_equals.vi $X \mid X$ No SI Trajectory_lerp_double.vi private static double lerp(double startValue, double endValue, internal XX No SI private static Pose2d lerp(Pose2d startValue, Pose2d endValue, Trajectory_lerp_Pose.vi

| RAJECTORY_STATE | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Namp Program | Function Prototype public State() | Notes |
|-----------------|-------------|------------|------------|-----------|---------------------|--------------|--------------------------------|--|--------|
| | X | Х | | Х | SI | | TrajectoryState_New.vi | public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter) | |
| | X | Χ | | Χ | | | TrajectoryState_Interpolate.vi | State interpolate(State endValue, double i) | |
| | X | X | | X | | | TrajectoryState_Equals.vi | boolean equals(other obj) | FUTURE |

| | 'mplemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Nample Program | Function Prototype | Notes |
|-------------------|-------------|------------|------------|-----------|---------------------|--------------|--|---|---|
| TRAJECTORY CONFIG | X | X | | X | SI | | TrajectoryConfig_Create.vi | public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq) | |
| | | | | | | | | public TrajectoryConfig addConstraint(TrajectoryConstraint constraint) | Implemented differently, can't duplicate. |
| | | | | | | | | public TrajectoryConfig addConstraints(List extends<br TrajectoryConstraint> constraints) | Implemented differently, can't duplicate. |
| | X | X | | X | SI | | TrajectoryConfig_setKinematicsDiffDrive.vi | public TrajectoryConfig setKinematics(DifferentialDriveKinematics kinematics) | |
| | X | X | | X | SI | | TrajectoryConfig_setKinematicsMecanumfDrive.vi | public TrajectoryConfig setKinematics(MecanumDriveKinematics kinematics) | |
| | X | X | | X | SI | | TrajectoryConfig_setKinematicsSwerveDrive.vi | public TrajectoryConfig setKinematics(SwerveDriveKinematics kinematics) | |
| | | | | | | | | public double getStartVelocity() | can use cluster unpack |
| | | | | | | | | public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond) | |
| | | | | | | | | public double getEndVelocity() | can use cluster unpack |
| | | | | | | | | public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond) | |
| | | | | | | | | public double getMaxVelocity() | can use cluster unpack |
| | | | | | | | | public double getMaxAcceleration() | can use cluster unpack |
| | | | | | | | | public List <trajectoryconstraint> getConstraints()</trajectoryconstraint> | Implemented differently, can't duplicate. |
| | | | | | | | | public boolean isReversed() | can use cluster unpack |
| | Χ | Χ | | X | SI | | TrajectoryConfig_setReversed.vi | public TrajectoryConfig setReversed(boolean reversed) | |
| | X | Χ | X | X | SI | | TrajectoryConfig_setCentripetalAccel.vi | | |
| | X | Χ | X | X | SI | | TrajectoryConfig_setVoltageDiffDrive.vi | | |
| | | | | | | | | NOTE ADD OTHER "SET" ROUTINES FOR OTHER | |

CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC.

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|---------------------|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|--|--------------------|
| TRAJECTORY GENERATE | X | X | | Χ | | | | TrajectoryGenerate_Make_Cubic_CtrlVect.vi | public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config)</translation2d> | uses cubic splines |
| | Χ | X | | X | | | | TrajectoryGenerate_Make_Cubic.vi | | uses cubic splines |

| on 2.X 11/12/2021 – State Space Items – (This list is s | | | | | Adde | d add | | al columns for test and sample. | | |
|---|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|--|--|
| | X | | X | | | | | | Helper to bring these all together | Use this one!!! |
| | Χ | X | | X | | | | | public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) | uses quintic splines |
| | X | X | | X | | | - | rajectoryGenerate_Make_Quintic.vi | public static Trajectory generateTrajectory(List <pose2d> waypoints, TrajectoryConfig config)</pose2d> | uses quintic splines |
| | Χ | X | | Χ | | | - | rajectoryGenerate_splinePointsFromSplines.vi | public static List <posewithcurvature> splinePointsFromSplines(Spline[] splines)</posewithcurvature> | |
| TRAJECTORY GENERATE (Control Vector) | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | | Function Prototype public ControlVectorList(int initialCapacity) public ControlVectorList() public ControlVectorList(Collection extends Spline.ControlVector collection) | Notes may not need, just data may not need, just data may not need, just data |
| | mplemented | Documented | Vot WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | | | |
| | _ | | Not | | Exe | | | | Function Prototype | Notes |
| TRAJECTORY PARAMETERIZE | | X | | X | | | | | public static Trajectory timeParameterizeTrajectory(List <posewithcurvature> points. List<trajectoryconstraint> constraints, double startVelocityMetersPerSecond, double endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq, boolean reversed) private static void enforceAccelerationLimits(boolean reverse,</trajectoryconstraint></posewithcurvature> | |
| | X | X | | No | | | | | private static void enforceAccelerationLimits(boolean revérse, List <trajectoryconstraint> constraints, ConstrainedState state)</trajectoryconstraint> | This routines needs to be char when new constraints are add |
| | Χ | | | | | | | rajectoryParam_calcStuffFwd.vi | | |
| | Χ | X | | No | | | | rajectoryParam_calcStuffRev.vi | | |
| | X | X | X | No | | | | rajectoryParam_enforceVelocity.vi | | This routines needs to be cha when new constraints are add |
| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | ′I Name | Function Prototype | Notes |
| AJECTORY PARAMETERIZE CONSTRAINED STATE | | X | < | X | E | | | ConstrainedState_New.vi | ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq) ConstrainedState() | 110.65 |
| | V | V | Х | Χ | | | (| ConstrainedState SetMaxAccel.vi | V | |
| | | _ ^ ' | | | | - 1 | | | | The state of the s |
| | | X | X | X | | | | ConstrainedState_SetMinAccel vi | | |
| | X | Χ | X | Χ | | | (| ConstrainedState_SetMinAccel.vi ConstrainedState_SetVelAccel.vi | | |

Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample. nple Program Test Routine Not WPILIB Menu Item Function Prototype Notes TrajectoryUtil fromPathWeaverJSON.vi TRAJECTORY UTIL X X X public static Trajectory fromPathweaverJson(Path path) X X X X X TrajectoryUtil MakeWeightedWayPoint.vi TrajectoryUtil MakeWeightedWayPoint ENG.vi X X X X X $X \mid X$ TrajectoryUtil_toPathWeaverJSON.vi public static void toPathweaverJson(Trajectory trajectory, Path public static Trajectory deserializeTrajectory(String json) public static String serializeTrajectory(Trajectory trajectory) Execution Optimized Sample Progr Test Routine Menu Item **Function Prototype** Notes TRAPEZOID PROFILE X X Χ TrapProfConstraint New.vi $X \mid X$ Χ TrapProfile Calculate.vi XX No TrapProfile Direct.vi Private, remove from menu $X \mid X \mid X \mid X$ TrapProfile Execute.vi XX Χ TrapProfile IsFinished.vi $X \mid X$ Χ TrapProfile New.vi $X \mid X$ Χ TrapProfile New DefInitial.vi $X \mid X$ No TrapProfile ShouldFlipAcceleration.vi Private, remove from menu TrapProfile TimeLeftUntil.vi $X \mid X$ Χ $X \mid X$ Χ TrapProfile TotalTime.vi TrapProfState Equals.vi $X \mid X$ Χ $X \mid X$ Χ TrapProfState New.vi '======== TRAJECTORY CONSTRAINT '========= Execution Optimize Sample Prog Test Routine Vot WPILIB Vlenu Item VI Name Function Prototype Notes CENTRIPETAL ACCELERATION CONSTRAINT X public double getMaxVelocityMetersPerSecond(Pose2d CentripetalAccelConstraint_getMaxVelocity.vi poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)
public MinMax XX CentripetalAccelConstraint getMinMaxAccel.vi Χ getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public CentripetalAccelerationConstraint(double $X \mid X$ X SI CentripetalAccelConstraint New.vi Can use cluster pack for now maxCentripetalAccelerationMetersPerSecondSq) Execution Optimized Sample Program rest Routine Not WPILIB **Menu Item** Function Prototype Notes

| | | | _ | | | | onal columns for test and sample. | | |
|-------------------------------------|-------------|------------|------------|----------------|---------------------|--|--|--|--|
| DIFF DRIVE KINEMATIC CONSTRAINT | X | X | | X | | | DiffDriveKinematicsConstraint_getMaxVelocity.vi | public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) | |
| | X | X | | X | | | DiffDriveKinematicsConstraint_getMinMaxAccel.vi | public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) | |
| | X | X | | X | SI | | DiffDriveKinematicsConstraint_New.vi | public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond) | |
| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | VI Name | Function Prototype | Notes |
| DIFF DRIVE VOLTAGE CONSTRAINT | | X | | _ <u>≥</u> | Щ | <u> </u> | DiffDriveVoltageConstraint_getMaxVelocity.vi | public double getMaxVelocityMetersPerSecond(Pose2d | Notes |
| | | | | | | | 5 _5 | poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) | |
| | X | X | | X | | | DiffDriveVoltageConstraint_getMinMaxAccel.vi | public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) | Code updated to match 2/20 library update. |
| | X | X | | X | SI | | DiffDriveVoltageConstraint_New.vi | public DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage) | Can use cluster pack for now |
| | Implemented | Documentea | | Menu Item | Execution | Test Routine | | | Notes |
| JERK CONSTRAINT | / | \vdash | X | | | | JerkConstraint_getMaxVelocity.vi JerkConstraint_getMinMaxAccel.vi | | FUTURE FUTURE |
| | / | | X | | SI | | JerkConstraint_New.vi | | FUTURE |
| | Implemented | Documented | | Menu Item | Execution Optimized | Test Routine | VI Name | Function Prototype | Notes |
| MECANUM DRIVE KINEMATICS CONSTRAINT | | X | | X | SI | | MecaDriveKinematicsConstraint_New.vi MecaDriveKinematicsConstraint_getMaxVelocity.vi | | |
| | X | X | | X | | | MecaDriveKinematicsConstraint_getMaxVelocity.vi MecaDriveKinematicsConstraint_getMinMaxAccel.vi | | |
| | mplemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | VI Name | Function Prototype | Notes |
| SWERVE DRIVE KINEMATICS CONSTRAINT | _ | X | | X | E | <u>- </u> | SwerveDriveKinematicsConstraint_getMaxVelocity.vi | public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) | 140[65 |
| | X | X | | X | | | SwerveDriveKinematicsConstraint_getMinMaxAccel.vi | public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) | |

| | | , | | | | | |
|---|---|-------|----|------|--|---|------------------------------|
| Χ | Χ | Χ | SI | | SwerveDriveKinematicsConstraint_New.vi | Newpublic SwerveDriveKinematicsConstraint(final | Can use cluster pack for now |
| | | | | | | SwerveDriveKinematics kinematics, double | Ť |
| | | | | | | maxSpeedMetersPerSecond) | |

TRAJECTORY CONSTRAINT

Interface class - nothing done (not needed)

Function Prototype VI Name Notes TRAJECTORY CONSTRAINT (Min Max) X X Constraint_MinMax_New.vi Constraint MinMax New X SI Constraint MinMax NewMinMax.VI Constraint MinMax New XX X SI

'=========

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 | Function Prototype | Notes |
|------|-------------|------------|------------|-----------|---------------------|--------------|---|--------------------|---|
| UTIL | X | Χ | Χ | Χ | SI | | Util ApproxEqual.vi | | |
| | X | Χ | X | X | | | Util_Array_PoseWCurv_to_XY.vi | | |
| | X | Χ | X | X | SI | | Util_CalcDist.vi | | |
| | X | Χ | X | Χ | | | Util_GetLibraryUsage.vi | | |
| | Χ | X | X | X | SI | | Util_GetLibraryVersion.vi | | |
| | X | X | X | X | | | Util_GetTime.vi | | Once tested completely, this should be optimized! |
| | Χ | X | X | No | N/A | | Util_LibraryGlobals.vi | | Global Variables – no block diag. |
| | X | Χ | Χ | Χ | | | Util_Trajectory_Absolute_To_Relative.vi | | |
| | X | Χ | X | Χ | | | Util_Trajectory_ReadFile.vi | | |
| | X | Χ | X | Χ | | | Util_Trajectory_to_XY.vi | | |
| | X | X | X | No | | | Util_Trajectory_WriteFile_Config.vi | | internal |
| | X | Χ | X | No | | | Util_Trajectory_WriteFile_OneState.vi | | internal |
| | X | Χ | X | Χ | | | Util_Trajectory_WriteFile_PathFinder.vi | | |
| | X | Χ | X | No | | | Util_Trajectory_WriteFile_PathFinderConfig.vi | | internal |
| | X | X | X | Χ | | | Util_Trajectory_WriteFile_Pathweaver.vi | | |
| | X | Χ | X | No | | | Util_Trajectory_WriteFile_States.vi | | internal |
| | X | X | X | No | | | Util_Trajectory_WriteFile_WayPoints.vi | | internal |
| | X | X | Χ | Χ | | | Util_Trajectory_WriteFile.vi | | |
| | X | X | X | Χ | | | Util_TrajectoryState_Meters_To_Inches.vi | | |
| | X | Χ | Χ | Χ | | | Util_TrajState_to_DiffDrive_WheelPos.vi | | |
| | X | Χ | Χ | Χ | | | Util_Waypoint_Eng_To_SI.vi | | |
| | X | X | Χ | Χ | | | Util_Waypoint_To_CubicInput.vi | | |
| | X | X | X | Χ | | | Util_Waypoint_To_QuinticInput.vi | | |
| | X | X | X | No | | | Util_WeightedWayPoint_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 Optimizea | Test Routine | Sample Program ame | Function Prototype | Notes |
|------|-------------|------------|------------|-----------|---------------------|--------------|------------------------------|--------------------|-------|
| CONV | Χ | X | Χ | Χ | SI | | Conv_AngleDegrees_Heading.vi | | |
| | Χ | X | Χ | Χ | SI | | Conv_AngleRadians_Heading.vi | | |
| | Χ | Χ | Χ | Χ | SI | | Conv_Centimeters_Meters.vi | | |
| | Χ | Χ | Χ | Χ | SI | | Conv_Deg_Radians.vi | | |
| | Χ | X | Χ | Χ | SI | | Conv_Feet_Meters.vi | | |
| | Χ | X | Χ | Χ | SI | | Conv_GyroDegrees_Heading.vi | | |
| | Χ | X | Χ | Χ | SI | | Conv_Heading_AngleRadians.vi | | |
| | Χ | X | Χ | Χ | SI | | Conv_Inches_Meters.vi | | |
| | Χ | X | Χ | Χ | SI | | Conv_Kilograms_Pounds.vi | | |
| | X | X | Χ | Χ | SI | | Conv_Meters_Feet.vi | | |
| | X | Χ | Χ | Χ | SI | | Conv_Meters_Inches.vi | | |
| | Χ | X | Χ | Χ | SI | | Conv_POSE_SI_Eng.vi | | |
| | Χ | X | X | Χ | SI | | Conv_Pounds_Kilograms.vi | | |
| | Χ | X | Χ | Χ | SI | | Conv_Radians_Deg.vi | | |
| | Χ | X | X | Χ | SI | | Conv_Yards_Meters.vi | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|-------|-------------|------------|------------|-----------|---------------------|--------------|----------------|---|--------------------|-------|
| UNITS | Χ | X | | X | | | | Units_DegreesToRadians.vi | | |
| | Χ | Χ | | X | | | | Units_FeetToMeters.vi | | |
| | Χ | Χ | | Χ | | | | Units_InchesToMeters.vi | | |
| | Χ | X | | X | | | | Units_MetersToFeet.vi | | |
| | Χ | X | | Χ | | | | Units_MetersToInches.vi | | |
| | Χ | Χ | | X | | | | Units_RadiansPerSecondToRotationsPerMinute.vi | | |
| | Χ | X | | X | | | | Units_RadiansToDegrees.vi | | |
| | Χ | Χ | | Χ | | | | Units_RotationsPerMinuteToRadiansPerSecond.vi | | |

'======== PATHFINDER UTIL

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

Function Prototype Notes PathfinderUtil_Continuous_Heading_Difference.vi PathfinderUtil_Continuous_Heading_Differer
PathfinderUtil_OptimizeTrajectoryStates.vi
PathfinderUtil_ToTrajectoryStates.vi
PathfinderUtil_ToTrajectoryStates.vi

'========= STATE SPACE MODEL '======

Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample.

Χ

| | Implemented | Documented | > | Menu Item | Execution Optimizec Test Routine | mble | VI Name | Function Prototype Notes | Code Review | Test Program | Error Checking |
|----------|-------------|------------|---|-----------|-------------------------------------|------|---------------------------------|--------------------------|-------------|--------------|----------------|
| DC MOTOR | X | X | | X | SI | | DCMotor_GetAndymark9015.vi | | | | |
| | Χ | X | | X | SI | | DCMotor_GetAndymarkRs775_125.vi | | | | |
| | 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 | | | | |
| | Χ | X | | X | SI | | DCMotor_GetCurrent.vi | | | | |
| | Χ | X | | X | SI | | DCMotor_GetFalcon500.vi | | | | |
| | X | X | | X | SI | | DCMotor_GetMiniCIM.vi | | | | |
| | X | X | | X | SI | | DCMotor_GetNEO.vi | | | | |
| | Χ | X | | | SI | | DCMotor_GetNEO550.vi | | | | |
| | X | X | | X | SI | | DCMotor_GetVex775Pro.vi | | | | |
| | X | X | | X | SI | | DCMotor_GetRomiBuiltIn.vi | | | | |
| | Χ | X | | Χ | SI | | DCMotor_New.vi | | | | |
| | Χ | X | | X | | | DCMotor_PickMotor.vi | | | | |
| | | | | | | | | | | | |

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

'====== STATE SPACE ESTIMATION '=======

> Function Prototype DIFFERENTIAL DRIVE POSE ESTIMATOR X X X DiffDrivePoseEst_AddVisionMeasurement.vi Just a shell, not functional! X X X X X X Χ DiffDrivePoseEst_FillStateVector.vi DiffDrivePoseEst GetEstimatedPosition.vi Χ Χ DiffDrivePoseEst Kalman F Callback.vi Χ DiffDrivePoseEst Kalman H Callback.vi X X X X Χ DiffDrivePoseEst New.vi Χ DiffDrivePoseEst ResetPosition.vi XX Χ DiffDrivePoseEst SetVisionMeasurementStdDevs.vi XX X DiffDrivePoseEst_Update.vi XX Χ DiffDrivePoseEst_UpdateWithTime.vi XX Χ DiffDrivePoseEst_VisionCorrect_Callback.vi

DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi

| molemented | Documented | Not WPILIB | Menu Item Execution Optimizec | S VI Name Function Prototype Notes | Code Review | est Program | |
|--|---------------------------------------|------------|----------------------------------|---|---------------------|-------------|-----------|
| | | | | Notes Suppose Notes | | ¥ | _ |
| EXTENDED KALMAN FILTER | | | X | | ll, not functional! | | - |
| | (X | | X | ExtendedKalmanFilter_Correct_OnlyUY.vi | | | + |
| <u> </u> | (X | | X | ExtendedKalmanFilter_GetP.vi | | | + |
| | (X | | X | ExtendedKalmanFilter_GetP_Single.vi | | | + |
| | (X | | X X | ExtendedKalmanFilter_GetXHat.vi | | | + |
| | (X | | | ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter New.vi | | | + |
| X | | | X X | ExtendedKalmanFilter_New.vi ExtendedKalmanFilter Predict.vi | | | + |
| | (X | | X | ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter Reset.vi | | | + |
| | (X | | X | ExtendedKalmanFilter_Reset.vi ExtendedKalmanFilter SetP.vi | | | + |
| | (X | | X | ExtendedKalmanFilter_SetX-vi | | | + |
| <u>^</u> | (X | | X | ExtendedKalmanFilter_SetXHat_Single.vi | | | + |
| <u> </u> | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | + | ^ | Extended (dimental little _oct/clat_olligic.vi | | | + |
| | | | Menu Item Execution | E B B B B B B B B B B B B B B B B B B B | Code R | Test Pro | Т |
| KALMAN FILTER | | | X | KalmanFilter_Correct.vi | | | + |
| X | (X X X | | X X | KalmanFilter_New.vi KalmanFilter Predict.vi | | | + |
| | (X | | X | KalmanFilter_Predict.vi KalmanFilter_Reset.vi | | + | + |
| | (X | | X | KalmanFilter GetK | | | + |
| | (X | | X | KalmanFilter_GetK_Single.vi | | | + |
| | (X | | X | KalmanFilter SetXHat | | + | + |
| | (X | | X | KalmanFilter_SetXHat_Single | | | \dagger |
| λ | | | X | KalmanFilter_GetXHat | | | \dagger |
| | (X | | X | KalmanFilter_GetXHaT_Single | | | T |
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| 1 | ented | Not WPILIB | Menu Item Execution Optimized | S VI Name Function Prototype Notes | Code Review | est Program | |
| nemelu | moo | ot v | ě ě | | Ō | <u>F</u> | \top |
| | | | | | | | |
| ILTER LATENCY COMPENSATOR $\overline{\lambda}$ | (X | | X | KalmanFilterLatencyComp_AddObserverState.vi Work in p | ogress. | | \top |
| | (X | | | | ogress. | | T |
| ILTER LATENCY COMPENSATOR X | (X | | X | KalmanFilterLatencyComp_AddObserverState.vi Work in p | | | |
| ILTER LATENCY COMPENSATOR X | (X (X | | X X | KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi Work in p | ogress. | | |
| ILTER LATENCY COMPENSATOR X | | | X X X | KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi Work in p | ogress. | | _ |
| ILTER LATENCY COMPENSATOR X | | | X X X | KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi Work in p | ogress. | | |

FRC LabVIEW Trajectory Library - VI Implementation List Revision 2.X 11/12/2021 - State Space Items - (This list is still missing one VI....) Added additional columns for test and sample. nple Program Function Prototype Notes SWERVE DRIVE POSE ESTIMATOR SwerveDrivePoseEst AddVisionMeasurement StdDev.vi Haven't started yet X X X X SwerveDrivePoseEst AddVisionMeasurement.vi Haven't started yet X SwerveDrivePoseEst VisionCorrect Callback.vi XX X SwerveDrivePoseEst VisionCorrect Kalman H Callback.vi XX Χ SwerveDrivePoseEst Kalman F Callback.vi XX X SwerveDrivePoseEst Kalman H Callback.vi XX Χ SwerveDrivePoseEst GetEstimatedPosition.vi Haven't started yet XX X SwerveDrivePoseEst New.vi Haven't started yet $X \mid X$ Χ SwerveDrivePoseEst ResetPosition.vi Haven't started yet XX X SwerveDrivePoseEst SetVisionMeasurementStdDevs.vi Haven't started yet XX X SwerveDrivePoseEst Update.vi Haven't started yet XX X SwerveDrivePoseEst UpdateWithTime.vi Haven't started yet Haven't started yet **Function Prototype** Notes UNSCENTED KALMAN FILTER X Χ UnscentedKalmanFilter Correct.vi Work in progress. Χ UnscentedKalmanFilter Correct FuncGroup.vi X UnscentedKalmanFilter Correct OnlyUY.vi Χ X UnscentedKalmanFilter Correct OnlyUYR.vi XX Χ UnscentedKalmanFilter GetP.vi XX X UnscentedKalmanFilter GetP Single.vi UnscentedKalmanFilter GetXHat.vi $X \mid X$ Χ UnscentedKalmanFilter GetXHat Single.vi $X \mid X$ Χ Χ Χ UnscentedKalmanFilter New.vi Χ X UnscentedKalmanFilter New Default.vi Χ X UnscentedKalmanFilter New FuncGroup.vi X X Χ UnscentedKalmanFilter Predict.vi XX Χ UnscentedKalmanFilter Reset.vi XX Χ UnscentedKalmanFilter SetP.vi XX X UnscentedKalmanFilter SetXHat.vi XX UnscentedKalmanFilter_SetXHat_Single.vi Χ Χ UnscentedKalmanFilter_Transform.vi '======== STATE SPACE CONTROL '======== Not WPILIB **Function Prototype** Notes CONTROL AFFINE PLANT INVERSION FEEDFORWARD

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| LINEAR PLANT INVERSION FEEDFORWARD | X | | X | | | LinearPIntInvFF_Calculate.vi | 7. | | | |
| | Χ | Χ | X | | | LinearPIntInvFF_Calculate_NextR.vi | | | | |
| | X | X | X | | | LinearPIntInvFF_GetUff.vi | | | | |
| | X | | X | | | LinearPIntInvFF_New.vi | | | | |
| | | X | X | | | LinearPIntInvFF_New_Plant.vi | | | | |
| | | X | X | | | LinearPIntInvFF_Reset_Initial.vi | | | | |
| | | X | X | | | LinearPIntInvFF_Reset_Zero.vi | | | | |
| | X | | X | | | LinearPIntInvFF_GetUff_Single.vi | | | | |
| | | Χ | X | | | LinearPIntInvFF_GetR.vi | | | | |
| | X | Χ | X | | | LinearPIntInvFF_GetR_Single.vi | | | | |
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| LINEAR QUADRATIC REGULATOR | | | X | | | LinearQuadraticRegulator_Calculate_NextR.vi | | | | |
| | X | | X | | | LinearQuadraticRegulator_Calculate.vi | | | | |
| | | | X | | | LinearQuadraticRegulator_GetK_Single.vi | | NOT ORIGINAL | | |
| | | Χ | X | | X | LinearQuadraticRegulator_GetK.vi | | | | |
| | | | X | | | LinearQuadraticRegulator_GetR_Single.vi | | | | |
| | | X | X | | | LinearQuadraticRegulator_GetR.vi | | | | |
| | | | X | | | LinearQuadraticRegulator_GetU_Single.vi | | | | |
| | | X | X | | | LinearQuadraticRegulator_GetU.vi | | | | |
| | / | X | X | | X | LinearQuadraticRegulator_LatencyCompensate.vi | | Routine exists, but it only has interger raise matrix to power. | | |
| | X | ~ | X | | | LinearQuadraticRegulator_New_ELMS.vi | | interger raise matrix to power. | | |
| | ^ | ^ | ^ | | | LinearQuadraticRegulator_New_Raw.vi | | | + | + |
| | X | × | X | | X | LinearQuadraticRegulator_New_SystemELMS.vi | | | + | + |
| | | ^ | ^ | | | LinearQuadraticRegulator New N vi | | | | |
| | X | X | X | | | LinearQuadraticRegulator_New_N.vi LinearQuadraticRegulator_New.vi | | | + | + |
| | X | $\frac{x}{x}$ | $\frac{\lambda}{X}$ | | | LinearQuadraticRegulator_Reset.vi | | | + | + |
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| | Ju, | õ | Ve Vot | Ж | Tes | VI Name | Function Prototype | Notes | Š | Test |
| LINEAR SYSTEM | | \overline{x} | X | | | LinearSystem CalculateX.vi | 71 | | T | T |
| | X | X | X | | | LinearSystem_CalculateY.vi | | | 1 | |
| | X | X | X | | | LinearSystem GetA.vi | | | | |
| | X | X | X | | | LinearSystem_GetAElement.vi | | | T | |
| | X | X | X | | | LinearSystem_GetB.vi | | | | 1 |
| | X | | X | | | LinearSystem_GetBElement.vi | | | | |
| | X | | X | | | LinearSystem_GetC.vi | | | | |
| | X | X | X | | | LinearSystem_GetCElement.vi | | | | |
| | X | Χ | X | | | LinearSystem_GetD.vi | | | | |
| | | | | | | | | | T | T |
| | X | X | X | | | LinearSystem_GetDElement.vi | | | | |

| | | Documented | Not WPILIB | | Execution Optimized | Test Routine | Nample Program | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|--------------------|---|------------|------------|---------|---------------------|--------------|---|--------------------|-------|-------------|--------------|----------------|
| LINEAR SYSTEM LOOP | | | ; | (| | | LinearSystemLoop_ClampInput.vi | | | | | |
| | Χ | X | ; | (| | | LinearSystemLoop_Correct.vi | | | | | |
| | | | | | | | LinearSystemLoop_GetClampFunction.vi | | | | | |
| | Χ | X | | (| | | LinearSystemLoop_GetController.vi | | | | | |
| | Χ | X | | (| | | LinearSystemLoop_GetError_Single.vi | | | | | |
| | | X | | (| | | LinearSystemLoop_GetError.vi | | | | | |
| | | X | | (| | | LinearSystemLoop_GetFeedForward.vi | | | | | |
| | | X | | (| | | LinearSystemLoop_GetNextR_Single.vi | | | | | |
| | | X | | (| | | LinearSystemLoop_GetNextR.vi | | | | | |
| | Χ | Χ | | (| | | LinearSystemLoop_GetObserver.vi | | | | | |
| | Χ | X | | (| | | LinearSystemLoop_GetU_Row.vi | | | | | |
| | | X | | (| | | LinearSystemLoop_GetU.vi | | | | | |
| | | X | | (| | | LinearSystemLoop_GetXHat_Single.vi | | | | | |
| | Χ | X | | (| | | LinearSystemLoop_GetXHat.vi | | | | | |
| | | | | | | | LinearSystemLoop_New_BBB | | | | | |
| | | | | | | | LinearSystemLoop_New_LinearSystem_ClampFunc | | | | | |
| | | X | | (| | | LinearSystemLoop_New_LinearSystem_ClampVal.vi | | | | | |
| | | X | | (| | | LinearSystemLoop_New.vi | | | | | |
| | | X | | (| | | LinearSystemLoop_Predict.vi | | | | | |
| | Χ | X | | (| | | LinearSystemLoop_Reset.vi | | | | | |
| | | | | | | | LinearSystemLoop_SetClampFunction.vi | | | | | |
| | | | | | | | LinearSystemLoop_SetNextR_Some.vi | | | | | |
| | Χ | X | | (| | | LinearSystemLoop_SetNextR.vi | | | | | |
| | | | | \perp | | | LinearSystemLoop_SetXHat_Single.vi | | | | | |
| | | | | | | | LinearSystemLoop_SetXHat.vi | | | | | |
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'========= STATE SPACE UTILITIES

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| CALLBACK HELPER | X X Implemented | Documented | X X Not WPILIB | X X Menu Item | Execution Optimized | Test Routine | | VI Name CallbackHelp_MatrixMinus.vi CallbackHelp_MatrixMult.vi CallbackHelp_MatrixMult_CoerceSizeB.vi CallbackHelp_MatrixPlus.vi | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|-----------------|-----------------|------------|----------------|---------------|---------------------|--------------|----------------|--|----------------------|-------|-------------|--------------|----------------|
| | Implemented | Documented | Not WPILIB | Jenu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Sode Review | est Program | error Checking |
| DISCRETIZATION | | X | | X | | X | | Discretization_DiscretizeA.vi | T unction i Tototype | Notes | | | Ш |
| | X | Χ | | Χ | | Χ | | Discretization_DiscretizeAB.vi | | | | | |
| | X | X | | Χ | | X | | Discretization_DiscretizeABTaylor.vi | | | | | |

| | | | | Discretization_DiscretizeAQ.vi | | |
|---|---|---|---|--------------------------------------|--|--|
| X | X | X | X | Discretization_DiscretizeAQTaylor.vi | | |
| X | X | X | | Discretization_DiscretizeR.vi | | |
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|------------------|-------------|------------|------------|-----------|---------------------|--------------|--|--------------------|------------------------------------|-------------|--------------|----------------|
| STATE SPACE UTIL | X | | | X | | Χ | | | | | | |
| | X | X | | X | | X | StateSpaceUtil_MakeCovarianceMatrix.vi | | | | | |
| | X | X | | X | | | StateSpaceUtil_MakeWhiteNoiseVector.vi | | | | | |
| | / | Χ | | | | | StateSpaceUtil_IsStabalizable.vi | | | | | |
| | X | Χ | | X | | | StateSpaceUtil_PoseToVector.vi | | | | | |
| | X | Χ | | X | | | StateSpaceUtil_ClampInputMaxMagnitude.vi | | Routine exists, it is just a shell | | | |
| | X | Χ | | Χ | | | StateSpaceUtil_NomalizeInputVector.vi | | | | | |
| | X | Χ | | Χ | | | StateSpaceUtil_PoseTo4dVector.vi | | | | | |
| | X | X | | Χ | | | StateSpaceUtil_PoseTo3dVector.vi | | | | | |
| | | | | | | | | | | | | |

'======== SIMULATION '========

> X X Menu Item
>
> ☑ ☑ Execution Optimized Function Prototype Notes BatterySim_CalculateDefaultBatteryLoadedVoltage.vi
> BatterySim_CalculateLoadedVoltage.vi BATTERY SIM X X XX

DIFFERENTIAL DRIVE TRAIN SIN

| | Implemented | Documented | Not WPILIB | | Execution Op | Routine | NI Name | Function Prototype | Notes | Code Review | Test Program | Error Checkin |
|---|-------------|------------|------------|---|--------------|---------|--|--------------------|-------|-------------|--------------|---------------|
| | | Χ | 7 | (| | | DiffDriveTrainSim_ClampInput.vi | | | | | |
| | Χ | Χ | _ ; | (| | | DiffDriveTrainSim_CreateKitbotSim.vi | | | | | |
| | | Χ | | (| | | DiffDriveTrainSim_CreateKitbotSim_EstMass.vi | | | | | |
| | | Χ | | (| | | DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi | | | | | |
| | | Χ | | (| | | DiffDriveTrainSim_GetCurrentDrawAmps.vi | | | | | |
| _ | | Χ | | (| | | DiffDriveTrainSim_GetCurrentGearing.vi | | | | | |
| | | Χ | | (| | | DiffDriveTrainSim_GetDynamics.vi | | | | | |
| | | Χ | _ | (| | | DiffDriveTrainSim_GetHeading.vi | | | | | |
| | | Χ | | (| | | DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi | | | | | |
| | | X | _ | (| | | DiffDriveTrainSim_GetLeftPositionMeters.vi | | | | | |
| _ | | Χ | | (| | | DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi | | | | | |
| _ | | Χ | | (| | | DiffDriveTrainSim_GetOutput_Single.vi | | | | | |
| | | X | _ | (| | | DiffDriveTrainSim_GetPose.vi | | | | | |
| _ | | Χ | | (| | | DiffDriveTrainSim_GetRightCurrentDrawAmps.vi | | | | | |
| | | X | _ | (| | | DiffDriveTrainSim_GetRightPositionMeters.vi | | | | | |
| | | Χ | | (| | | DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi | | | | | |
| | | Χ | | (| | | DiffDriveTrainSim_GetState.vi | | | | | |
| | Χ | Χ | | (| | | DiffDriveTrainSim_GetState_Single.vi | | | | | |
| | X | Χ | 7 | (| | | DiffDriveTrainSim_KitBotWheelSize.vi | | | | | |

| on 2.X 11/12/2021 – State Space Items – (This list is | X X X X X X X X X X X X X X X X X X X | X | X | | C C C C C C C C C C C C C C C C C C C | DiffDriveTrainSim_New.vi DiffDriveTrainSim_New_Mass_MOI.vi DiffDriveTrainSim_SetCurrentGearing.vi DiffDriveTrainSim_SetInputs.vi DiffDriveTrainSim_SetPose.vi DiffDriveTrainSim_SetState.vi DiffDriveTrainSim_ToughBoxMiniGearRatio.vi DiffDriveTrainSim_ToughBoxMiniMotor.vi DiffDriveTrainSim_Update.vi | | | | | |
|---|---------------------------------------|----------------------------|-----------------------|---------------------|---------------------------------------|---|--------------------|--|-------------|--------------|---------|
| | X X X X X X X X X X X X X X X X X X X | X X X X X X | X X X X X | | | DiffDriveTrainSim_New_Mass_MOI.vi DiffDriveTrainSim_SetCurrentGearing.vi DiffDriveTrainSim_SetInputs.vi DiffDriveTrainSim_SetPose.vi DiffDriveTrainSim_SetState.vi DiffDriveTrainSim_ToughBoxMiniGearRatio.vi DiffDriveTrainSim_ToughBoxMiniMotor.vi | | | | | |
| | X X X X X X X X X X X X X X X X X X X | X X X X X X | X X X X X | | | DiffDriveTrainSim_SetCurrentGearing.vi DiffDriveTrainSim_SetInputs.vi DiffDriveTrainSim_SetPose.vi DiffDriveTrainSim_SetState.vi DiffDriveTrainSim_ToughBoxMiniGearRatio.vi DiffDriveTrainSim_ToughBoxMiniMotor.vi | | | | | |
| | X X X X X X X X X X X X X X X X X X X | X X X X | X X X X | | C | DiffDriveTrainSim_SetInputs.vi DiffDriveTrainSim_SetPose.vi DiffDriveTrainSim_SetState.vi DiffDriveTrainSim_ToughBoxMiniGearRatio.vi DiffDriveTrainSim_ToughBoxMiniMotor.vi | | | | | |
| | X | X X X X | X X X X | | | DiffDriveTrainSim_SetPose.vi DiffDriveTrainSim_SetState.vi DiffDriveTrainSim_ToughBoxMiniGearRatio.vi DiffDriveTrainSim_ToughBoxMiniMotor.vi | | | | | |
| | XXX | X X | X X X | | | DiffDriveTrainSim_ToughBoxMiniGearRatio.vi DiffDriveTrainSim_ToughBoxMiniMotor.vi | | | | | |
| | X | X | X | | | DiffDriveTrainSim_ToughBoxMiniMotor.vi | | | | | |
| | | | | | | | | | | | |
| | X . | <u>x</u> | X | | |)iffDriveTrainSim_Update.vi | | | | | |
| | | | | | | | | | | | _ |
| ELEVATOR SIN | X X X X X X X X X X X X X X X X X X X | Not WPILIB | X | Execution Optimized | E E E | /I Name ElevatorSim_New.vi ElevatorSim_GetCurrentDraw.vi ElevatorSim_GetPositionMeters.vi ElevatorSim_GetVelocityMetersPerSecond.vi ElevatorSim_SetState.vi ElevatorSim_SetInputVoltage.vi ElevatorSim_UpdateX.vi ElevatorSim_WouldHitLowerLimit.vi ElevatorSim_WouldHitUpperLimit.vi ElevatorSim_Update.vi | Function Prototype | Notes Needed because this doesn't extend. | Code Review | Test Program | |
| | X | | X | | | ElevatorSim_HasHitLowerLimit.vi | | | | | _ |
| | X | | X | | | ElevatorSim_HasHitUpperLimit.vi | | | | | \perp |
| | X | X | No | | | ElevatorSim_RKF45_Func.vi | | | | | |
| | | | | | | ElevatorSim New NoNoise.vi | | | | | |
| | | | | | | | | | | | \perp |
| | | | | | E | ElevatorSim_New_NoNoise.vi ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi | | | | | |
| | | | | otimized | ram | ElevatorSim_New_LinSys.vi | | | | 2 | |
| | nplemented | ocumented ot WPILIB | lenu Item | 8 | ple Program | ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi | Function Dratature | Nata | ode Review | est Program | |
| ELVANUEFI ON | < Implemented | Documented Not WPILIB | | 0 | Sample Program | ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi | Function Prototype | Notes | Code Review | Test Program | |
| FLYWHEEL SIN | A X | Not WPILIB | X | 8 | Sample Program | ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi /I Name ElyWheelSim_GetAngularVelocityRadPerSec.vi | Function Prototype | Notes | Code Review | Test Program | |
| FLYWHEEL SIN | 1 X X | Not WPILIB | X | 8 | Sample Program | ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi /I Name ElyWheelSim_GetAngularVelocityRadPerSec.vi ElyWheelSim_New_MOI.vi | Function Prototype | Notes | Code Review | Test Program | |
| FLYWHEEL SIN | A X X X | Not WPILIB | X X X | 8 | Sample Program | ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi /I Name ElyWheelSim_GetAngularVelocityRadPerSec.vi ElyWheelSim_New_MOI.vi ElyWheelSim_SetInput.vi | Function Prototype | Notes | Code Review | Test Program | |
| FLYWHEEL SIN | X X X X | Not WPILIB | X X X | 8 | Sample Program | ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi /I Name ElyWheelSim_GetAngularVelocityRadPerSec.vi ElyWheelSim_New_MOI.vi ElyWheelSim_SetInput.vi ElyWheelSim_Update.vi | Function Prototype | Notes | Code Review | Test Program | |
| FLYWHEEL SIN | X X X X X X | Not WPILIB | X X X X | 8 | Sample Program | ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi /I Name ElyWheelSim_GetAngularVelocityRadPerSec.vi ElyWheelSim_New_MOI.vi ElyWheelSim_SetInput.vi ElyWheelSim_Update.vi ElyWheelSim_GetCurrentDrawAmps | Function Prototype | Notes | Code Review | Test Program | |
| FLYWHEEL SIN | X X X X | Not WPILIB | X X X | 8 | Sample Program | ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi FlyWheelSim_GetAngularVelocityRadPerSec.vi ElyWheelSim_New_MOI.vi ElyWheelSim_SetInput.vi ElyWheelSim_Update.vi ElyWheelSim_GetCurrentDrawAmps ElyWheelSim_GetAngularVelocityRPM.vi | Function Prototype | | Code Review | Test Program | |
| FLYWHEEL SIN | X X X X X X | Not WPILIB | X X X X | 8 | Sample Program | ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi FlyWheelSim_GetAngularVelocityRadPerSec.vi ElyWheelSim_New_MOI.vi ElyWheelSim_SetInput.vi ElyWheelSim_Update.vi ElyWheelSim_GetCurrentDrawAmps ElyWheelSim_GetAngularVelocityRPM.vi ElyWheelSim_New_LinSys_NoNoise | Function Prototype | Future | Code Review | Test Program | |
| FLYWHEEL SIN | X X X X X X | Not WPILIB | X X X X | 8 | Sample Program | ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi FlyWheelSim_GetAngularVelocityRadPerSec.vi ElyWheelSim_New_MOI.vi ElyWheelSim_SetInput.vi ElyWheelSim_Update.vi ElyWheelSim_GetCurrentDrawAmps ElyWheelSim_GetAngularVelocityRPM.vi | Function Prototype | | Code Review | Test Program | |

| 5 51111 | 111155111 | inssing one vi) Added additional columns for test and sample. | | | | | | | | | | | |
|---------|-----------|---|----|--|--|---------------------------------------|--|---------------------|--|--|--|--|--|
| | X | | X | | | LinearSystemSim_New | | | | | | | |
| | X | | X | | | LinearSystemSim_SetInput_Single.vi | | | | | | | |
| (| X | | X | | | LinearSystemSim_Update.vi | | | | | | | |
| | X | | No | | | LinearSystemSim_UpdateX.vi | | | | | | | |
| | X | X | No | | | LinearSystemSim_UpdateY.vi | | | | | | | |
| | | | | | | LinearSystemSim_New_NoNoise.vi | | | | | | | |
| (| X | | X | | | LinearSystemSim_SetInput.vi | | | | | | | |
| | X | | X | | | LinearSystemSim_SetInput_Array.vi | | Doesn't use clamp ? | | | | | |
| (| X | | X | | | LinearSystemSim_Setstate.vi | | | | | | | |
| | | | | | | LinearSystemSim_GetCurrentDrawAmps.vi | | DONT IMPLEMENT | | | | | |
| (| X | | X | | | LinearSystemSim_ClampInput.vi | | | | | | | |

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

'======== MATRIX UTILITIES

| Implemented | Documented | Not WPILIB | Execution Optimized | Test Routine | Sample Program | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---------------|------------|------------|---------------------|--------------|----------------------|--------------------|-------|-------------|--------------|----------------|
| MAT BUILDER X | | \ \ \ | SI | | MatBuilder_Fill.vi | | | | | |
| X | |) | (SI | | MatBuilder_Create.vi | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimizec | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|--------|-------------|------------|------------|-----------|---------------------|--------------|----------------|-----------------------|--------------------|-------|-------------|--------------|----------------|
| MATRIX | X | Χ | | X | SI | | | Matrix_AssignBlock.vi | | | | | |
| | X | X | | X | SI | | | Matrix_Block.vi | | | | | |
| | X | X | | X | SI | | | Matrix_Create.vi | | | | | |
| | X | X | | X | SI | | | Matrix_Diag.vi | | | | | |
| | X | X | | X | SI | | | Matrix_ElementSum.vi | | | | | |
| | X | X | | X | 1 | | | Matrix Exp.vi | | | | | |

| 3 31111 | 111133111 | g one vi | , Auc | icu au | iditional columns for test and sample. | | | |
|---------|-----------|----------|-------|--------|--|--|--|--|
| | <i>X</i> | X | SI | | Matrix_ExtractColumnVector.vi | | | |
| | <i>X</i> | X | SI | | Matrix_ExtractFrom.vi | | | |
| | Y | X | SI | | Matrix_ExtractMatrix.vi | | | |
| | <i>X</i> | X | SI | | Matrix_ExtractRowVector.vi | | | |
| | <i>X</i> | X | SI | | Matrix_Fill.vi | | | |
| | <i>X</i> | X | 1 | | Matrix_Ident.vi | | | |
| | <i>X</i> | X | SI | | Matrix_lsEqual.vi | | | |
| | <i>X</i> | X | 1 | | Matrix_LltDecompose.vi | | | |
| | <i>X</i> | X | 1 | | Matrix_Pow.vi | | | |
| | <i>X</i> | X | SI | | Matrix_SetColumn.vi | | | |
| | <i>X</i> | X | SI | | Matrix_SetRow.vi | THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT SHOULD BE INCLUDED HERE FOR ISOLATION. | | |
| - | | | | | | SHOULD BE INCLUDED HERE FOR ISOLATION. | | |
| | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Nample Program | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---------------|-------------|------------|------------|-----------|---------------------|--------------|----------------------------------|--------------------|-------|-------------|--------------|----------------|
| MATRIX HELPER | X | | X | X | SI | | MatrixHelper_Zero.vi | | | | | |
| | X | | Χ | Χ | SI | | MatrixHelper_CooerceSize.vi | | | | | |
| | X | | X | Χ | SI | | MatrixHelper_MultCooerceBSize.vi | | | | | |

| | Implemented | cumen | Not WPILIB | Menu Item | ecution | Sample Program by Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|----------------|-------------|-------|------------|-----------|---------|----------------------------|--------------------|-------|-------------|--------------|----------------|
| VECTOR BUILDER | Χ | X | | | SI | VecBuilder_1x1Fill.vi | | | | | |
| | Χ | X | | | SI | VecBuilder_2x1Fill.vi | | | | | |
| | Χ | X | | | SI | VecBuilder_3x1Fill.vi | | | | | |
| | X | X | | | SI | VecBuilder_4x1Fill.vi | | | | | |
| | X | X | | X | SI | VecBuilder_5x1Fill.vi | | | | | |
| | X | X | | X | SI | VecBuilder_6x1Fill.vi | | | | | |
| | Χ | X | | | SI | VecBuilder_7x1Fill.vi | | | | | |
| | X | X | | X | SI | VecBuilder_8x1Fill.vi | | | | | |
| | | | | | | VecBuilder_9x1Fill.vi | | | | | |
| | | | | | | VecBuilder_10x1Fill.vi | | | | | |
| | Χ | X | X | X | SI | VecBuilder_ArrayBy1Fill.vi | | | | | |
| | | | | | | | | | | | |

'======== MATH '=========

> Function Prototype Notes AngleStats_AngleAdd.vi
> AngleStats_AngleAdd_CallbackHelp.vi
> AngleStats_AngleMean.vi AngleStats_AngleMean_CallbackHelp.vi
> AngleStats_AngleResidual.vi

Χ

Χ

X

X

No X

Χ

X

Χ

X

Χ

NumIntegrate Rk4 K Dbl.vi

NumIntegrate Rk4 Mat X.vi

NumIntegrate_Rkf45Impl.vi

NumIntegrate Trap Dbl.vi

NumIntegrate_Trap_Mat.vi

NumIntegrate Rkf45.vi

NumIntegrate Rk4 Mat X U.vi

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample. X X X X X AngleStats AngleResidual CallbackHelp.vi X X Menu Item VI Name **Function Prototype** Notes MATH UTILITY X X MathUtil_AngleModulus.vi XX MathUtil Clamp.vi | X | SI | X | SI | X | SI | XX MathUtil_ApplyDeadband.vi MathUtil Clamp Int.vi XX MathUtil InputModulus.vi XX Execution Optimized Sample Prog Menu Item Function Prototype Notes X MERWE SCALED SIGMA POINTS $X \mid X$ MerweScSigPts ComputeWeights.vi Χ MerweScSigPts GetNumSigmas.vi XX SI XX X SI MerweScSigPts GetWc.vi X SI XX MerweScSigPts_GetWc_Single.vi XX X SI MerweScSigPts_GetWm.vi XX X SI MerweScSigPts_GetWm_Single.vi XX XI MerweScSigPts New.vi XX ΧI MerweScSigPts New Default.vi XX X I MerweScSigPts_SigmaPoints.vi Execution Optimized nple Progr Not WPILIB S Menu Item VI Name Function Prototype Notes NUMERICAL INTEGRATION X NumIntegrate_Func_Ax_Bu_K.vi No NumIntegrate_Func_Bs.vi Χ NumIntegrate_Func_Ch.vi No Χ No NumIntegrate_Func_Ct.vi Χ NumIntegrate Rk4 Dbl.vi NOT DONE

Page 27 / 29 FRC_LabVIEW_Trajectory_Library_Routines.xlsx

NOT DONE

| | ·-·· | . , , | ************ |
|--------------|--------------|-------------------------|--|
| Revision 2.X | 11/12/2021 - | - State Space Items - (| This list is still missing one VI) Added additional columns for test and sample. |

| NUMERICAL JACOBIAN | Implemented | X Documented | Not WPILIB | X Menu Item | Execution Optimized | Test Routine | NumJacobian_X.vi NumJacobian_U.vi | Function Prototype | Notes There are others that may need implemented. | Code Review | Test Program | Error Checking |
|--------------------|-------------|--------------|------------|-------------|---------------------|--------------|------------------------------------|--------------------|---|-------------|--------------|----------------|
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | Function Prototype | Notes | Code Review | Test Program | Error Checking |
| RICCATI | / | | | Χ | | | Riccati_Check_Detectable.vi | | Routine exists, it is just a shell | | | |
| | / | | | Χ | | | Riccati_Check_Stabilizable.vi | | Not really done !!! | | | |
| | X | Χ | | X | | Χ | Riccati_DARE.vi | | | | | |
| | Χ | | | Χ | | X | Riccati_DARE_Iterate.vi | | | | | |
| | X | Χ | | Χ | | | Riccati_DARE_N.vi | | | | | |
| | Χ | | | Χ | | | Riccati_Input_Check.vi | | | | | |
| | | | | | | | 1 | 1 | | | | 1 |

'====== TYPE DEFINITIONS '=======

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimizea | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|---------|-------------|------------|------------|-----------|---------------------|--------------|----------------|--|--------------------|-------------|
| TypeDef | Ζ | | Χ | Χ | N/A | | | ARM_FF.CTL | | |
| | 1 | | Χ | Χ | N/A | | | BICon-Matrix_FUNC_TYPE.CTL | | |
| | Ζ | | X | Χ | N/A | | | CALLBACK_FUNC_TYPE.CTL | | |
| | Ζ | Χ | Χ | Χ | N/A | | | CHASSIS_SPEEDS.CTL | | |
| | Ζ | Χ | Χ | Χ | N/A | | | CONTRAINED_STATE.CTL | | |
| | Ζ | | Χ | Χ | N/A | | | DCMOTOR.CTL | | |
| | Ζ | Χ | | Χ | N/A | | | DIFF_DRIVE_KINEMATICS.CTL | | |
| | Ζ | | X | X | N/A | | | DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl | | |
| | Ζ | | Χ | Χ | N/A | | | DiFF_DRIVE_POSE_EST.ctl | | |
| | Ζ | | X | Χ | N/A | | | DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl | | |
| | Ζ | | Χ | X | N/A | | | DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl | | |
| | Ζ | | Χ | Χ | N/A | | | DIFF_DRIVE_TRAIN_SIM.ctl | | |
| | Ζ | | Χ | Χ | N/A | | | ELEVATOR_SIM.CTL | | |
| | Ζ | | Χ | Χ | N/A | | | ELEV_FF.CTL | | |
| | Z | | Χ | X | N/A | | | EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL | | |
| - | Z | | X | X | N/A | | | EXTENDED_KALMAN_FILTER.CTL | | |
| - | Z | | X | X | N/A | | | FLYWHEEL_SIM.ctl | | N 4/00/04 |
| - | Z | | X | X | N/A | | | HOLONOMIC_DRV_CTRL.CTL | | New 1/26/21 |
| - | Ζ | | X | X | N/A | | | KALMAN_FILTER.ctl | | |
| - | Z | V | X | X | N/A | | | KALMAN_FILTER_LATENCY_COMP.CTL | | |
| - | Z | X | X | X | N/A | | | LINEAR_FILTER.CTL | | |
| | Ζ | | Χ | X | N/A | | | LINEAR_PLANT_INV_FF.ctl | | |

| still mi | ssing | | | | ditional columns for test and sample. | |
|----------|----------------|-----------|---|------------|--|------------------------------------|
| Z | | | | N/A | LINEAR_QUADRATIC_REGULATOR.ctl | |
| Z | | Χ | X | N/A | LINEAR_SYSTEM_LOOP.ctl | |
| Z | | Χ | Χ | N/A | LINEAR_SYSTEM_SIM.ctl | |
| Z | | Χ | X | N/A | LINEAR SYSTEM.ctl | |
| Z | Χ | Χ | X | N/A | MECA DRIVE KINEMATICS.CTL | |
| Z | X | Χ | X | N/A | MECA DRIVE ODOMETRY.CTL | |
| Z | X | X | | N/A | MECA_WHEEL_SPEEDS.CTL | |
| Z | | X | X | N/A | MEDIAN FILTER.CTL | |
| Z | | X | X | N/A | MERWE_SCALED_SIGMA_PTS.ctl | |
| Z | | X | X | N/A | OBSERVER SNAPSHOT.CTL | |
| Z | | \hat{x} | X | N/A | OBSERVER SNAP LIST ITEM.CTL | |
| Z | Х | X | X | N/A | PARAM STACK ITEM.CTL | |
| Z | \hat{x} | X | X | N/A | PARAM STACK.CTL | |
| Z | ^ | X | X | N/A | PID ADV LIMITS.CTL | |
| Z | | X | | N/A | PID ADV TUNING.CTL | |
| Z | | X | | N/A | PID CONTROLLER.CTL | |
| | | | X | | PID_CONTROLLER.CTL PID_ERROR_TOLERANCE.CTL | |
| Z | | X | | N/A | | |
| Z | | X | X | N/A | PID_INPUT_LIMITS.CTL | |
| Z | V | X | X | N/A | PID_TUNING.CTL | |
| Z | X | X | | N/A | POSE2D.CTL | |
| Z | X | Χ | | N/A | POSEWCURVATURE.CTL | |
| Z | | X | | N/A | PROFILED_PID_CONTROLLER.CTL | |
| Z | X | X | Χ | N/A | RAMSETE.CTL | |
| Z | | Χ | | N/A | RAMSETE_EXE_TUNING.CTL | |
| Z | Χ | Χ | | N/A | ROTATION2D.CTL | |
| Ζ | | Χ | X | N/A | SINGLE_JOINT_ARM_SIM.CTL | |
| Z | Χ | Χ | | N/A | SIMPLE_MOTOR_FF.CTL | |
| Z | | Χ | | N/A | SLEW_RATE_LIMITER.CTL | |
| Z | X | Χ | | N/A | SPLINE_CTRL_VECTOR.CTL | |
| Z | Χ | Χ | X | N/A | SPLINE.CTL SPLINE.CTL | |
| Z | Χ | Χ | X | N/A | SWERVE_DRIVE_KINEMATICS.CTL | |
| Z | Χ | Χ | | N/A | SWERVE_DRIVE_MODULE_STATE.CTL | |
| Z | Χ | Χ | Χ | N/A | SWERVE_DRIVE_ODOMETRY.CTL | |
| Z | | | Χ | N/A | SWERVE_DRIVE_POSE_EST.CTL | |
| Z | | Χ | X | N/A | TIMER.CTL | |
| Z | Χ | Χ | X | N/A | TRAJ_CONFIG.CTL | |
| Z | Χ | Χ | X | N/A | TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL | |
| Z | Χ | Χ | X | N/A | TRAJ_CONSTRAINT_DIFF_DRIVE_KINEMATICS.CTL | |
| Z | X | Χ | X | N/A | TRAJ CONSTRAINT DIFF DRIVE VOLTAGE.CTL | |
| 1 | | Χ | | N/A | TRAJ CONSTRAINT JERK.CTL | Routine exists, it is just a shell |
| Z | Χ | Χ | Χ | N/A | TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL | , |
| Z | X | Χ | | N/A | TRAJ CONSTRAINT MINMAX.CTL | |
| Z | | | Х | | TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL | |
| Z | X | X | | N/A | TRAJ STATE.CTL | |
| Z | X | X | | N/A | TRAJECTORY.CTL | |
| Z | | X | | N/A | TRAJECTORY SPLINE TYPE ENUM.CTL | |
| Z | Х | X | Х | N/A | TRANSFORM2D.CTL | |
| Z | \overline{X} | X | | N/A | TRANSLATION2D.CTL | |
| Z | | X | | N/A | TRAPEZOID PROFILE CONSTRAINT.CTL | |
| Z | | X | X | N/A | TRAPEZOID PROFILE STATE.CTL | |
| Z | | X | X | N/A | TRAPEZOID_PROFILE.CTL | |
| Z | Х | \hat{x} | | N/A | TWIST2D.CTL | |
| Z | ^ | X | X | N/A | UNSCENTED KALMAN FILTER.ctl | |
| Z | | X | X | N/A | UNSCENTED KALMAN NEW FUNC GROUP.CTL | |
| Z | | X | X | N/A | UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL | |
| | V | X | | N/A N/A | UTIL PATHFINDER CONFIG.CTL | |
| Z | X | X | X | NA NA | UTIL_PATHFINDER_CONFIG.CTL UTIL_WAYPOINT.ctl | |
| Z | X | | | | | Now V1 5 |
| Z | | X | Χ | NA N/A | UTIL_WEIGHTED_WAYPOINT.ctl | New V1.5 |
| N/A | | N/A | V | N/A | WAYPOINTS.CTL WEICHTED WAYPOINT CTI | Delete – obsolete |
| Z | | X | Χ | NA N/A | WEIGHTED_WAYPOINT.CTL | New V1.5 |
| N/A | | N/A | | N/A | X_Y_HEADINGS.CTL | Delete – obsolete |