FRC LabVIEW Trajectory Library – VI Implementation List

Revision 2.X  5/2/2022 – added implicit model follower and time interpolatable routines.

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program |
|---|---|---|---|---|---|---|---|
| VI / CTL Totals | 898 | 864 | 292 | 831 | 456 | 34 | 12 |
| VI Total (X) | 805 | | | | | | |
| CTL Total (Z) | 93 | | | | | | |
| VI Shell Total (/) | 4 | | | | | | |
| CTRL Shell Total (\) | 2 | | | | | | |

Doc completed Pct
*96.21%*
*Optimization Pct*
50.78%

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

'============
BASE
'============

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FUNCTION GENERATOR** | X | | X | | | | | FunctionGenerator_Add_Value.vi | | Similar to interpolated tree map.. | | | |
| | X | | X | | | | | FunctionGenerator_Add_XY.vi | | Similar to interpolated tree map.. | | | |
| | X | | X | | | | | FunctionGenerator_Calculate.vi | | Similar to interpolated tree map.. | | | |
| | X | | X | | | | | FunctionGenerator_Clear.vi | | | | | |
| | X | | X | | | | | FunctionGenerator_Execute.vi | | Similar to interpolated tree map.. | | | |
| | X | | X | | | | | FunctionGenerator_New.vi | | Similar to interpolated tree map.. | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LINEAR FILTER** | X | X | | X | I | | | LinearFilter_BackwardFiniteDifference.vi | | | | | |
| | X | X | | X | SI | | | LinearFilter_Calculate.vi | | | | | |
| | X | X | X | X | X | | | LinearFilter_CutoffFrequency.vi | | | | | |
| | X | X | X | X | I | | X | LinearFilter_Execute.vi | | Labview style helper | | | |
| | X | X | | No | I | | | LinearFilter_Factorial.vi | | AN INTERNAL ROUTINE | | | |
| | X | X | | X | X | | | LinearFilter_HighPass.vi | | | | | |
| | X | X | X | X | X | | | LinearFilter_HighPassBW1.vi | | | | | |
| | X | X | X | X | X | | | LinearFilter_HighPassBW2.vi | | | | | |
| | X | X | X | X | X | | | LinearFilter_LowPassBW1.vi | | | | | |
| | X | X | X | X | X | | | LinearFilter_LowPassBW2.vi | | | | | |
| | X | X | | X | X | | | LinearFilter_MovingAverage.vi | | | | | |
| | X | X | | X | I | | | 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 | X | X | X | X | | | LinearFilter_TimeConst.vi | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MEDIAN FILTER** | X | X | | X | X | | | MedianFilter_Calculate.vi | | | | | |
| | X | X | X | X | I | | X | MedianFilter_Execute.vi | | Labview style helper | | | |
| | X | X | | X | SI | | | MedianFilter_New.vi | | | | | |
| | X | X | | X | SI | | | MedianFilter_Reset.vi | | | | | |
| | X | X | X | X | SI | | | MedianFilter_ResetToValue.vi | | | | | |

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

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

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

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TIME INTERPOLATABLE POSE** | X | | X | X | | | | TimeInterpPose_AddSample.vi | | Update to use create matrix | | | |
| | X | | X | No | | | | TimeInterpPose_CleanUp.vi | | Update to use create matrix | | | |
| | X | | X | X | | | | TimeInterpPose_Clear.vi | | | | | |
| | X | | X | X | | | | TimeInterpPose_GetSample.vi | | | | | |
| | X | | X | X | | | | TimeInterpPose_New.vi | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TIME INTERPOLATABLE ROTATION** | X | | X | | | | | TimeInterpRotation_AddSample.vi | | Update to use create matrix | | | |
| | X | | X | No | | | | TimeInterpRotation_CleanUp.vi | | Update to use create matrix | | | |
| | X | | X | | | | | TimeInterpRotation_Clear.vi | | | | | |
| | X | | X | | | | | TimeInterpRotation_GetSample.vi | | | | | |
| | X | | X | | | | | TimeInterpRotation_New.vi | | | | | |
| | | | | | | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DIG SEQ LOGIC** | X | X | X | X | | | | DigSeqLogic_On_Delay.vi | | | | | |
| | X | X | X | X | | | | DigSeqLogic_Off_Delay.vi | | | | | |
| | X | X | X | X | | | | DigSeqLogic_One_Shot.vi | | | | | |
| | X | X | X | X | | | | DigSeqLogic_SR_Flip_Flop.vi | | | | | |
| | | | | | | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DEBOUNCER** | X | X | | X | | | | Debouncer_New.vi | | | | | |
| | X | X | | X | | | | Debouncer_Calculate.vi | | | | | |
| | X | X | X | X | | | | Debouncer_Execute.vi | | | | | |
| | X | X | | No | | | | Debouncer_Reset.vi | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | X | | No | | | | Debouncer_HasElapsed.vi | | | | | |
| | | | | | | | | | | | | |

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ARM FF** | X | X | | X | | | | ArmFF_Calculate.vi | | | | | |
| | X | X | | X | | | | ArmFF_CalculateVelocityOnly.vi | | | | | |
| | | | X | | | | | ArmFF_Execute.vi | | LabVIEW style single call | | | |
| | | | X | | | | | ArmFF_ExecuteVelocityOnly.vi | | LabVIEW style single call | | | |
| | X | X | | X | | | | ArmFF_MaxAchieveAccel.vi | | | | | |
| | X | X | | X | | | | ArmFF_MaxAchieveVelocity.vi | | | | | |
| | X | X | | X | | | | ArmFF_MinAchieveAccel.vi | | | | | |
| | X | X | | X | | | | ArmFF_MinAchieveVelocity.vi | | | | | |
| | X | X | | X | | | | ArmFF_New_ZeroGravity.vi | | | | | |
| | X | X | | X | | | | ArmFF_New.vi | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BANG BANG** | X | X | | X | SI | | | BangBang_AtSetpoint.vi | | | | | |
| | X | X | | X | SI | | | BangBang_Calculate_PV.vi | | | | | |
| | X | X | | X | SI | | | BangBang_Calculate_SP_PV.vi | | | | | |
| | X | X | X | X | SI | | | BangBang_Execute.vi | | | | | |
| | X | X | | X | SI | | | BangBang_GetAll.vi | | | | | |
| | X | X | | X | SI | | | BangBang_GetError.vi | | | | | |
| | X | X | | X | SI | | | BangBang_New.vi | | | | | |
| | X | X | | X | SI | | | BangBang_SetSetpoint.vi | | | | | |
| | X | X | | X | SI | | | BangBang_SetTolerance.vi | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CONTROLLER UTIL** | X | X | | X | SI | | | ControllerUtil_GetModulusError.vi | | This was short lived in WPILIB, but still useful here. | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ELEV FF** | X | X | | X | | | | ElevFF_Calculate.vi | | | | | |
| | X | X | | X | | | | ElevFF_CalculateVelocityOnly.vi | | | | | |
| | | | X | | | | | ElevFF_Execute.vi | | LabVIEW style single call | | | |
| | | | X | | | | | ElevFF_ExecuteVelocityOnly.vi | | LabVIEW style single call | | | |
| | X | X | | X | | | | ElevFF_MaxAchieveAccel.vi | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | X | X | | X | | | | ElevFF_MaxAchieveVelocity.vi | | | | | |
| | X | X | | X | | | | ElevFF_MinAchieveAccel.vi | | | | | |
| | X | X | | X | | | | ElevFF_MinAchieveVelocity.vi | | | | | |
| | X | X | | X | | | | ElevFF_New_ZeroAccel.vi | | | | | |
| | X | X | | X | | | | ElevFF_New.vi | | | | | |

| | *Implemented* | *Documented* | *Not WPILIB* | *Menu Item* | *Execution Optimized* | *Test Routine* | *Sample Program* | VI Name | Function Prototype | Notes | *Code Review* | *Test Program* | *Error Checking* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HOL_DRV_CTRL** | X | X | X | X | | | | HolDrvCtrl_AdvCalculate_Trajectory.vi | | Added 1/24/2022 | | | |
| | X | X | X | X | | | | HolDrvCtrl_AdvCalculate.vi | | Added 1/24/2022 | | | |
| | X | X | | X | SI | | | HolDrvCtrl_AtReference.vi | | Added 1/26/21 | | | |
| | X | X | | X | I | | | HolDrvCtrl_Calculate_Trajectory.vi | | Added 1/26/21 | | | |
| | X | X | | X | I | | | HolDrvCtrl_Calculate.vi | | Added 1/26/21 | | | |
| | X | X | X | X | | | | HolDrvCtrl_Execute_Trajectory.vi | | Added 1/24/2022 | | | |
| | X | X | X | X | | | | HolDrvCtrl_Execute.vi | | Future | | | |
| | X | X | | X | SI | | | HolDrvCtrl_New.vi | | Added 1/26/21 | | | |
| | X | X | X | X | SI | | | HolDrvCtrl_PackExecuteSP.vi | | | | | |
| | X | X | X | X | | | | HolDrvCtrl_PackPID.vi | | Added 1/24/2022 | | | |
| | X | X | X | X | | | | HolDrvCtrl_PackProfPID.vi | | Added 1/24/2022 | | | |
| | X | X | | X | SI | | | HolDrvCtrl_SetEnabled.vi | | Added 1/26/21 | | | |
| | X | X | | X | SI | | | HolDrvCtrl_SetTolerance.vi | | Added 1/26/21 | | | |

| | *Implemented* | *Documented* | *Not WPILIB* | *Menu Item* | *Execution Optimized* | *Test Routine* | *Sample Program* | VI Name | Function Prototype | Notes | *Code Review* | *Test Program* | *Error Checking* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PID CONTROLLER** | X | X | X | X | | | | PIDController_AdvCalculate_FF_Sp_Pv_Per.vi | | Advanced PID | | | |
| | X | X | X | X | | | | PIDController_AdvCalculate_FF_Sp_Pv.vi | | Advanced PID | | | |
| | X | X | X | X | | | X | PIDController_AdvExecute.vi | | Labview style helper. Advanced PID | | | |
| | X | X | | X | SI | | | PIDController_AtSetpoint.vi | | | | | |
| | X | X | | X | | | | PIDController_Calculate_PV.vi | | | | | |
| | X | X | | X | | | | PIDController_Calculate_SP_PV.vi | | | | | |
| | X | X | | X | SI | | | PIDController_DisableContinousInput.vi | | | | | |
| | X | X | | X | SI | | | PIDController_EnableContinousInput.vi | | | | | |
| | X | X | X | X | | | X | PIDController_Execute.vi | | Labview style helper | | | |
| | | | | | | | | PIDController_GetContinuousError.vi | | OBSOLETE – Removed | | | |
| | X | X | | X | SI | | | PIDController_GetPeriod.vi | | | | | |
| | X | X | | X | SI | | | PIDController_GetPID.vi | | | | | |
| | X | X | | X | SI | | | PIDController_GetPositionError.vi | | | | | |
| | X | X | | X | SI | | | PIDController_GetSetpoint.vi | | | | | |
| | X | X | | X | SI | | | PIDController_GetVelocityError.vi | | | | | |
| | X | X | | X | SI | | | PIDController_IsContinuousInputEnabled.vi | | | | | |
| | X | X | | X | I | | | PIDController_New.vi | | | | | |
| | X | X | | X | I | | | PIDController_NewPeriod.vi | | | | | |
| | X | X | X | X | SI | | | PIDController_Pack_AdvLimits.vi | | | | | |
| | X | X | X | X | SI | | | PIDController_Pack_AdvTuning.vi | | | | | |
| | X | X | X | X | SI | | | PIDController_Pack_ErrorTolerance.vi | | | | | |
| | X | X | X | X | SI | | | PIDController_Pack_InputLimits.vi | | | | | |
| | X | X | X | X | SI | | | PIDController_Pack_Tuning.vi | | | | | |
| | X | X | | X | SI | | | PIDController_Reset.vi | | | | | |
| | X | X | | X | SI | | | PIDController_SetD.vi | | | | | |
| | X | X | X | X | SI | | | PIDController_SetDerivativeFilter.vi | | Advanced PID | | | |
| | X | X | X | No | | | | PIDController_SetFeedForward_OBSOLETE_DELETE.vi | | Advanced PID, Obsolete – DELETE | | | |
| | X | X | X | No | | | | PIDController_SetFFGain_OBSOLETE_DELETE.vi | | Advanced PID, Obsolete – DELETE | | | |
| | X | X | | X | SI | | | PIDController_SetI.vi | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | PIDController_SetInputRange.vi | | OBSOLETE – Removed | | | |
| X | X | | X | SI | | | PIDController_SetIntegratorRange.vi | | | | | |
| X | X | X | X | SI | | | PIDController_SetOutputLimits.vi | | Advanced PID | | | |
| X | X | | X | SI | | | PIDController_SetP.vi | | | | | |
| X | X | X | X | SI | | | PIDController_SetPeriod.vi | | | | | |
| X | X | | X | SI | | | PIDController_SetPID.vi | | | | | |
| X | X | X | X | SI | | | PIDController_SetPIDF.vi | | Advanced PID | | | |
| X | X | | X | SI | | | PIDController_SetSetpoint.vi | | | | | |
| X | X | | X | SI | | | PIDController_SetTolerance.vi | | | | | |
| X | X | | X | SI | | | PIDController_SetTolerancePandV.vi | | | | | |

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

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

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

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

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POSE** | X | X | | X | SI | | | Pose_Equals.VI | boolean equals( other obj ) | | | | |
| | X | X | | X | X | | | Pose_Exp.vi | pose2d exp( twist2d twist ) | | | | |
| | X | X | | X | SI | | | Pose_getRotation.vi | rotation2d getRotation() | can also use cluster unpack | | | |
| | X | X | | X | SI | | | Pose_getTranslation.vi | translation2d getTranslation() | can also use cluster unpack | | | |
| | X | X | X | X | SI | | | Pose_getXY.vi | | | | | |
| | X | X | X | X | SI | | | Pose_getXYAngle.vi | | | | | |
| | X | X | | X | I | | | Pose_Interpolate.vi | | | | | |
| | X | X | | X | X | | | Pose_Log.vi | twist2d log( pose2d end ) | | | | |
| | X | X | | X | SI | | | Pose_Minus.vi | transform2d minus( pose2d other ) | | | | |
| | X | X | | X | SI | | | Pose_New_TRRO.vi | pose2d new( translation2d, rotation2d ) | | | | |
| | X | X | | X | SI | | | Pose_New.vi | pose2d new( double x, double y, rotation2d ) | | | | |
| | X | X | | X | SI | | | Pose_Plus.vi | pose2d plus( transform2d other ) | | | | |
| | X | X | | X | SI | | | Pose_RelativeTo.vi | pose2d relativeto( pose2d other ) | | | | |
| | X | X | | X | SI | | | Pose_TransformBy.vi | pose2d transformby( transform2d other ) | | | | |
| | | | | | | | | | pose2d new( ) | can use cluster constant | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ROTATION** | X | X | | X | SI | | | Rotation_CreateAngle.vi | rotation2d new( double value ) | | | | |
| | X | X | | X | SI | | | Rotation_CreateAngleDegrees.vi | rotation2d fromDegrees( double degrees ) | convert to radians then create | | | |
| | X | X | | X | SI | | | Rotation_CreateAngleRotations.vi | | | | | |
| | X | X | | X | SI | | | Rotation_CreateXY.vi | rotation2d new( double x, double y ) | | | | |
| | X | X | | X | SI | | | Rotation_Equals.vi | boolean equals( rotation2d other ) | | | | |
| | X | X | X | X | SI | | | Rotation_GetAngleCosSin.vi | | New 1/26/21 | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | X | X | | X | SI | | | Rotation_GetCos.VI | double getCos() | use cluster unpack | | | |
| | X | X | | X | SI | | | Rotation_GetDegrees.VI | double getDegrees() | use cluster unpack, then convert to degree | | | |
| | X | X | | X | SI | | | Rotation_GetRadians.VI | double getRadians() | use cluster unpack | | | |
| | X | X | | X | SI | | | Rotation_GetRotations.vi | | | | | |
| | X | X | | X | SI | | | Rotation_GetSin.VI | double getSin() | use cluster unpack | | | |
| | X | X | | X | SI | | | Rotation_GetTan.VI | double getTan() | can calculate | | | |
| | X | X | | X | SI | | | Rotation_Interpolate.vi | | | | | |
| | X | X | | X | SI | | | Rotation_Minus.vi | rotation2d minus( rotation2d other ) | | | | |
| | X | X | | X | SI | | | Rotation_Plus.vi | rotation2d plus( rotation2d other ) | | | | |
| | X | X | | X | SI | | | Rotation_RotateBy.vi | rotation2d rotateby( rotation2d other ) | | | | |
| | X | X | | X | SI | | | Rotation_Times.vi | rotation2d times( double scalar ) | | | | |
| | X | X | | X | SI | | | Rotation_UnaryMinus.vi | rotation2d unaryminus( ) | | | | |
| | | | | | | | | | rotation2d new() | can use cluster constant | | | |

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

| | *Implemented* | *Documented* | *Not WPILIB* | *Menu Item* | *Execution Optimized* | *Test Routine* | *Sample Program* | VI Name | Function Prototype | Notes | *Code Review* | *Test Program* | *Error Checking* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TRANSLATION** | X | X | | X | SI | | | Translation_Create_DistAng.vi | | | | | |
| | X | X | | X | SI | | | Translation_Create.vi | translation2d new( double x, double y ) | | | | |
| | X | X | | X | SI | | | Translation_Equals.vi | boolean equals( translation other ) | | | | |
| | X | X | | X | SI | | | Translation_GetDistance.vi | double getDistance( translation2d other ) | | | | |
| | X | X | | X | SI | | | Translation_GetNorm.VI | double getNorm() | can use cluster unpack | | | |
| | X | X | | X | SI | | | Translation_GetX.VI | double getX() | can use cluster unpack | | | |
| | X | X | X | X | SI | | | Translation_GetXY.VI | | | | | |
| | X | X | | X | SI | | | Translation_GetY.VI | double getY() | can use cluster unpack | | | |
| | X | X | | X | SI | | | Translation_Interpolate.vi | | | | | |
| | X | X | | X | SI | | | Translation_Minus.vi | translation2d minus( translation2d other ) | | | | |
| | X | X | | X | SI | | | Translation_Plus.vi | translation2d plus( translation2d other ) | | | | |
| | X | X | | X | SI | | | Translation_RotateBy.vi | translation2d rotateBy( rotation2d other ) | | | | |
| | X | X | | X | SI | | | Translation_Times.vi | translation2d times( double scalar ) | | | | |
| | X | X | | X | SI | | | Translation_UnaryMinus.vi | translation2d unaryminus( ) | | | | |
| | | | | | | | | | translation2d new() | can use cluster constant | | | |
| | | | | | | | | | translation2d div( double scalar ) | can multiply by 1/scalar | | | |

| | *Implemented* | *Documented* | *Not WPILIB* | *Menu Item* | *Execution Optimized* | *Test Routine* | *Sample Program* | VI Name | Function Prototype | Notes | *Code Review* | *Test Program* | *Error Checking* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TWIST** | X | X | | X | SI | | | Twist_Create.vi | twist new( x, y, theta ) | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | X | | X | SI | | | Twist_Equals.VI | boolean equals( obj other ) | | | | |
| X | X | X | X | SI | | | Twist_GetAll.VI | | | | | |

'============
KINEMATICS
'============

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

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DIFFERENTIAL DRIVE ODOMETRY** | | | X | | | | | DiffOdometry_Execute.vi | | DONT NEED | | | |
| | X | X | | X | X | | | DiffOdometry_Update.vi | pose2d update( rotation2d gyro, double leftdist, double right dist ) | Incorporates enhanced reset | | | |
| | | | | | | | | | diffDrOdom new( rotation gyro, pose initial ) | | | | |
| | | | | | | | | | diffDrOdom new( rotation gyro ) | | | | |
| | | | | | | | | | void resetPosition( pose2d, rotation2d ) | incorporated into “update” | | | |
| | | | | | | | | | pose2d getPoseMeters() | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DIFFERENTIAL DRIVE WHEEL SPEEDS** | | | | | | | | | diffDrWheelSpeeds new() | | | | |
| | | | | | | | | | diffDrWheelSpeeds new( double leftVel, double rightVel ) | | | | |
| | X | X | | X | X | | | DiffWheel_Normalize.vi | void normalize( double maxVel ) | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MECANUM DRIVE KINEMATICS** | X | X | | X | I | | | MecaKinematics_New.vi | | | | | |
| | X | X | | X | X | | | MecaKinematics_SetInverseKinematics.vi | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | X | X | | X | X | | | MecaKinematics_ToChassisSpeeds.vi | | | | | |
| | X | X | | X | X | | | MecaKinematics_ToWheelSpeeds.vi | | | | | |
| | X | X | | X | X | | | MecaKinematics_ToWheelSpeedsZeroCenter.vi | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MECANUM DRIVE MOTOR VOLTAGE** | | | | | | | | | | | | | |
| *nothing done* | | | | | | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MECANUM DRIVE ODOMETRY** | | | X | | | | | MecaOdometry_Execute.vi | | | | | |
| | X | X | | X | | | | MecaOdometry_GetPose.vi | | | | | |
| | X | X | | X | | | | MecaOdometry_New.vi | | | | | |
| | X | X | | X | | | | MecaOdometry_NewDefaultPose.vi | | | | | |
| | X | X | | X | | | | MecaOdometry_Reset.VI | | | | | |
| | X | X | | X | | | | MecaOdometry_Update.vi | | | | | |
| | X | X | | X | | | | MecaOdometry_UpdateWithTime.vi | | | | | |

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

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SWERVE DRIVE ODOMETRY** | | | | | | | | SwerveOdometry_Execute4.vi | | | | | |
| | | | | | | | | SwerveOdometry_ExecuteX.vi | | | | | |
| | X | X | | X | | | | SwerveOdometry_GetPosition.VI | public Pose2d getPoseMeters() | | | | |
| | X | X | | X | | | | SwerveOdometry_New.VI | public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle, Pose2d initialPose) | | | | |
| | X | X | | X | | | | SwerveOdometry_NewZeroCenter.VI | public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle) | | | | |
| | X | X | | X | | | | SwerveOdometry_ResetPosition.VI | public void resetPosition(Pose2d pose, Rotation2d gyroAngle) | | | | |
| | X | X | X | X | | | | SwerveOdometry_Update4.VI | | For 4 module drives | | | |
| | X | X | X | X | | | | SwerveOdometry_UpdateWithTime4.VI | | For 4 module drives | | | |
| | X | X | X | X | | | | SwerveOdometry_UpdateWithTimeX.VI | | uses array as input | | | |
| | X | X | X | X | | | | SwerveOdometry_UpdateX.VI | | uses array as input | | | |
| | | | | | | | | | public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState... moduleStates) | variable parameters (replace with array and “4” calls) | | | |
| | | | | | | | | | public Pose2d update(Rotation2d gyroAngle, SwerveModuleState... moduleStates) | variable parameters (replace with array and “4” calls) | | | |

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

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

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

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

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | public double curvatureRadPerMeter.. | not needed, use cluster unpack | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **QUINTIC HERMITE SPLINE** | X | X | | X | | | | QuinticHermiteSpline_getControlVectorFromArrays.vi | private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) | | | | |
| | X | X | | X | | | | QuinticHermiteSpline_makeHermiteBasis.vi | private SimpleMatrix makeHermiteBasis() | | | | |
| | X | X | | X | | | | QuinticHermiteSpline_New.vi | public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) | | | | |
| | | | | | | | | | protected SimpleMatrix getCoefficients() | not needed, use cluster unpack | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SPLINE (Abstract class)** | X | X | | X | | | | Spline_getPoint.vi | public PoseWithCurvature getPoint(double t) | | | | |
| | | | | | | | | | Spline(int degree) | | | | |
| | | | | | | | | | public static class ControlVector | | | | |
| | | | | | | | | | public ControlVector(double[] x, double[] y) | implemented as data structure | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SPLINE HELPER** | X | X | | X | SI | | | SplineHelp_GetCubicCtrlVector.vi | private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point) | | | | |
| | X | X | | X | | X | | SplineHelp_GetCubicCtrlVectorsFromWayPts.vi | public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints( Pose2d start, Translation2d[] interiorWaypoints, Pose2d end ) | | | | |
| | X | X | X | X | | | | SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi | | | | | |
| | X | X | X | No | | | | SplineHelp_GetCubicSpline_Calc1.vi | | internal | | | |
| | X | X | X | No | | | | SplineHelp_GetCubicSpline_Calc2.vi | | internal | | | |
| | X | X | X | No | | | | SplineHelp_GetCubicSpline_Calc3.vi | | internal | | | |
| | X | X | | X | | X | | SplineHelp_getCubicSplinesFromControlVectors.vi | public static CubicHermiteSpline[] getCubicSplinesFromControlVectors( Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end) | | | | |
| | X | X | | X | SI | | | SplineHelp_GetQuinticCtrlVector.vi | private static Spline.ControlVector getQuinticControlVector(double scalar, Pose2d point) | | | | |
| | | | | | | | | SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi | public static List<Spline.ControlVector> getQuinticControlVectorsFromWaypoints( List<Pose2d> waypoints ) | REMOVED 2762 | | | |
| | | | | | | | | SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi | | REMOVED 2762 | | | |
| | X | X | | X | | | | SplineHelp_getQuinticSplinesFromControlVectors.vi | public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors( Spline.ControlVector[] controlVectors) | | | | |
| | X | X | X | X | | | | SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi | | New 2762 | | | |
| | X | X | | X | | | | SplineHelp_GetQuinticSplinesFromWayPts.vi | | New 2762 | | | |
| | X | X | | No | | | | SplineHelp_ThomasAlgorithm.vi | private static void thomasAlgorithm(double[] a, double[] b, double[] c, double[] d, double[] solutionVector) | internal | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SPLINE PARAMETERIZER** | X | X | | X | | | | SplineParam_Spline_T0_T1.vi | public static List<PoseWithCurvature> parameterize(Spline spline, double t0, double t1) | | | | |
| | X | X | | X | | X | | SplineParam_Spline.vi | public static List<PoseWithCurvature> parameterize(Spline spline) | | | | |
| | X | X | X | No | | | | SplineParam_StackGet.vi | | internal | | | |
| | X | X | X | No | | | | SplineParam_StackPop.vi | | internal | | | |
| | X | X | X | No | | | | SplineParam_StackPush.vi | | internal | | | |

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

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

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TRAJECTORY CONFIG** | X | X | | X | SI | | | TrajectoryConfig_Create.vi | public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq) | | | | |
| | X | X | X | X | SI | | | TrajectoryConfig_setCentripetalAccel.vi | | | | | |
| | 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) | | | | |
| | X | X | | X | SI | | | TrajectoryConfig_setReversed.vi | public TrajectoryConfig setReversed(boolean reversed) | | | | |
| | X | X | X | X | SI | | | TrajectoryConfig_setVoltageDiffDrive.vi | | | | | |
| | | | | | | | | | public TrajectoryConfig addConstraint(TrajectoryConstraint constraint) | Implemented differently, can't duplicate. | | | |
| | | | | | | | | | public TrajectoryConfig addConstraints(List<? extends TrajectoryConstraint> constraints) | Implemented differently, can't duplicate. | | | |
| | | | | | | | | | 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() | Implemented differently, can't duplicate. | | | |
| | | | | | | | | | public boolean isReversed() | can use cluster unpack | | | |
| | | | | | | | | | 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 | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TRAJECTORY GENERATE** | X | X | | X | | | | TrajectoryGenerate_Make_Cubic_CtrlVect.vi | public static Trajectory generateTrajectory( Spline.ControlVector initial, List<Translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config ) | uses cubic splines | | | |
| | X | X | | X | | | | TrajectoryGenerate_Make_Cubic.vi | public static Trajectory generateTrajectory( Pose2d start, List<Translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config ) | uses cubic splines | | | |
| | X | X | X | X | | | | TrajectoryGenerate_Make_Generic.vi | Helper to bring these all together…. | Use this one!!! | | | |
| | X | X | | X | | | | TrajectoryGenerate_Make_Quintic_CtrlVect.vi | public static Trajectory generateTrajectory( ControlVectorList controlVectors, TrajectoryConfig config) | uses quintic splines | | | |
| | X | X | X | X | | | | TrajectoryGenerate_Make_Quintic_Weighted.vi | | New 2762 | | | |
| | X | X | | X | | | | TrajectoryGenerate_Make_Quintic.vi | public static Trajectory generateTrajectory(List<Pose2d> waypoints, TrajectoryConfig config) | uses quintic splines | | | |
| | X | X | | X | | | | TrajectoryGenerate_splinePointsFromSplines.vi | public static List<PoseWithCurvature> splinePointsFromSplines(Spline[] splines) | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TRAJECTORY GENERATE (Control Vector)** | | | | | | | | | public ControlVectorList(int initialCapacity) | may not need, just data | | | |
| | | | | | | | | | public ControlVectorList() | may not need, just data | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | public ControlVectorList(Collection<? extends Spline.ControlVector> collection) | may not need, just data | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TRAJECTORY PARAMETERIZE** | X | X | X | No | | | | TrajectoryParam_calcStuffFwd.vi | | | | | |
| | X | X | X | No | | | | TrajectoryParam_calcStuffRev.vi | | | | | |
| | X | X | | No | | | | TrajectoryParam_enforceAccel.vi | private static void enforceAccelerationLimits(boolean reverse, List<TrajectoryConstraint> constraints, ConstrainedState state) | This routines needs to be changed when new constraints are added. | | | |
| | X | X | X | No | | | | TrajectoryParam_enforceVelocity.vi | | This routines needs to be changed when new constraints are added. | | | |
| | X | X | | X | | | | TrajectoryParam_timeParam.vi | public static Trajectory timeParameterizeTrajectory( List<PoseWithCurvature> points. List<TrajectoryConstraint> constraints, double startVelocityMetersPerSecond, double endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq, boolean reversed ) | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TRAJECTORY PARAMETERIZE CONSTRAINED STATE** | X | X | | X | | | | ConstrainedState_New.vi | ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq) | | | | |
| | X | X | X | X | | | | ConstrainedState_SetMaxAccel.vi | | | | | |
| | X | X | X | X | | | | ConstrainedState_SetMinAccel.vi | | | | | |
| | X | X | X | X | | | | ConstrainedState_SetVelAccel.vi | | | | | |
| | X | X | X | X | | | | ConstrainedState_SetVelocity.vi | | | | | |
| | | | | | | | | | ConstrainedState() | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TRAJECTORY UTIL** | X | X | | X | | | | TrajectoryUtil_fromPathWeaverJSON.vi | public static Trajectory fromPathweaverJson(Path path) | | | | |
| | X | X | X | X | X | | | TrajectoryUtil_MakeWeightedWayPoint_ENG.vi | | | | | |
| | X | X | X | X | X | | | TrajectoryUtil_MakeWeightedWayPoint.vi | | | | | |
| | X | X | | X | | | | TrajectoryUtil_toPathWeaverJSON.vi | public static void toPathweaverJson(Trajectory trajectory, Path path) | | | | |
| | | | | | | | | | public static Trajectory deserializeTrajectory(String json) | | | | |
| | | | | | | | | | public static String serializeTrajectory(Trajectory trajectory) | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **TRAPEZOID PROFILE** | X | X | | X | | | | TrapProfConstraint_New.vi | | |
| | X | X | | X | | | | TrapProfile_Calculate.vi | | |
| | X | X | | No | | | | TrapProfile_Direct.vi | | Private, remove from menu |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| X | X | X | X | | | | TrapProfile_Execute.vi | | |
| X | X | X | X | SI | | | TrapProfile_Execute_AtGoal.vi | | |
| X | X | | X | | | | TrapProfile_IsFinished.vi | | |
| X | X | | X | | | | TrapProfile_New_DefInitial.vi | | |
| X | X | | X | | | | TrapProfile_New.vi | | |
| X | X | | No | | | | TrapProfile_ShouldFlipAcceleration.vi | | Private, remove from menu |
| X | X | | X | | | | TrapProfile_TimeLeftUntil.vi | | |
| X | X | | X | | | | TrapProfile_TotalTime.vi | | |
| X | X | | X | | | | TrapProfState_Equals.vi | | |
| X | X | | X | | | | TrapProfState_New.vi | | |

'============
TRAJECTORY CONSTRAINT
'============

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **CENTRIPETAL ACCELERATION CONSTRAINT** | X | X | | X | | | | CentripetalAccelConstraint_getMaxVelocity.vi | public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) | |
| | X | X | | X | | | | CentripetalAccelConstraint_getMinMaxAccel.vi | public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) | |
| | X | X | | X | SI | | | CentripetalAccelConstraint_New.vi | public CentripetalAccelerationConstraint(double maxCentripetalAccelerationMetersPerSecondSq) | Can use cluster pack for now |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **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 | Sample Program | VI Name | Function Prototype | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **DIFF DRIVE VOLTAGE CONSTRAINT** | X | X | | X | | | | DiffDriveVoltageConstraint_getMaxVelocity.vi | public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) | |
| | X | X | | X | | | | DiffDriveVoltageConstraint_getMinMaxAccel.vi | public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) | |
| | X | X | | X | SI | | | DiffDriveVoltageConstraint_New.vi | public DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage) | |

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

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

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

**TRAJECTORY CONSTRAINT**

*Interface class - nothing done (not needed)*

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **TRAJECTORY CONSTRAINT (Min Max)** | X | X | | X | SI | | | Constraint_MinMax_New.vi | Constraint_MinMax_New | |
| | X | X | | X | SI | | | Constraint_MinMax_NewMinMax.VI | Constraint_MinMax_New | |

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

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

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | X | X | X | X | | | | Util_Array_PoseWCurv_to_XY.vi | | |
| | X | X | X | X | SI | | | Util_CalcDist.vi | | |
| | X | X | X | X | SI | | | Util_GetLibraryVersion.vi | | |
| | X | X | X | X | SI | | | Util_GetLibUsage.vi | | |
| | X | X | X | X | | | | Util_GetTime.vi | | Once tested completely, this should be optimized! |
| | X | X | X | No | N/A | | | Util_LibraryGlobals.vi | | Global Variables – no block diag. |
| | X | X | X | X | | | | Util_Trajectory_Absolute_To_Relative.vi | | |
| | X | X | X | X | | | | Util_Trajectory_ReadFile.vi | | |
| | X | X | X | X | | | | Util_Trajectory_to_XY.vi | | |
| | X | X | X | No | | | | Util_Trajectory_WriteFile_Config.vi | | internal |
| | X | X | X | No | | | | Util_Trajectory_WriteFile_OneState.vi | | internal |
| | X | X | X | X | | | | Util_Trajectory_WriteFile_PathFinder.vi | | |
| | X | X | X | No | | | | Util_Trajectory_WriteFile_PathFinderConfig.vi | | internal |
| | X | X | X | X | | | | Util_Trajectory_WriteFile_Pathweaver.vi | | |
| | X | X | X | No | | | | Util_Trajectory_WriteFile_States.vi | | internal |
| | X | X | X | No | | | | Util_Trajectory_WriteFile_WayPoints.vi | | internal |
| | X | X | X | X | | | | Util_Trajectory_WriteFile.vi | | |
| | X | X | X | X | | | | Util_TrajectoryState_Meters_To_Inches.vi | | |
| | X | X | X | X | | | | Util_TrajState_to_DiffDrive_WheelPos.vi | | |
| | X | X | X | X | | | | Util_Waypoint_Eng_To_SI.vi | | |
| | X | X | X | X | | | | Util_Waypoint_To_CubicInput.vi | | |
| | X | X | X | X | | | | Util_Waypoint_To_QuinticInput.vi | | |
| | X | X | X | X | | | | Util_WeightedWaypiont_Eng_To_WeightedWaypoint | | |
| | X | X | X | No | | | | Util_WeightedWayPoint_To_WeightedWayPoint.vi | | Sorry about the confusing name.. |

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **CONV** | X | X | X | X | SI | | | Conv_AngleDegrees_Heading.vi | | |
| | X | X | X | X | SI | | | Conv_AngleRadians_Heading.vi | | |
| | X | X | X | X | SI | | | Conv_Centimeters_Meters.vi | | |
| | X | X | X | X | SI | | | Conv_Deg_Radians.vi | | |
| | X | X | X | X | SI | | | Conv_Deg_Rotations.vi | | |
| | X | X | X | X | SI | | | Conv_Feet_Meters.vi | | |
| | X | X | X | X | SI | | | Conv_GyroDegrees_Heading.vi | | |
| | X | X | X | X | SI | | | Conv_Heading_AngleRadians.vi | | |
| | X | X | X | X | SI | | | Conv_Inches_Meters.vi | | |
| | X | X | X | X | SI | | | Conv_Kilograms_Pounds.vi | | |
| | X | X | X | X | SI | | | Conv_Meters_Feet.vi | | |
| | X | X | X | X | SI | | | Conv_Meters_Inches.vi | | |
| | X | X | X | X | SI | | | Conv_POSE_SI_Eng.vi | | |
| | X | X | X | X | SI | | | Conv_Pounds_Kilograms.vi | | |
| | X | X | X | X | SI | | | Conv_Radians_Deg.vi | | |
| | X | X | X | X | SI | | | Conv_Radians_Rotations.vi | | |
| | X | X | X | X | SI | | | Conv_Rotations_Deg.vi | | |
| | X | X | X | X | SI | | | Conv_Rotations_Radians.vi | | |
| | X | X | X | X | SI | | | Conv_Yards_Meters.vi | | |

Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines.

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

'============
PATHFINDER UTIL
'============

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

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

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DC MOTOR** | X | X | | X | SI | | | DCMotor_GetAndymark9015.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetAndymarkRs775_125.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetBag.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetBanebotsRs550.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetBanebotsRs775.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetCIM.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetCurrent.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetFalcon500.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetMiniCIM.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetNEO.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetNEO550.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetRomiBuiltIn.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_GetVex775Pro.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_New.vi | | | | | |
| | X | X | | X | SI | | | DCMotor_PickMotor.vi | | | | | |
| | | | | | | | | | | | | | |

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

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

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

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

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

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SWERVE DRIVE POSE ESTIMATOR** | | | | | | | | SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi | | | | | |
| | X | X | | X | | | | SwerveDrivePoseEst_AddVisionMeasurement.vi | | | | | |
| | X | X | | X | | | | SwerveDrivePoseEst_GetEstimatedPosition.vi | | | | | |
| | X | X | | X | | | | SwerveDrivePoseEst_Kalman_F_Callback.vi | | | | | |
| | X | X | | X | | | | SwerveDrivePoseEst_Kalman_H_Callback.vi | | | | | |
| | X | X | | X | | | | SwerveDrivePoseEst_New.vi | | | | | |
| | X | X | | X | | | | SwerveDrivePoseEst_ResetPosition.vi | | | | | |
| | X | X | | X | | | | SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi | | | | | |
| | X | X | | X | | | | SwerveDrivePoseEst_Update.vi | | | | | |
| | X | X | | X | | | | SwerveDrivePoseEst_UpdateWithTime.vi | | | | | |
| | X | X | | X | | | | SwerveDrivePoseEst_VisionCorrect_Callback.vi | | | | | |
| | X | X | | X | | | | SwerveDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi | | | | | |
| | | | | | | | | | | | | | |

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

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines.

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **UNSCENTED KALMAN FILTER** | X | X | | X | | | | UnscentedKalmanFilter_Correct_FuncGroup.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_Correct_OnlyUY.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_Correct_OnlyUYR.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_Correct.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_GetP_Single.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_GetP.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_GetXHat_Single.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_GetXHat.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_New_Default.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_New_FuncGroup.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_New.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_Predict.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_Reset.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_SetP.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_SetXHat_Single.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_SetXHat.vi | | | | | |
| | X | X | | X | | | | UnscentedKalmanFilter_Transform.vi | | | | | |
| | | | | | | | | | | | | | |

'============
STATE SPACE CONTROL
'============

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CONTROL AFFINE PLANT INVERSION FEEDFORWARD** | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DIFFERENTIAL DRIVE ACCELERATION LIMITER** | X | | | | | X | | DiffDrvAccelLimit_Calculate.vi | | | | | |
| | X | | | | | X | | DiffDrvAccelLimit_New.vi | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **IMPLICIT MODEL FOLLOWER** | X | | | X | | X | | ImplModelFollow_Calculate.vi | | | | | |
| | X | | | X | | X | | ImplModelFollow_GetU.vi | | | | | |
| | X | | | X | | X | | ImplModelFollow_GetU_Single.vi | | | | | |
| | X | | | X | | X | | ImplModelFollow_New.vi | | | | | |
| | X | | | X | | X | | ImplModelFollow_New_Plant.vi | | | | | |
| | X | | | X | | X | | ImplModelFollow_Reset.vi | | | | | |
| | | | | | | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LINEAR PLANT INVERSION FEEDFORWARD** | X | X | | X | | | | LinearPlntInvFF_Calculate_NextR.vi | | | | | |
| | X | X | | X | | | | LinearPlntInvFF_Calculate.vi | | | | | |
| | X | X | | X | | | | LinearPlntInvFF_GetR_Single.vi | | | | | |
| | X | X | | X | | | | LinearPlntInvFF_GetR.vi | | | | | |
| | X | X | | X | | | | LinearPlntInvFF_GetUff_Single.vi | | | | | |
| | X | X | | X | | | | LinearPlntInvFF_GetUff.vi | | | | | |
| | X | X | | X | | | | LinearPlntInvFF_New_Plant.vi | | | | | |
| | X | X | | X | | | | LinearPlntInvFF_New.vi | | | | | |
| | X | X | | X | | | | LinearPlntInvFF_Reset_Initial.vi | | | | | |
| | X | X | | X | | | | LinearPlntInvFF_Reset_Zero.vi | | | | | |
| | | | | | | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LINEAR QUADRATIC REGULATOR** | X | X | | X | | | | LinearQuadraticRegulator_Calculate_NextR.vi | | | | | |
| | X | X | | X | | | | LinearQuadraticRegulator_Calculate.vi | | | | | |
| | X | X | | X | | | | LinearQuadraticRegulator_GetK_Single.vi | | NOT ORIGINAL… | | | |
| | X | X | | X | | X | | LinearQuadraticRegulator_GetK.vi | | | | | |
| | X | X | | X | | | | LinearQuadraticRegulator_GetR_Single.vi | | | | | |
| | X | X | | X | | | | LinearQuadraticRegulator_GetR.vi | | | | | |
| | X | X | | X | | | | LinearQuadraticRegulator_GetU_Single.vi | | | | | |
| | X | X | | X | | | | LinearQuadraticRegulator_GetU.vi | | | | | |
| | / | X | | X | | X | | LinearQuadraticRegulator_LatencyCompensate.vi | | Routine exists, but it only has interger raise matrix to power. | | | |
| | X | X | | X | | | | LinearQuadraticRegulator_New_ELMS.vi | | | | | |
| | X | X | | X | | | | LinearQuadraticRegulator_New_N.vi | | | | | |
| | | | | | | | | LinearQuadraticRegulator_New_Raw.vi | | | | | |
| | X | X | | X | | X | | LinearQuadraticRegulator_New_SystemELMS.vi | | | | | |
| | X | X | | X | | | | LinearQuadraticRegulator_New.vi | | | | | |
| | X | X | | X | | | | LinearQuadraticRegulator_Reset.vi | | | | | |
| | | | | | | | | | | | | | |

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

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

'============
STATE SPACE UTILITIES
'============

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CALLBACK HELPER** | X | X | X | X | | | | CallbackHelp_MatrixMinus.vi | | | | | |
| | X | X | X | X | | | | CallbackHelp_MatrixMult_CoerceSizeB.vi | | | | | |
| | X | X | X | X | | | | CallbackHelp_MatrixMult.vi | | | | | |
| | X | X | X | X | | | | CallbackHelp_MatrixPlus.vi | | | | | |
| | | | | | | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DISCRETIZATION** | X | X | | X | | X | | Discretization_DiscretizeA.vi | | | | | |
| | X | X | | X | | X | | Discretization_DiscretizeAB.vi | | | | | |
| | X | X | | X | | X | | Discretization_DiscretizeABTaylor.vi | | | | | |
| | X | X | | X | | X | | Discretization_DiscretizeAQ.vi | | | | | |
| | X | X | | X | | X | | Discretization_DiscretizeAQTaylor.vi | | | | | |
| | X | X | | X | | | | Discretization_DiscretizeR.vi | | | | | |
| | | | | | | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **STATE SPACE UTIL** | X | X | X | No | | | | StateSpaceUtil_Check_Stabalizable.vi | | Internal routine | | | |
| | X | X | | X | | | | StateSpaceUtil_ClampInputMaxMagnitude.vi | | Routine exists, it is just a shell | | | |
| | X | X | | X | | | | StateSpaceUtil_IsDetectable.vi | | | | | |
| | X | X | | X | | | | StateSpaceUtil_IsStabalizable.vi | | | | | |
| | X | X | | X | | X | | StateSpaceUtil_MakeCostMatrix.vi | | | | | |
| | X | X | | X | | X | | StateSpaceUtil_MakeCovarianceMatrix.vi | | | | | |
| | X | X | | X | | | | StateSpaceUtil_MakeWhiteNoiseVector.vi | | | | | |
| | X | X | | X | | | | StateSpaceUtil_NomalizeInputVector.vi | | | | | |
| | X | X | | X | | | | StateSpaceUtil_PoseTo3dVector.vi | | | | | |
| | X | X | | X | | | | StateSpaceUtil_PoseTo4dVector.vi | | | | | |
| | X | X | | X | | | | StateSpaceUtil_PoseToVector.vi | | | | | |
| | | | | | | | | | | | | | |

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BATTERY SIM** | X | X | | X | SI | | | BatterySim_CalculateDefaultBatteryLoadedVoltage.vi | | | | | |
| | X | X | | X | SI | | | BatterySim_CalculateLoadedVoltage.vi | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DC MOTOR SIM** | X | X | | X | | | | DCMotorSim_getAngularPositionRad.vi | | | | | |
| | X | X | | X | | | | DCMotorSim_getAngularPositionRotations.vi | | | | | |
| | X | X | | X | | | | DCMotorSim_getAngularVelocityRadPerSec.vi | | | | | |
| | X | X | | X | | | | DCMotorSim_getAngularVelocityRPM.vi | | | | | |
| | X | X | | X | | | | DCMotorSim_GetCurrentDrawAmps.vi | | | | | |
| | X | X | | X | | | | DCMotorSim_New_MOI.vi | | | | | |
| | X | X | | X | | | | DCMotorSim_New_Plant.vi | | | | | |
| | X | X | | X | | | | DCMotorSim_SetInputVoltage.vi | | | | | |
| | X | X | | X | | | | DCMotorSim_Update.vi | | | | | |
| | | | | | | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DIFFERENTIAL DRIVE TRAIN SIM** | X | X | | X | | | | DiffDriveTrainSim_ClampInput.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_CreateKitbotSim_EstMass.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_CreateKitbotSim.vi | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | X | X | | X | | | | DiffDriveTrainSim_GetCurrentDrawAmps.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetCurrentGearing.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetDynamics.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetHeading.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetLeftPositionMeters.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetOutput_Single.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetPose.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetRightCurrentDrawAmps.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetRightPositionMeters.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetState_Single.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_GetState.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_KitBotWheelSize.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_New_Mass_MOI.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_New.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_SetCurrentGearing.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_SetInputs.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_SetPose.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_SetState.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_ToughBoxMiniGearRatio.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_ToughBoxMiniMotor.vi | | | | | |
| | X | X | | X | | | | DiffDriveTrainSim_Update.vi | | | | | |
| | | | | | | | | | | | | | |

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

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

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | X | | X | | | | FlyWheelSim_SetInput.vi | | | | | |
| X | X | | X | | | | FlyWheelSim_SetState.vi | | | | | |
| X | X | | X | | | | FlyWheelSim_Update.vi | | | | | |
| | | | | | | | | | | | | |

| | *Implemented* | *Documented* | *Not WPILIB* | *Menu Item* | *Execution Optimized* | *Test Routine* | *Sample Program* | VI Name | Function Prototype | Notes | *Code Review* | *Test Program* | *Error Checking* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LINEAR SYSTEM SIM** | X | X | | X | | | | LinearSystemSim_ClampInput.vi | | | | | |
| | | | | | | | | LinearSystemSim_GetCurrentDrawAmps.vi | | DONT IMPLEMENT… | | | |
| | X | X | | X | | | | LinearSystemSim_GetOutput_Single.vi | | | | | |
| | X | X | | X | | | | LinearSystemSim_GetOutput.vi | | | | | |
| | X | X | | X | | | | LinearSystemSim_New | | | | | |
| | | | | | | | | LinearSystemSim_New_NoNoise.vi | | | | | |
| | X | X | | X | | | | LinearSystemSim_SetInput_Array.vi | | Doesn't use clamp ? | | | |
| | X | X | | X | | | | LinearSystemSim_SetInput_Single.vi | | | | | |
| | X | X | | X | | | | LinearSystemSim_SetInput.vi | | | | | |
| | X | X | | X | | | | LinearSystemSim_Setstate.vi | | | | | |
| | X | X | | X | | | | LinearSystemSim_Update.vi | | | | | |
| | X | X | | *No* | | | | LinearSystemSim_UpdateX.vi | | | | | |
| | X | X | X | *No* | | | | LinearSystemSim_UpdateY.vi | | | | | |

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

'============
MATRIX UTILITIES
'============

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MATRIX** | X | X | | X | SI | | | Matrix_AssignBlock.vi | | | | | |
| | X | X | | X | SI | | | Matrix_Block.vi | | | | | |
| | | | | | | | | Matrix_ChangeBoundsUnchecked.vi | | | | | |
| | X | X | | X | SI | | | Matrix_Create.vi | | | | | |
| | | | | | | | | Matrix_Det.vi | | | | | |
| | X | X | | X | SI | | | Matrix_Diag.vi | | | | | |
| | | | | | | | | Matrix_Div_Scalar.vi | | labview has function | | | |
| | | | | | | | | Matrix_ElementPower.vi | | | | | |
| | X | X | | X | SI | | | Matrix_ElementSum.vi | | | | | |
| | | | | | | | | Matrix_ElementTimes.vi | | | | | |
| | | | | | | | | Matrix_Equals.vi | | | | | |
| | X | X | | X | I | | | Matrix_Exp.vi | | | | | |
| | X | X | | X | SI | | | Matrix_ExtractColumnVector.vi | | | | | |
| | X | X | | X | SI | | | Matrix_ExtractFrom.vi | | | | | |
| | | | | | | | | Matrix_ExtractMatrix.vi | | | | | |
| | X | X | | X | SI | | | Matrix_ExtractRowVector.vi | | | | | |
| | X | X | | X | SI | | | Matrix_Fill.vi | | | | | |
| | | | | | | | | Matrix_Get.vi | | labview has function | | | |
| | X | X | | X | I | | | Matrix_Ident.vi | | WPILIB calls this EYE | | | |
| | | | | | | | | Matrix_Inv.vi | | | | | |
| | X | X | | X | SI | | | Matrix_IsEqual.vi | | | | | |
| | | | | | | | | Matrix_IsIdentical.vi | | | | | |
| | X | X | | X | I | | | Matrix_LLTDecompose.vi | | | | | |
| | | | | | | | | Matrix_Max.vi | | | | | |
| | | | | | | | | Matrix_MaxAbs.vi | | | | | |
| | | | | | | | | Matrix_Mean.vi | | | | | |
| | | | | | | | | Matrix_MinInternal.vi | | | | | |
| | | | | | | | | Matrix_Minus_Matrix.vi | | | | | |
| | | | | | | | | Matrix_Minus_Scalar.vi | | | | | |
| | X | X | | X | I | | | Matrix_NormF.vi | | | | | |
| | | | | | | | | Matrix_NormIndP1.vi | | | | | |
| | | | | | | | | Matrix_Plus_Matrix.vi | | | | | |
| | | | | | | | | Matrix_Plus_Scalar.vi | | | | | |
| | X | X | | X | I | | | Matrix_Pow.vi | | THIS NEEDS WORK!!!! | | | |
| | X | X | | X | SI | | | Matrix_SetColumn.vi | | | | | |
| | X | X | | X | SI | | | Matrix_SetRow.vi | THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT SHOULD BE INCLUDED HERE FOR ISOLATION. | | | | |
| | | | | | | | | Matrix_Solve.vi | | | | | |
| | | | | | | | | Matrix_Times_Matrix.vi | | | | | |
| | | | | | | | | Matrix_Times_Scalar.vi | | | | | |
| | | | | | | | | Matrix_Trace.vi | | | | | |
| | X | X | | X | SI | | | Matrix_Transpose.vi | | | | | |
| | | | | | | | | | | | | | |

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SIMPLE MATRIX** | X | X | | X | SI | | | SimpleMatrix_ExtractMatrix.vi | | NOTE Matrix also has an ExtractMatrix with different calling parameters…. YUK. | | | |
| | | | | | | | | | | | | | |

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **VECTOR BUILDER** | X | X | | X | SI | | | VecBuilder_1x1Fill.vi | | | | | |
| | X | X | | X | SI | | | VecBuilder_2x1Fill.vi | | | | | |
| | X | X | | X | SI | | | VecBuilder_3x1Fill.vi | | | | | |
| | X | X | | X | SI | | | VecBuilder_4x1Fill.vi | | | | | |
| | X | X | | X | SI | | | VecBuilder_5x1Fill.vi | | | | | |
| | X | X | | X | SI | | | VecBuilder_6x1Fill.vi | | | | | |
| | X | X | | X | SI | | | VecBuilder_7x1Fill.vi | | | | | |
| | X | X | | X | SI | | | VecBuilder_8x1Fill.vi | | | | | |
| | | | | | | | | VecBuilder_9x1Fill.vi | | | | | |
| | | | | | | | | VecBuilder_10x1Fill.vi | | | | | |
| | X | X | X | X | SI | | | VecBuilder_ArrayBy1Fill.vi | | | | | |
| | | | | | | | | | | | | | |

```
'============
MATH
'============
```

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

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

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

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

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

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

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **RICCATI** | X | X | | X | | | | Riccati_Check_Detectable.vi | | Routine exists, it is just a shell | | | |
| | X | X | | X | | | | Riccati_Check_Stabilizable.vi | | Not really done !!! | | | |
| | X | X | | X | | X | | Riccati_DARE_Iterate.vi | | | | | |
| | X | X | | X | | | | Riccati_DARE_N.vi | | | | | |
| | X | X | | X | | X | | Riccati_DARE.vi | | | | | |
| | X | X | | X | | | | Riccati_Input_Check.vi | | | | | |

'============
VISION
'============

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

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

| | Implemented | Documented | Not WPILIB | Menu Item | Execution Optimized | Test Routine | Sample Program | VI Name | Function Prototype | Notes | Code Review | Test Program | Error Checking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TypeDef** | Z | X | X | X | N/A | | | ARM_FF.CTL | | | | | |
| | Z | X | X | X | N/A | | | BANG_BANG.CTL | | | | | |
| | \ | | X | X | N/A | | | BICon-Matrix_FUNC_TYPE.CTL | | NOT USED. Should this be deleted or abandoned??? | | | |
| | Z | X | X | X | N/A | | | CALLBACK_FUNC_TYPE.CTL | | | | | |
| | Z | X | X | X | N/A | | | CHASSIS_SPEEDS.CTL | | | | | |
| | Z | X | X | X | N/A | | | CONTRAINED_STATE.CTL | | | | | |
| | Z | X | X | X | N/A | | | DCMOTOR_TYPES_ENUM.CTL | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Z | X | X | X | N/A | | | DCMOTOR.CTL | | |
| Z | X | X | X | N/A | | | DCMOTOR_SIM.CTL | | |
| Z | X | X | X | N/A | | | DEBOUNCER_TYPE_ENUM.Ctl | | |
| Z | X | X | X | N/A | | | DEBOUNCER.CTL | | |
| Z | X | X | X | N/A | | | DIFF_DRIVE_ACCEL_LIMIT.CTL | | |
| Z | X | X | X | N/A | | | DIFF_DRIVE_KINEMATICS.CTL | | |
| Z | X | X | X | N/A | | | DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl | | |
| Z | X | X | X | N/A | | | DiFF_DRIVE_POSE_EST.ctl | | |
| Z | X | X | X | N/A | | | DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl | | |
| Z | X | X | X | N/A | | | DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl | | |
| Z | X | | X | N/A | | | DIFF_DRIVE_TRAIN_SIM_STATE_ENUM.CTL | | |
| Z | X | X | X | N/A | | | DIFF_DRIVE_TRAIN_SIM.ctl | | |
| Z | X | X | X | NA | | | DISPLAY_WAYPOINT.ctl | | Was UTIL_WAYPOINT.VI |
| Z | X | X | X | NA | | | DISPLAY_WEIGHTED_WAYPOINT.ctl | | New V1.5.  was UTIL_WEIGHTED_WAYPOINIT.VI |
| Z | X | X | X | N/A | | | ELEV_FF.CTL | | |
| Z | X | X | X | N/A | | | ELEVATOR_SIM.CTL | | |
| Z | X | X | X | N/A | | | EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL | | |
| Z | | X | X | N/A | | | ExTENDED_KALMAN_FILTER.CTL | | |
| Z | X | X | X | N/A | | | FLYWHEEL_SIM.ctl | | |
| Z | X | X | X | N/A | | | FUNCTION_GENERATOR.ctl | | |
| Z | X | X | X | N/A | | | HOLONOMIC_DRV_CTRL.CTL | | New 1/26/21 |
| Z | X | X | X | N/A | | | TIME_INTERPOLATABLE_BOOLEAN.CTL | | |
| Z | X | X | X | N/A | | | TIME_INTERPOLATABLE_DOUBLE.CTL | | |
| Z | X | X | X | N/A | | | TIME_INTERPOLATABLE_POSE.CTL | | |
| Z | X | X | X | N/A | | | TIME_INTERPOLATABLE_ROTATION.CTL | | |
| Z | X | X | X | N/A | | | KALMAN_FILTER_LATENCY_COMP_FUNC_GROUP.CTL | | |
| Z | X | X | X | N/A | | | KALMAN_FILTER_LATENCY_COMP.CTL | | |
| Z | X | X | X | N/A | | | KALMAN_FILTER.ctl | | |
| Z | X | X | X | N/A | | | LINEAR_FILTER.CTL | | |
| Z | X | X | X | N/A | | | LINEAR_PLANT_INV_FF.ctl | | |
| Z | X | X | X | N/A | | | LINEAR_QUADRATIC_REGULATOR.ctl | | |
| Z | X | X | X | N/A | | | LINEAR_SYSTEM_LOOP.ctl | | |
| Z | X | X | X | N/A | | | LINEAR_SYSTEM_SIM.ctl | | |
| Z | X | X | X | N/A | | | LINEAR_SYSTEM.ctl | | |
| Z | X | X | X | N/A | | | MECA_DRIVE_KINEMATICS.CTL | | |
| Z | X | X | X | N/A | | | MECA_DRIVE_ODOMETRY.CTL | | |
| Z | X | X | X | N/A | | | MECA_WHEEL_SPEEDS.CTL | | |
| Z | X | X | X | N/A | | | MEDIAN_FILTER.CTL | | |
| Z | X | X | X | N/A | | | MERWE_SCALED_SIGMA_PTS.ctl | | |
| Z | X | X | X | N/A | | | OBSERVER_SNAP_LIST_ITEM.CTL | | |
| Z | X | X | X | N/A | | | OBSERVER_SNAPSHOT.CTL | | |
| Z | X | X | X | N/A | | | PARAM_STACK_ITEM.CTL | | |
| Z | X | X | X | N/A | | | PARAM_STACK.CTL | | |
| Z | X | X | X | N/A | | | PID_ADV_LIMITS.CTL | | |
| Z | X | X | X | N/A | | | PID_ADV_TUNING.CTL | | |
| Z | X | X | X | N/A | | | PID_CONTROLLER.CTL | | |
| Z | X | X | X | N/A | | | PID_ERROR_TOLERANCE.CTL | | |
| Z | X | X | X | N/A | | | PID_INPUT_LIMITS.CTL | | |
| Z | X | X | X | N/A | | | PID_TUNING.CTL | | |
| Z | X | X | X | N/A | | | POSE2D.CTL | | |
| Z | X | X | X | N/A | | | POSEwCURVATURE.CTL | | |
| Z | X | X | X | N/A | | | PROFILED_PID_CONTROLLER.CTL | | |
| Z | X | X | X | N/A | | | RAMSETE_EXE_TUNING.CTL | | |
| Z | X | X | X | N/A | | | RAMSETE.CTL | | |
| Z | X | X | X | N/A | | | ROTATION2D.CTL | | |
| Z | X | X | X | N/A | | | SIMPLE_MOTOR_FF.CTL | | |
| Z | X | X | X | N/A | | | SINGLE_JOINT_ARM_SIM.CTL | | |
| Z | X | X | X | N/A | | | SLEW_RATE_LIMITER.CTL | | |
| Z | X | X | X | N/A | | | SPLINE_CTRL_VECTOR.CTL | | |
| Z | X | X | X | N/A | | | SPLINE.CTL | | |
| Z | X | X | X | N/A | | | SWERVE_DRIVE_KINEMATICS.CTL | | |
| Z | X | X | X | N/A | | | SWERVE_DRIVE_MODULE_STATE.CTL | | |
| Z | X | X | X | N/A | | | SWERVE_DRIVE_ODOMETRY.CTL | | |
| Z | X | X | X | N/A | | | SWERVE_DRIVE_POSE_EST.CTL | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Z | X | X | X | N/A | | | TIMER.CTL | | |
| Z | X | X | X | N/A | | | TRAJ_CONFIG.CTL | | |
| Z | X | X | X | N/A | | | TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL | | |
| Z | X | X | X | N/A | | | TRAJ_CONSTRAINT_DIIF_DRIVE_KINEMATICS.CTL | | |
| Z | X | X | X | N/A | | | TRAJ_CONSTRAINT_DIIF_DRIVE_VOLTAGE.CTL | | |
| \ | | X | | N/A | | | TRAJ_CONSTRAINT_JERK.CTL | | Routine exists, it is just a shell |
| Z | X | X | X | N/A | | | TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL | | |
| Z | X | X | X | N/A | | | TRAJ_CONSTRAINT_MINMAX.CTL | | |
| Z | X | X | X | N/A | | | TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL | | |
| Z | X | X | X | N/A | | | TRAJ_STATE.CTL | | |
| Z | X | X | X | N/A | | | TRAJECTORY_SPLINE_TYPE_ENUM.CTL | | |
| Z | X | X | X | N/A | | | TRAJECTORY.CTL | | |
| Z | X | X | X | N/A | | | TRANSFORM2D.CTL | | |
| Z | X | X | X | N/A | | | TRANSLATION2D.CTL | | |
| Z | X | X | X | N/A | | | TRAPEZOID_PROFILE_CONSTRAINT.CTL | | |
| Z | X | X | X | N/A | | | TRAPEZOID_PROFILE_STATE.CTL | | |
| Z | X | X | X | N/A | | | TRAPEZOID_PROFILE.CTL | | |
| Z | X | X | X | N/A | | | TWIST2D.CTL | | |
| Z | X | X | X | N/A | | | UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL | | |
| Z | X | X | X | N/A | | | UNSCENTED_KALMAN_FILTER.ctl | | |
| Z | X | X | X | N/A | | | UNSCENTED_KALMAN_NEW_FUNC_GROUP.CTL | | |
| Z | X | X | X | N/A | | | UTIL_PATHFINDER_CONFIG.CTL | | |
| N/A | | N/A | | N/A | | | WAYPOINTS.CTL | | Delete – obsolete |
| Z | X | X | X | NA | | | WEIGHTED_WAYPOINT.CTL | | New V1.5 |
| N/A | | N/A | | N/A | | | X_Y_HEADINGS.CTL | | Delete – obsolete |
| Z | X | X | X | N/A | | | X_Y_PAIR.CTL | | |