WPILib LabVIEW Math Library – VI Implementation List

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

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	1108	1107	342	1030	632	49	12
VI Total (X)	995	995					
CTL Total (Z)	113	112					
VI Shell Total (/)	3						
CTRL Shell Total (\)	2						

Doc completed Pct
99.91%
Optimization Pct
57.04%

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

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BASE
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Category	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking	All on for auto filter…
ANALOG DELAY	X	X	X	X	I			AnalogDelay_Execute.vi		Similar to interpolated tree map..				x

x
x

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking	
BUMPLESS TRANSFER	X	X	X	X	I			BumplessTransfer_Execute.vi						x

x
x

	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		X	I			FunctionGenerator_Add_Value.vi		Similar to interpolated tree map..				x
	X	X		X	I			FunctionGenerator_Add_XY.vi		Similar to interpolated tree map..				x
	X	X		X	I			FunctionGenerator_Calculate.vi		Similar to interpolated tree map..				x
	X	X		X	SI			FunctionGenerator_Clear.vi						x
	X	X	X	X	I			FunctionGenerator_Execute.vi		Similar to interpolated tree map..				x
	X	X		X	SI			FunctionGenerator_New.vi		Similar to interpolated tree map..				x

x
x

	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 MATRIX	X	X	X	X	I			FunctionGeneratorMatrix_Add.vi		Similar to interpolated tree map..				x
	X	X	X	X	I			FunctionGeneratorMatrix_Calculate.vi		Similar to interpolated tree map..				x
	X	X	X	X	SI			FunctionGeneratorMatrix_New.vi		Similar to interpolated tree map..				x

x

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LEAD LAG												
X	X	X	X	I			LeadLag_Execute.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 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			I			LinearFilter_FiniteDifference.vi					
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	X	X	I			TimeInterpBoolean_AddSample.vi		Update to use create matrix			
	X	X	X	No	I			TimeInterpBoolean_CleanUp.vi		Update to use create matrix			
	X	X	X	X	SI			TimeInterpBoolean_Clear.vi					
	X	X	X	X	I			TimeInterpBoolean_GetSample.vi					
								TimeInterpBoolean_GetTimeForValue.vi					
	X	X	X	X	SI			TimeInterpBoolean_New.vi					
	X	X	X	X	SI			TimeInterpBoolean_SetMaxTime.vi					

	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	X	X	I			TimeInterpDouble_AddSample.vi		Update to use create matrix			
	X	X	X	No	I			TimeInterpDouble_CleanUp.vi		Update to use create matrix			
	X	X	X	X	SI			TimeInterpDouble_Clear.vi					
	X	X	X	X	I			TimeInterpDouble_GetSample.vi					
	X	X	X					TimeInterpDouble_GetTimeForValue.vi					
	X	X	X	X	SI			TimeInterpDouble_New.vi					
	X	X	X	X	SI			TimeInterpDouble_SetMaxTime.vi					

	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 POSE2D	X	X	X	X	I			TimeInterpPose2d_AddSample.vi		Update to use create matrix			
	X	X	X	No	I			TimeInterpPose2d_CleanUp.vi		Update to use create matrix			
	X	X	X	X	SI			TimeInterpPose2d_Clear.vi					
	X	X	X	X	I			TimeInterpPose2d_GetSample.vi					
								TimeInterpPose2d_GetTimeForValue.vi					
	X	X	X	X	SI			TimeInterpPose2d_New.vi					
	X	X	X	X	SI			TimeInterpPose2d_SetMaxTime.vi					

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

TIME INTERPOLATABLE ROTATION2D

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	X	X	X	I			TimeInterpRotation2d_AddSample.vi		Update to use create matrix			
X	X	X	No	I			TimeInterpRotation2d_CleanUp.vi		Update to use create matrix			
X	X	X	X	SI			TimeInterpRotation2d_Clear.vi					
X	X	X	X	I			TimeInterpRotation2d_GetSample.vi					
							TimeInterpRotation2d_GetTimeForValue.vi					
X	X	X	X	SI			TimeInterpRotation2d_New.vi					
X	X	X	X	SI			TimeInterpRotation2d_SetMaxTime.vi					

WAIT ADJUST

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	X	X	X				WaitAdjust.vi					

DIGITAL SEQUENTIAL LOGIC

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	X	X	X				DigSeqLogic_Delay.vi					
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					

DEBOUNCER

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

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CONTROLLER
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ARM FF

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				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					

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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				ArmFF_MinAchieveAccel.vi					x
X	X		X				ArmFF_MinAchieveVelocity.vi					x
X	X		X				ArmFF_New_ZeroGravity.vi					x
X	X		X				ArmFF_New.vi					x

BANG BANG 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	SI			BangBang_AtSetpoint.vi					x
X	X		X	SI			BangBang_Calculate_PV.vi					x
X	X		X	SI			BangBang_Calculate_SP_PV.vi					x
X	X	X	X	SI			BangBang_Execute.vi					x
X	X		X	SI			BangBang_GetAll.vi					x
X	X		X	SI			BangBang_GetError.vi					x
X	X		X	SI			BangBang_New.vi					x
X	X		X	SI			BangBang_SetSetpoint.vi					x
X	X		X	SI			BangBang_SetTolerance.vi					x

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

ELEV FF 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				ElevFF_Calculate.vi					x
X	X		X				ElevFF_CalculateVelocityOnly.vi					x
		X					ElevFF_Execute.vi		LabVIEW style single call			x
		X					ElevFF_ExecuteVelocityOnly.vi		LabVIEW style single call			x
X	X		X				ElevFF_MaxAchieveAccel.vi					x
X	X		X				ElevFF_MaxAchieveVelocity.vi					x
X	X		X				ElevFF_MinAchieveAccel.vi					x
X	X		X				ElevFF_MinAchieveVelocity.vi					x
X	X		X				ElevFF_New_ZeroAccel.vi					x
X	X		X				ElevFF_New.vi					x

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

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	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	SI			HolDrvCtrl_SetTolerance.vi		Added 1/26/21				x
														x
														x
PID AUTOTUNE	X	X	X	No				PIDAutoTune_ClosedLoopStep.vi						x
	X	X	X	No				PIDAutoTune_Convert_Academic_To_NonInteracting.vi						x
	x	X	X	No				PIDAutoTune_OpenLoopStep.vi						x
	X	X	X	X				PIDAutoTune_SetTuningArguments.vi						x
	X	X	X	X				PIDAutoTune_Step_Execute.vi						x
														x
														x
PID CONTROLLER	X	X	X	X				PIDController_AdvCalculate_FF_Sp_Pv_Per.vi		Advanced PID				x
	X	X	X	X				PIDController_AdvCalculate_FF_Sp_Pv.vi		Advanced PID				x
	X	X	X	X			X	PIDController_AdvExecute.vi		Labview style helper. Advanced PID				x
	X	X		X	SI			PIDController_AtSetpoint.vi						x
	X	X		X				PIDController_Calculate_PV.vi						x
	X	X		X				PIDController_Calculate_SP_PV.vi						x
	X	X		X	SI			PIDController_DisableContinousInput.vi						x
	X	X		X	SI			PIDController_EnableContinousInput.vi						x
	X	X	X	X			X	PIDController_Execute.vi		Labview style helper				x
								PIDController_GetContinuousError.vi		OBSOLETE – Removed				x
	X	X		X	SI			PIDController_GetPeriod.vi						x
	X	X		X	SI			PIDController_GetPID.vi						x
	X	X		X	SI			PIDController_GetPositionError.vi						x
	X	X		X	SI			PIDController_GetSetpoint.vi						x
	X	X			SI			PIDController_GetTolerance.vi						x
	X	X		X	SI			PIDController_GetVelocityError.vi						x
	X	X		X	SI			PIDController_IsContinuousInputEnabled.vi						x
	X	X		X	I			PIDController_New.vi						x
	X	X		X	I			PIDController_NewPeriod.vi						x
	X	X	X	X	SI			PIDController_Pack_AdvLimits.vi						x
	X	X	X	X	SI			PIDController_Pack_AdvTuning.vi						x
	X	X	X	X	SI			PIDController_Pack_ErrorTolerance.vi						x
	X	X	X	X	SI			PIDController_Pack_InputLimits.vi						x
	X	X	X	X	SI			PIDController_Pack_Tuning.vi						x
	X	X		X	SI			PIDController_Reset.vi						x
	X	X		X	SI			PIDController_SetD.vi						x
	X	X	X	X	SI			PIDController_SetDerivativeFilter.vi		Advanced PID				x
	X	X	X	No				PIDController_SetFeedForward_OBSOLETE_DELETE.vi		Advanced PID, Obsolete – DELETE				x
	X	X	X	No				PIDController_SetFFGain_OBSOLETE_DELETE.vi		Advanced PID, Obsolete – DELETE				x
	X	X		X	SI			PIDController_SetI.vi						x
								PIDController_SetInputRange.vi		OBSOLETE – Removed				x
	X	X		X	SI			PIDController_SetIntegratorRange.vi						x
	X	X	X	X	SI			PIDController_SetOutputLimits.vi		Advanced PID				x
	X	X		X	SI			PIDController_SetP.vi						x
	X	X	X	X	SI			PIDController_SetPeriod.vi						x
	X	X		X	SI			PIDController_SetPID.vi						x
	X	X	X	X	SI			PIDController_SetPIDF.vi		Advanced PID				x
	X	X		X	SI			PIDController_SetSetpoint.vi						x
	X	X		X	SI			PIDController_SetTolerance.vi						x
	X	X		X	SI			PIDController_SetTolerancePandV.vi						x
														x

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x

PROFILED PID CONTROLLER

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

x
x

RAMSETE

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	SI			Ramsete_AtReference.vi	AtReference					x
X	X		X	X			Ramsete_Calculate_Trajectory.vi	calculate_trajectory					x
X	X		X	X			Ramsete_Calculate.vi	calculate					x
X	X	X	X	X			Ramsete_Diff_DO_Eng.vi						x
X	X	X	X	X			Ramsete_Diff_DO_SI.vi						x
X	X	X	X	I			Ramsete_Execute_ENG.vi	Use this one!!					x
X	X	X	X	SI			Ramsete_Execute_PackTuning_ENG.vi						x
X	X	X	X	SI			Ramsete_Execute_PackTuning.vi						x
X	X	X	X	I			Ramsete_Execute.vi						x
X	X		X	SI			Ramsete_New_B_Z.vi	new(b, zeta)					x
X	X		X	SI			Ramsete_New.vi	new					x
X	X		X	SI			Ramsete_SetEnabled.vi	SetEnabled					x
X	X		X	SI			Ramsete_SetTolerance.vi	SetTolerance					x
X	X		X	X			Ramsete_SINC.vi	sinc	internal				x

x
x

SIMPLE MOTOR FEEDFORWARD

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking	
X	X	X	X	SI			SimpleMotorFF_Calculate_CalcAccel.vi						x
X	X		X				SimpleMotorFF_Calculate_NextV_Dt.vi						x
X	X		X	SI			SimpleMotorFF_Calculate.vi	public double calculate(double velocity, double acceleration)					x

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	SI			SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)						x
X	X	X					SimpleMotorFF_Ka_AutoTune.vi							x
X	X		X	X			SimpleMotorFF_MaxAchieveAccel.vi	public double maxAchievableAcceleration(double maxVoltage, double velocity)						x
X	X		X	X			SimpleMotorFF_MaxAchieveVel.vi	public double maxAchievableVelocity(double maxVoltage, double acceleration)						x
X	X		X	X			SimpleMotorFF_MinAchieveAccel.vi	public double minAchievableAcceleration(double maxVoltage, double velocity)						x
X	X		X	X			SimpleMotorFF_MinAchieveVel.vi	public double minAchievableVelocity(double maxVoltage, double acceleration)						x
X	X		X	SI			SimpleMotorFF_New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)						x
X	X	X		SI			SimpleMotorFF_Pack_Ka_Tune_Params.vi							x
								public SimpleMotorFeedforward(double ks, double kv)						x

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

														x
														x
														x
														x

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

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes		Code Review	Test Program	Error Checking	
POSE2D	X	X			SI			Pose2d_Div.VI							x
	X	X		X	SI			Pose2d_Equals.VI	boolean equals(other obj)						x
	X	X		X	X			Pose2d_Exp.vi	pose2d exp(twist2d twist)						x
	X	X		X	SI			Pose2d_getRotation.vi	rotation2d getRotation()	can also use cluster unpack					x
	X	X		X	SI			Pose2d_getTranslation.vi	translation2d getTranslation()	can also use cluster unpack					x
	X	X	X	X	SI			Pose2d_getXY.vi							x
	X	X	X	X	SI			Pose2d_getXYAngle.vi							x
	X	X		X	I			Pose2d_Interpolate.vi							x
	X	X		X	X			Pose2d_Log.vi	twist2d log(pose2d end)						x
	X	X		X	SI			Pose2d_Minus.vi	transform2d minus(pose2d other)						x
	X	X		X	SI			Pose2d_New_TRRO.vi	pose2d new(translation2d, rotation2d)						x
	X	X		X	SI			Pose2d_New.vi	pose2d new(double x, double y, rotation2d)						x
	X	X		X	SI			Pose2d_Plus.vi	pose2d plus(transform2d other)						x
	X	X		X	SI			Pose2d_RelativeTo.vi	pose2d relativeto(pose2d other)						x
	X	X			SI			Pose2d_Times.vi							x

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

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	SI			Pose2d_TransformBy.vi	pose2d transformby(transform2d other)				x
								pose2d new( )	can use cluster constant			x
												x
												x

POSE3D

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		(yellow)	SI			Pose3d_Div.vi					x
X	X		X	SI			Pose3d_Equals.VI					x
X	X		X	X (green)			Pose3d_Exp.vi					x
X	X		X	SI			Pose3d_getRotation.vi					x
X	X		X	SI			Pose3d_getTranslation.vi					x
X	X	X	X	SI			Pose3d_getXYZ.vi					x
X	X		X	I			Pose3d_Interpolate.vi					x
X	X		X	X (green)			Pose3d_Log.vi					x
X	X		X	SI			Pose3d_Minus.vi					x
X	X		X	SI			Pose3d_New.vi					x
X	X		X	SI			Pose3d_New_Default.vi					x
X	X		(yellow)	SI			Pose3d_New_Pose2d.vi					x
X	X		X	SI			Pose3d_New_Trans3dRot3d.vi					x
X	X		X	SI			Pose3d_Plus.vi					x
X	X		X	SI			Pose3d_RelativeTo.vi					x
X	X		No	SI			Pose3d_RotationVectorToMatrix.vi					x
X	X		X	SI			Pose3d_ToPose2d.vi					x
X	X		(yellow)	SI			Pose3d_Times.vi					x
X	X		X	SI			Pose3d_TransformBy.vi					x
												x
												x
												x

QUATERNION

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	SI			*Quaternion_Equals.vi*					x
X	X		X	SI			Quaternion_Get_All.vi					x
X	X		X	SI			Quaternion_Get_LVQuat.vi					x
X	X		X	SI			Quaternion_Get_Vect.vi					x
X	X		X	SI			Quaternion_Get_W.vi					x
X	X		X	SI			Quaternion_Inverse.vi					x
X	X		X	SI			Quaternion_New.vi					x
X	X		X	SI			Quaternion_New_Default.vi					x
X	X		X	SI			Quaternion_New_LVQuat.vi					x
X	X		X	SI			Quaternion_Normalize.vi					x
X	X		X	SI			Quaternion_Plus.vi					x
X	X		X	SI			Quaternion_Times.vi					x
X	X		X	SI			Quaternion_ToRotationVector.vi					x
												x
												x
												x

ROTATION2D

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	X		X	SI			Rotation2d_CreateAngle.vi	rotation2d new(double value)				x
X	X		X	SI			Rotation2d_CreateAngleDegrees.vi	rotation2d fromDegrees(double degrees)	convert to radians then create			x
X	X		X	SI			Rotation2d_CreateAngleRotations.vi					x
X	X		X	SI			Rotation2d_CreateXY.vi	rotation2d new(double x, double y)				x
X	X		(yellow)	SI			Rotation2d_Div.vi					x
X	X		X	SI			Rotation2d_Equals.vi	boolean equals(rotation2d other)				x
X	X	X	X	SI			Rotation2d_GetAngleCosSin.vi		New 1/26/21			x
X	X		X	SI			Rotation2d_GetCos.VI	double getCos()	use cluster unpack			x
X	X		X	SI			Rotation2d_GetDegrees.VI	double getDegrees()	use cluster unpack, then convert to degree			x

Impl	Doc	Not	Menu	Exec	VI Name	Function Prototype	Notes			
X	X		X	SI	Rotation2d_GetRadians.VI	double getRadians()	use cluster unpack			x
X	X		X	SI	Rotation2d_GetRotations.vi					x
X	X		X	SI	Rotation2d_GetSin.VI	double getSin()	use cluster unpack			x
X	X		X	SI	Rotation2d_GetTan.VI	double getTan()	can calculate			x
X	X		X	SI	Rotation2d_Interpolate.vi					x
X	X		X	SI	Rotation2d_Minus.vi	rotation2d minus(rotation2d other)				x
X	X		X	SI	Rotation2d_Plus.vi	rotation2d plus(rotation2d other)				x
X	X		X	SI	Rotation2d_RotateBy.vi	rotation2d rotateby(rotation2d other)				x
X	X		X	SI	Rotation2d_Times.vi	rotation2d times(double scalar)				x
X	X		X	SI	Rotation2d_UnaryMinus.vi	rotation2d unaryminus( )				x
						rotation2d new()	can use cluster constant			x

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking	
TRANSFORM2D	X	X		X	SI			Transform2d_Create_PosePose.vi	transform2d new(pose2d, pose2d)					x
	X	X		X	SI			Transform2d_Create_TransRot.vi	transform2d new(translation2d, rotation2d)					x
	X	X			SI			Transform2d_Div.vi						x
	X	X		X	SI			Transform2d_Equals.VI	boolean equals(other transform2d)					x
	X	X		X	SI			Transform2d_GetRotation.VI	rotation2d getRotation()	use cluster unpack				x
	X	X		X	SI			Transform2d_GetTranslation.VI	translation2d getTranslation()	use cluster unpack				x
	X	X	X	X	SI			Transform2d_GetXY.vi						x
	X	X	X	X	SI			Transform2d_GetXYAngle.vi						x
	X	X		X	SI			Transform2d_Inverse.vi	transform inverse()	new				x
	X	X		X	Si			Transform2d_Plus.vi						x
	X	X		X	SI			Transform2d_Times.vi	transform2d times(double scalar)					x
									transform2d new( )	can use cluster constant				x

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking	
TRANSFORM3D	X	X		X	SI			Transform3d_Create_Default.vi						x
	X	X		X	SI			Transform3d_Create_Pose3dPose.3dvi						x
	X	X		X	SI			Transform3d_Create_Trans3dRot3d.vi						x

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			SI			Transform3d_Div.vi						x
X	X		X	SI			Transform3d_Equals.VI						x
X	X		X	SI			Transform3d_GetRotation3d.VI						x
X	X		X	SI			Transform3d_GetTranslation3d.VI						x
X	X	X	X	SI			Transform3d_GetXYZ.vi						x
X	X		X	SI			Transform3d_Inverse.vi						x
X	X		X	Si			Transform3d_Plus.vi						x
X	X		X	SI			Transform3d_Times.vi						x
													x
													x
													x

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRANSLATION3D	X	X		X	SI			Translation3d_Create.vi						x
	X	X		X	SI			Translation3d_Create_Default.vi						x
	X	X		X	SI			Translation3d_Create_DistAng.vi						x
	X	X		X	SI			Translation3d_Div.vi						x
	X	X		X	SI			Translation3d_Equals.vi						x
	X	X		X	SI			Translation3d_GetDistance.vi						x
	X	X		X	SI			Translation3d_GetNorm.VI						x
	X	X	X	X	SI			Translation3d_GetXYZ.vi						x
	X	X		X	SI			Translation3d_Interpolate.vi						x
	X	X		X	SI			Translation3d_Minus.vi						x
	X	X		X	SI			Translation3d_Plus.vi						x
	X	X		X	SI			Translation3d_RotateBy.vi						x
	X	X		X	SI			Translation3d_Times.vi						x
	X	X		X	SI			Translation3d_ToTranslation2d.vi						x
	X	X		X	SI			Translation3d_UnaryMinus.vi						x

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

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

TWIST3D

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	SI	X		Twist3d_Create.vi					
X	X		X	SI	X		Twist3d_Equals.VI					
X	X	X	X	SI	X		Twist3d_GetAll.VI					

'===========
KINEMATICS
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CHASSIS SPEEDS

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			SI			ChassisSpeeds_FromFieldRelativeChassisSpeeds.VI					
X	X		X	SI			ChassisSpeeds_FromFieldRelativeSpeeds.VI	chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle)				
X	X	X	X	SI			ChassisSPeeds_GetXYOmega.vi					
X	X		X	SI			ChassisSpeeds_New.vi	chassisspeeds new (double xvel, double yvel, double angvel)				
								chassisspeeds new ()	can use cluster constant			

DIFFERENTIAL DRIVE KINEMATICS

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

DIFFERENTIAL DRIVE ODOMETRY

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

DIFFERENTIAL DRIVE WHEEL SPEEDS

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

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

	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				MecaKinematics_ToTwist2d.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	X	X			MecaOdometry_GetKinematics.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					
								MecaOdometry_UpdateWithTime.vi		Removed…			

	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 POSITION	X	X		X	SI			MecaWheelPos_Get.vi					
	X	X		X	SI			MecaWheelPos_New.vi					
	X	X		X	SI			MecaWheelPos_Sub.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	SI			MecaWheel_GetAll.vi					
	X	X		X	X			MecaWheel_Normalize.vi	public void normalize(double attainableMaxSpeedMetersPerSecond)				

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

	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)				
	X	X		X				SwerveKinematics_ToTwist2d4.VI					
	X	X		X				SwerveKinematics_ToTwist2dX.VI					
									public SwerveDriveKinematics(Translation2d... wheelsMeters)	variable parameters (replace with array and "4" calls)			
									public ChassisSpeeds toChassisSpeeds(SwerveModuleState... wheelStates)	variable parameters (replace with array and "4" calls)			

	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			
								SwerveOdometry_UpdateWithTime4.VI		REMOVED			
								SwerveOdometry_UpdateWithTimeX.VI		REMOVED			
	X	X	X	X				SwerveOdometry_UpdateX.VI		uses array as input			
									public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState... moduleStates)	variable parameters (replace with array and "4" calls)			
									public Pose2d update(Rotation2d gyroAngle, SwerveModuleState... moduleStates)	variable parameters (replace with array and "4" calls)			

	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 POSITIONS	X	X		X	SI			SwerveModulePosition_CompareTo.vi					
	X	X		X	SI			SwerveModulePosition_Get.vi					
	X	X		X	SI			SwerveModulePosition_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
SWERVE DRIVE MODULE STATE	X	X		X	SI			SwerveModuleState_CompareTo.vi	public int compareTo(SwerveModuleState o)				
	X	X		X	SI			SwerveModuleState_Get.vi					
	X	X		X	SI			SwerveModuleState_New.vi	public SwerveModuleState(double speedMetersPerSecond, Rotation2d angle)				

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

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	SI			SwerveModuleState_Optimize.vi	public SwerveModuleState optimize(SwerveModuleState desired, Rotation2d angle)				

'============
SPLINE
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CUBIC HERMITE SPLINE

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

POSE WITH CURVATURE

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	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			

QUINTIC HERMITE SPLINE

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

SPLINE (Abstract class)

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

SPLINE HELPER

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	X		X	SI			SplineHelp_GetCubicCtrlVector.vi	private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point)				

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

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

	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		X		SplineParam_Spline.vi	public static List<PoseWithCurvature> parameterize(Spline spline)				x
	X	X	X	No				SplineParam_StackGet.vi		internal			x
	X	X	X	No				SplineParam_StackPop.vi		internal			x
	X	X	X	No				SplineParam_StackPush.vi		internal			x

'===========
TRAJECTORY
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	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		X				Trajectory_equals.vi	boolean equals(other obj)	FUTURE			x
	X	X		X	SI			Trajectory_GetStates.vi	public List<State> getStates()	not needed, use unpack			x
	X	X		X	SI			Trajectory_GetTotalTime.vi	public double getTotalTimeSeconds()	not needed, use unpack			x
	X	X		No	SI			Trajectory_lerp_double.vi	private static double lerp(double startValue, double endValue, double t)	internal			x
	X	X		No	SI			Trajectory_lerp_Pose.vi	private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t)	internal			x
	X	X		X	SI			Trajectory_New_Empty.vi					x
	X	X		X	SI			Trajectory_New.vi	public Trajectory(final List<State> states)				x
	X	X		X				Trajectory_RelativeTo.vi	public Trajectory relativeTo(Pose2d pose)				x
	X	X		X				Trajectory_Sample.vi	public State sample(double timeSeconds)				x
	X	X	X	X				Trajectory_SampleReverse.vi		Sample in reverse order. Negate sample.			x
	X	X		X				Trajectory_TransformBy.vi	public Trajectory transformBy(Transform2d transform)				x
									public Pose2d getInitialPose()	can use cluster unpack, array index			x

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

	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	X				TrajectoryState_GetAll.vi						x
	X	X		X	SI			TrajectoryState_GetPose.vi						x
	X	X		X	(yellow)			TrajectoryState_Interpolate.vi	State interpolate(State endValue, double i)					x
	X	X		X	SI			TrajectoryState_New.vi	public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter)					x
	(cyan)								public State()					x

	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				TrajectoryConfig_AddConstraint.vi	public TrajectoryConfig addConstraint(TrajectoryConstraint constraint)	Implemented differently, can't duplicate.				x
	X	X		X				TrajectoryConfig_AddConstraints.vi	public TrajectoryConfig addConstraints(List<? extends TrajectoryConstraint> constraints)	Implemented differently, can't duplicate.				x
	X	X		X	SI			TrajectoryConfig_Create.vi	public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq)					x
	X	X		X				TrajectoryConfig_GetCentripetalAccel.vi						x
	X	X	X	X				TrajectoryConfig_GetConstraints.vi	public List<TrajectoryConstraint> getConstraints()	Implemented differently, can't duplicate.				x
	X	X		X				TrajectoryConfig_GetEndVelocity.vi	public double getEndVelocity()	can use cluster unpack				x
	X	X		X				TrajectoryConfig_GetKinematicsDiffDrive.vi						x
	X	X		X				TrajectoryConfig_GetKinematicsMecanumfDrive.vi						x
	X	X		X				TrajectoryConfig_GetKinematicsSwerveDrive.vi						x
	X	X	X	X				TrajectoryConfig_GetMaxVelAccel.vi						x
	X	X		X				TrajectoryConfig_GetStartVelocity.vi	public double getStartVelocity()	can use cluster unpack				x
	X	X		X				TrajectoryConfig_GetVoltageDiffDrive.vi						x
	X	X		X				TrajectoryConfig_IsReversed.vi	public boolean isReversed()	can use cluster unpack				x
	X	X	X	X	SI			TrajectoryConfig_setCentripetalAccel.vi						x
	X	X		X				TrajectoryConfig_SetEndVelocity.vi	public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond)					x
	X	X		X	SI			TrajectoryConfig_setKinematicsDiffDrive.vi	public TrajectoryConfig setKinematics(DifferentialDriveKinematics kinematics)					x
	X	X		X	SI			TrajectoryConfig_setKinematicsMecanumfDrive.vi	public TrajectoryConfig setKinematics(MecanumDriveKinematics kinematics)					x
	X	X		X	SI			TrajectoryConfig_setKinematicsSwerveDrive.vi	public TrajectoryConfig setKinematics(SwerveDriveKinematics kinematics)					x
	X	X		X	SI			TrajectoryConfig_setReversed.vi	public TrajectoryConfig setReversed(boolean reversed)					x
	X	X		X				TrajectoryConfig_SetStartVelocity.vi	public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond)					x
	X	X	X	X	SI			TrajectoryConfig_setVoltageDiffDrive.vi						x
	(yellow)								public double getMaxVelocity()	Created function to return both				x
									public double getMaxAcceleration()	Created function to return both				x
									NOTE ADD OTHER "SET" ROUTINES FOR OTHER CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC.						x

	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

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

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				TrajectoryGenerate_Make_Cubic.vi	public static Trajectory generateTrajectory(Pose2d start, List<Translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config)	uses cubic splines			x
X	X	X	X				TrajectoryGenerate_Make_Generic.vi	Helper to bring these all together….	Use this one!!!			x
X	X		X				TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config)	uses quintic splines			x
X	X	X	X				TrajectoryGenerate_Make_Quintic_Weighted.vi		New 2762			x
X	X		X				TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(List<Pose2d> waypoints, TrajectoryConfig config)	uses quintic splines			x
X	X		X				TrajectoryGenerate_splinePointsFromSplines.vi	public static List<PoseWithCurvature> splinePointsFromSplines(Spline[] splines)				x

TRAJECTORY GENERATE (Control Vector)

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

TRAJECTORY PARAMETERIZE

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	No				TrajectoryParam_calcStuffFwd.vi					x
X	X	X	No				TrajectoryParam_calcStuffRev.vi					x
X	X		No				TrajectoryParam_enforceAccel.vi	private static void enforceAccelerationLimits(boolean reverse, List<TrajectoryConstraint> constraints, ConstrainedState state)	This routines needs to be changed when new constraints are added.			x
X	X	X	No				TrajectoryParam_enforceVelocity.vi		This routines needs to be changed when new constraints are added.			x
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)				x

TRAJECTORY PARAMETERIZE CONSTRAINED STATE

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				ConstrainedState_New.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)				x
X	X	X	X				ConstrainedState_SetMaxAccel.vi					x
X	X	X	X				ConstrainedState_SetMinAccel.vi					x
X	X	X	X				ConstrainedState_SetVelAccel.vi					x
X	X	X	X				ConstrainedState_SetVelocity.vi					x
								ConstrainedState()				x

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TRAJECTORY UTIL

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	X		X				TrajectoryUtil_fromPathWeaverJSON.vi	public static Trajectory fromPathweaverJson(Path path)				x
X	X	X	X	X			TrajectoryUtil_MakeWeightedWayPoint_ENG.vi					x

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

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	
X	X	X	X	X			TrajectoryUtil_MakeWeightedWayPoint.vi			x
X	X		X				TrajectoryUtil_toPathWeaverJSON.vi	public static void toPathweaverJson(Trajectory trajectory, Path path)		x
								public static Trajectory deserializeTrajectory(String json)		x
								public static String serializeTrajectory(Trajectory trajectory)		x
										x
										x

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

'===========
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		X				CentripetalAccelConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)		x
	X	X		X	SI			CentripetalAccelConstraint_New.vi	public CentripetalAccelerationConstraint(double maxCentripetalAccelerationMetersPerSecondSq)	Can use cluster pack for now	x

	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		X				DiffDriveKinematicsConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)		x
	X	X		X	SI			DiffDriveKinematicsConstraint_New.vi	public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond)		x

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

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

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	
ELLIPTICAL REGION CONSTRAINT	X	X		X				EllipRegionConstraint_getMaxVelocity.vi			x
	X	X		X				EllipRegionConstraint_getMinMaxAccel.vi			x
	X	X		X				EllipRegionConstraint_IsPoseInRegion.vi			x
	X	X		X				EllipRegionConstraint_New.vi			x
											x
											x

	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
	/		X					JerkConstraint_getMinMaxAccel.vi	Routine exists, it is just a shell	FUTURE	x
	/		X		SI			JerkConstraint_New.vi	Routine exists, it is just a shell	FUTURE	x
											x
											x

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

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

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

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

	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

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

	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		

					VI Name		Notes	
X	X	X	X		Util_TrajectoryState_Meters_To_Inches.vi			x
X	X	X	X		Util_TrajState_to_DiffDrive_WheelPos.vi			x
X	X	X	X		Util_DispWaypoint_Eng_To_SI.vi			x
X	X	X	X		Util_DispWaypoint_To_CubicInput.vi			x
X	X	X	X		Util_DispWaypoint_To_QuinticInput.vi			x
X	X	X	X		Util_DispWeightedWaypoint_Eng_To_WeightedWaypoint			x
X	X	X	No		Util_DispWeightedWayPoint_To_WeightedWayPoint.vi		Sorry about the confusing name..	x

'===========
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	X	SI			Conv_AngleRadians_Heading.vi			x
	X	X	X	X	SI			Conv_Centimeters_Meters.vi			x
	X	X	X	X	SI			Conv_Deg_Radians.vi			x
	X	X	X	X	SI			Conv_Deg_Rotations.vi			x
	X	X	X	X	SI			Conv_Feet_Meters.vi			x
	X	X	X	X	SI			Conv_GyroDegrees_Heading.vi			x
	X	X	X	X	SI			Conv_Heading_AngleRadians.vi			x
	X	X	X	X	SI			Conv_Inches_Meters.vi			x
	X	X	X	X	SI			Conv_Kilograms_Pounds.vi			x
	X	X	X	X	SI			Conv_Meters_Feet.vi			x
	X	X	X	X	SI			Conv_Meters_Inches.vi			x
	X	X	X	X	SI			Conv_Pose2d_SI_Eng.vi			x
	X	X	X	X	SI			Conv_Pounds_Kilograms.vi			x
	X	X	X	X	SI			Conv_Radians_Deg.vi			x
	X	X	X	X	SI			Conv_Radians_Rotations.vi			x
	X	X	X	X	SI			Conv_Rotations_Deg.vi			x
	X	X	X	X	SI			Conv_Rotations_Radians.vi			x
	X	X	X	X	SI			Conv_Yards_Meters.vi			x

	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		X	SI			Units_DegreesToRotations.vi			x
	X	X		X	SI			Units_FeetToMeters.vi			x
	X	X		X	SI			Units_InchesToMeters.vi			x
	X	X		X	SI			Units_MetersToFeet.vi			x
	X	X		X	SI			Units_MetersToInches.vi			x
	X	X		X	SI			Units_MillisecondsToSeconds.vi			x
	X	X		X	SI			Units_RadiansPerSecondToRotationsPerMinute.vi			x
	X	X		X	SI			Units_RadiansToDegrees.vi			x
	X	X		X	SI			Units_RadiansToRotations.vi			x
	X	X		X	SI			Units_RotationsPerMinuteToRadiansPerSecond.vi			x
	X	X		X	SI			Units_RotationsToDegrees.vi			x
	X	X		X	SI			Units_RotationsToRadians.vi			x
	X	X		X	SI			Units_SecondsToMilliseconds.vi			x

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

WPILib LabVIEW Math Library – VI Implementation List

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

	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
'===========

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	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	X	SI		DCMotor_GetAndymark9015.vi					
	X	X		X	X	SI		DCMotor_GetAndymarkRs775_125.vi					
	X	X		X	X	SI		DCMotor_GetBag.vi					
	X	X		X	X	SI		DCMotor_GetBanebotsRs550.vi					
	X	X		X	X	SI		DCMotor_GetBanebotsRs775.vi					
	X	X		X	X	SI		DCMotor_GetCIM.vi					
	X	X		X	X	SI		DCMotor_GetCurrent.vi					
	X	X		X	X	SI		DCMotor_GetFalcon500.vi					
	X	X		X	X	SI		DCMotor_GetMiniCIM.vi					
	X	X		X	X	SI		DCMotor_GetNEO.vi					
	X	X		X	X	SI		DCMotor_GetNEO550.vi					
	X	X		X	X	SI		DCMotor_GetRomiBuiltIn.vi					
	X	X		X	X	SI		DCMotor_GetVex775Pro.vi					
	X	X		X	X	SI		DCMotor_New.vi					
	X	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_CreateDCMotorSystem.vi					
	X	X		X				LinearSystemId_CreateDriveTrainVelocitySystem.vi		Update to use create matrix			
	X	X		X				LinearSystemId_CreateElevatorSystem.vi		Update to use create matrix			
	X	X		X				LinearSystemId_CreateFlywheelSystem.vi		Update to use create matrix			
	X	X		X				LinearSystemId_CreateSingleJointedArmSystem.vi		Update to use create matrix			
	X	X		X				LinearSystemId_IdentifyDriveTrainSystem.vi		Update to use create matrix			
	X	X		X				LinearSystemId_IdentifyPositionSystem.vi		Update to use create matrix			
	X	X		X				LinearSystemId_IdentifyVelocitySystem.vi		Update to use create matrix			

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

	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					

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

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				DiffDrivePoseEst_FillStateVector.vi						x
X	X		X				DiffDrivePoseEst_GetEstimatedPosition.vi						x
X	X		X				DiffDrivePoseEst_Kalman_F_Callback.vi						x
X	X		X				DiffDrivePoseEst_Kalman_H_Callback.vi						x
X	X		X				DiffDrivePoseEst_New.vi						x
X	X		X				DiffDrivePoseEst_ResetPosition.vi						x
X	X		X				DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi						x
X	X		X				DiffDrivePoseEst_Update.vi						x
X	X		X				DiffDrivePoseEst_UpdateWithTime.vi						x
X	X		X				DiffDrivePoseEst_VisionCorrect_Callback.vi						x
X	X		X				DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi						x
													x
													x

	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		X				ExtendedKalmanFilter_Correct.vi		Just a shell, not functional!				x
	X	X		X				ExtendedKalmanFilter_GetP_Single.vi						x
	X	X		X				ExtendedKalmanFilter_GetP.vi						x
	X	X		X				ExtendedKalmanFilter_GetXHat_Single.vi						x
	X	X		X				ExtendedKalmanFilter_GetXHat.vi						x
	X	X		X				ExtendedKalmanFilter_New.vi						x
	X	X		X				ExtendedKalmanFilter_Predict.vi						x
	X	X		X				ExtendedKalmanFilter_Reset.vi						x
	X	X		X				ExtendedKalmanFilter_SetP.vi						x
	X	X		X				ExtendedKalmanFilter_SetXHat_Single.vi						x
	X	X		X				ExtendedKalmanFilter_SetXHat.vi						x
														x
														x
														x

	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		X				KalmanFilter_GetK						x
	X	X		X				KalmanFilter_GetK_Single.vi						x
	X	X		X				KalmanFilter_GetXHat						x
	X	X		X		X		KalmanFilter_GetXHaT_Single						x
	X	X		X		X		KalmanFilter_New.vi						x
	X	X		X		X		KalmanFilter_Predict.vi						x
	X	X		X				KalmanFilter_Reset.vi						x
	X	X		X				KalmanFilter_SetXHat						x
	X	X		X		X		KalmanFilter_SetXHat_Single						x
														x
														x
														x

	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		X				KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi						x
	X	X		X				KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi						x
	X	X		X				KalmanFilterLatencyComp_FindClosestMeasurement.vi						x
	X	X		X				KalmanFilterLatencyComp_New.vi						x
	X	X		X				KalmanFIlterLatencyComp_Observer_New.vi						x
	X	X		X				KalmanFilterLatencyComp_Reset.vi						x
														x

x

	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 POSE ESTIMATOR								MecaDrivePoseEst_AddVisionMeasurement_StdDev.vi						x
	X	X		X				MecaDrivePoseEst_AddVisionMeasurement.vi						x
	X	X		X				MecaDrivePoseEst_GetEstimatedPosition.vi						x
	X	X		No				MecaDrivePoseEst_Kalman_F_Callback.vi						x
	X	X		No				MecaDrivePoseEst_Kalman_H_Callback.vi						x
	X	X		X				MecaDrivePoseEst_New.vi						x
	X	X		X				MecaDrivePoseEst_ResetPosition.vi						x
	X	X		X				MecaDrivePoseEst_SetVisionMeasurementStdDevs.vi						x
	X	X		X				MecaDrivePoseEst_Update.vi						x
	X	X		X				MecaDrivePoseEst_UpdateWithTime.vi						x
	X	X		No				MecaDrivePoseEst_VisionCorrect_Callback.vi						x
	X	X		No				MecaDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi						x
														x
														x
														x
														x

	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		X				SwerveDrivePoseEst_AddVisionMeasurement.vi						x
	X	X		X				SwerveDrivePoseEst_GetEstimatedPosition.vi						x
	X	X		X				SwerveDrivePoseEst_Kalman_F_Callback.vi						x
	X	X		X				SwerveDrivePoseEst_Kalman_H_Callback.vi						x
	X	X		X				SwerveDrivePoseEst_New.vi						x
	X	X		X				SwerveDrivePoseEst_ResetPosition.vi						x
	X	X		X				SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi						x
	X	X		X				SwerveDrivePoseEst_Update.vi						x
	X	X		X				SwerveDrivePoseEst_UpdateWithTime.vi						x
	X	X		X				SwerveDrivePoseEst_VisionCorrect_Callback.vi						x
	X	X		X				SwerveDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi						x
														x
														x
														x

	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		X				UnscentedKalmanFilter_Correct_OnlyUY.vi						x
	X	X		X				UnscentedKalmanFilter_Correct_OnlyUYR.vi						x
	X	X		X				UnscentedKalmanFilter_Correct.vi						x
	X	X		X				UnscentedKalmanFilter_GetP_Single.vi						x
	X	X		X				UnscentedKalmanFilter_GetP.vi						x
	X	X		X				UnscentedKalmanFilter_GetXHat_Single.vi						x
	X	X		X				UnscentedKalmanFilter_GetXHat.vi						x
	X	X		X				UnscentedKalmanFilter_New_Default.vi						x
	X	X		X				UnscentedKalmanFilter_New_FuncGroup.vi						x
	X	X		X				UnscentedKalmanFilter_New.vi						x
	X	X		X				UnscentedKalmanFilter_Predict.vi						x
	X	X		X				UnscentedKalmanFilter_Reset.vi						x
	X	X		X				UnscentedKalmanFilter_SetP.vi						x
	X	X		X				UnscentedKalmanFilter_SetXHat_Single.vi						x
	X	X		X				UnscentedKalmanFilter_SetXHat.vi						x
	X	X		X				UnscentedKalmanFilter_Transform.vi						x
														x
														x

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

'============
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		X		X		DiffDrvAccelLimit_Calculate.vi					
	X	X		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		X		ImplModelFollow_Calculate.vi					
	X	X		X		X		ImplModelFollow_GetU.vi					
	X	X		X		X		ImplModelFollow_GetU_Single.vi					
	X	X		X		X		ImplModelFollow_New.vi					
	X	X		X		X		ImplModelFollow_New_Plant.vi					
	X	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…			

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

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	X		X		X		LinearQuadraticRegulator_GetK.vi					x
X	X		X				LinearQuadraticRegulator_GetR_Single.vi					x
X	X		X				LinearQuadraticRegulator_GetR.vi					x
X	X		X				LinearQuadraticRegulator_GetU_Single.vi					x
X	X		X				LinearQuadraticRegulator_GetU.vi					x
X	X		X		X		LinearQuadraticRegulator_LatencyCompensate.vi		Routine exists, but it only has interger raise matrix to power.			x
X	X		X				LinearQuadraticRegulator_New_ELMS.vi					x
X	X		X				LinearQuadraticRegulator_New_N.vi					x
							LinearQuadraticRegulator_New_Raw.vi					x
X	X		X		X		LinearQuadraticRegulator_New_SystemELMS.vi					x
X	X		X				LinearQuadraticRegulator_New.vi					x
X	X		X				LinearQuadraticRegulator_Reset.vi					x
												x
												x
												x

	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		X	I			LinearSystem_CalculateY.vi					x
	X	X		X	SI			LinearSystem_GetA.vi					x
	X	X		X	SI			LinearSystem_GetAElement.vi					x
	X	X		X	SI			LinearSystem_GetB.vi					x
	X	X		X	SI			LinearSystem_GetBElement.vi					x
	X	X		X	SI			LinearSystem_GetC.vi					x
	X	X		X	SI			LinearSystem_GetCElement.vi					x
	X	X		X	SI			LinearSystem_GetD.vi					x
	X	X		X	SI			LinearSystem_GetDElement.vi					x
	X	X		X	SI			LinearSystem_New.vi					x
													x
													x
													x
													x

	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		X				LinearSystemLoop_Correct.vi					x
								LinearSystemLoop_GetClampFunction.vi					x
	X	X		X				LinearSystemLoop_GetController.vi					x
	X	X		X				LinearSystemLoop_GetError_Single.vi					x
	X	X		X				LinearSystemLoop_GetError.vi					x
	X	X		X				LinearSystemLoop_GetFeedForward.vi					x
	X	X		X				LinearSystemLoop_GetNextR_Single.vi					x
	X	X		X				LinearSystemLoop_GetNextR.vi					x
	X	X		X				LinearSystemLoop_GetObserver.vi					x
	X	X		X				LinearSystemLoop_GetU_Row.vi					x
	X	X		X				LinearSystemLoop_GetU.vi					x
	X	X		X				LinearSystemLoop_GetXHat_Single.vi					x
	X	X		X				LinearSystemLoop_GetXHat.vi					x
								LinearSystemLoop_New_BBB					x
								LinearSystemLoop_New_LinearSystem_ClampFunc					x
	X	X		X				LinearSystemLoop_New_LinearSystem_ClampVal.vi					x
	X	X		X				LinearSystemLoop_New.vi					x
	X	X		X				LinearSystemLoop_Predict.vi					x
	X	X		X				LinearSystemLoop_Reset.vi					x
								LinearSystemLoop_SetClampFunction.vi					x
								LinearSystemLoop_SetNextR_Some.vi					x
	X	X		X				LinearSystemLoop_SetNextR.vi					x
								LinearSystemLoop_SetXHat_Single.vi					x
								LinearSystemLoop_SetXHat.vi					x
													x
													x

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

LTV DIFFERENTIAL DRIVE CONTROLLER

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	X		X				LTVDiffDriveCtrl_Calculate.vi					
X	X		X				LTVDiffDriveCtrl_New.vi					
X	X		X				LTVDiffDriveCtrl_Calculate_TrajState.vi					
X	X		X				LTVDiffDriveCtrl_Calculate_SetTolerance.vi					
X	X		X				LTVDiffDriveCtrl_Calculate_AtReference.vi					

LTV UNICYCLE CONTROLLER

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	X		X		X		LTVUnicycleCtrl_AtReference.vi					
X	X		X		X		LTVUnicycleCtrl_Calculate_TrajState.vi					
X	X		X		X		LTVUnicycleCtrl_Calculate.vi					
X	X		X		X		LTVUnicycleCtrl_New.vi					
X	X		X		X		LTVUnicycleCtrl_SetEnabled.vi					
X	X		X		X		LTVUnicycleCtrl_SetTolerance.vi					

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

CALLBACK HELPER

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

DISCRETIZATION

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

STATE SPACE UTIL

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	X	X	No				StateSpaceUtil_Check_Stabalizable.vi		Internal routine			

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

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

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

BATTERY SIM

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	SI			BatterySim_CalculateDefaultBatteryLoadedVoltage.vi						x
X	X		X	SI			BatterySim_CalculateLoadedVoltage.vi						x

DC MOTOR SIM

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				DCMotorSim_getAngularPositionRad.vi						x
X	X		X				DCMotorSim_getAngularPositionRotations.vi						x
X	X		X				DCMotorSim_getAngularVelocityRadPerSec.vi						x
X	X		X				DCMotorSim_getAngularVelocityRPM.vi						x
X	X		X				DCMotorSim_GetCurrentDrawAmps.vi						x
X	X		X				DCMotorSim_New_MOI.vi						x
X	X		X				DCMotorSim_New_Plant.vi						x
X	X		X				DCMotorSim_SetInputVoltage.vi						x
X	X		X				DCMotorSim_Update.vi						x

DIFFERENTIAL DRIVE TRAIN SIM

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_ClampInput.vi						x
X	X		X				DiffDriveTrainSim_CreateKitbotSim_EstMass.vi						x
X	X		X				DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi						x
X	X		X				DiffDriveTrainSim_CreateKitbotSim.vi						x
X	X		X				DiffDriveTrainSim_GetCurrentDrawAmps.vi						x
X	X		X				DiffDriveTrainSim_GetCurrentGearing.vi						x
X	X		X				DiffDriveTrainSim_GetDynamics.vi						x
X	X		X				DiffDriveTrainSim_GetHeading.vi						x
X	X		X				DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi						x
X	X		X				DiffDriveTrainSim_GetLeftPositionMeters.vi						x
X	X		X				DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi						x
X	X		X				DiffDriveTrainSim_GetOutput_Single.vi						x
X	X		X				DiffDriveTrainSim_GetPose.vi						x
X	X		X				DiffDriveTrainSim_GetRightCurrentDrawAmps.vi						x
X	X		X				DiffDriveTrainSim_GetRightPositionMeters.vi						x
X	X		X				DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi						x
X	X		X				DiffDriveTrainSim_GetState_Single.vi						x
X	X		X				DiffDriveTrainSim_GetState.vi						x

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

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_KitBotWheelSize.vi						x
X	X		X				DiffDriveTrainSim_New_Mass_MOI.vi						x
X	X		X				DiffDriveTrainSim_New.vi						x
X	X		X				DiffDriveTrainSim_SetCurrentGearing.vi						x
X	X		X				DiffDriveTrainSim_SetInputs.vi						x
X	X		X				DiffDriveTrainSim_SetPose.vi						x
X	X		X				DiffDriveTrainSim_SetState.vi						x
X	X		X				DiffDriveTrainSim_ToughBoxMiniGearRatio.vi						x
X	X		X				DiffDriveTrainSim_ToughBoxMiniMotor.vi						x
X	X		X				DiffDriveTrainSim_Update.vi						x
													x
													x
													x

ELEVATOR SIM

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				ElevatorSim_GetCurrentDraw.vi						x
X	X		X				ElevatorSim_GetPositionMeters.vi						x
X	X		X				ElevatorSim_GetVelocityMetersPerSecond.vi						x
X	X		X				ElevatorSim_HasHitLowerLimit.vi						x
X	X		X				ElevatorSim_HasHitUpperLimit.vi						x
							ElevatorSim_New_LinSys_NoNoise.vi						x
							ElevatorSim_New_LinSys.vi						x
							ElevatorSim_New_NoNoise.vi						x
X	X		X				ElevatorSim_New.vi						x
X	X	X	No				ElevatorSim_RKF45_Func.vi						x
X	X		X				ElevatorSim_SetInputVoltage.vi						x
X	X		X				ElevatorSim_SetState.vi						x
X	X	X	X				ElevatorSim_Update.vi		Needed because this doesn't extend.				x
X	X		X				ElevatorSim_UpdateX.vi						x
X	X		X				ElevatorSim_WouldHitLowerLimit.vi						x
X	X		X				ElevatorSim_WouldHitUpperLimit.vi						x
													x
													x

FLYWHEEL SIM

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				FlyWheelSim_GetAngularVelocityRadPerSec.vi						x
X	X		X				FlyWheelSim_GetAngularVelocityRPM.vi						x
X	X		X				FlyWheelSim_GetCurrentDrawAmps						x
							FlyWheelSim_New_LinSys		Future				x
							FlyWheelSim_New_LinSys_MOI_NoNoise		Future				x
							FlyWheelSim_New_LinSys_NoNoise		Future				x
X	X		X				FlyWheelSim_New_MOI.vi						x
X	X		X				FlyWheelSim_SetInput.vi						x
X	X		X				FlyWheelSim_SetState.vi						x
X	X		X				FlyWheelSim_Update.vi						x
													x
													x
													x

LINEAR SYSTEM SIM

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				LinearSystemSim_ClampInput.vi						x
							LinearSystemSim_GetCurrentDrawAmps.vi		DONT IMPLEMENT…				x
X	X		X				LinearSystemSim_GetOutput_Single.vi						x
X	X		X				LinearSystemSim_GetOutput.vi						x
X	X		X				LinearSystemSim_New						x
							LinearSystemSim_New_NoNoise.vi						x

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

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

	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		X				SngJntArmSim_GetAngleRads.vi					x
	X	X		X				SngJntArmSim_GetCurrentDraw.vi					x
	X	X		X				SngJntArmSim_GetVelocityRadsPerSec.vi					x
	X	X		X				SngJntArmSim_HasHitLowerLimit.vi					x
	X	X		X				SngJntArmSim_HasHitUpperLimit.vi					x
	X	X		X				SngJntArmSim_New.vi					x
	X	X		No				SngJntArmSim_Rkf45_Func.vi					x
	X	X		X				SngJntArmSim_SetInputVoltage.vi					x
	X	X		X				SngJntArmSim_SetState.vi					x
	X	X		X				SngJntArmSim_Update.vi					x
	X	X		X				SngJntArmSim_UpdateX.vi					x
	X	X		X				SngJntArmSim_WouldHitLowerLimit.vi					x
	X	X		X				SngJntArmSim_WouldHitUpperLimit.vi					x

'============
MATRIX UTILITIES
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	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		X	SI			MatBuilder_Fill.vi					x

	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		X	SI			Matrix_Block.vi					x
								Matrix_ChangeBoundsUnchecked.vi					x
	X	X		X	SI			Matrix_Create.vi					x
								Matrix_Det.vi					x
	X	X		X	SI			Matrix_Diag.vi					x
								Matrix_Div_Scalar.vi		labview has function			x
								Matrix_ElementPower.vi					x
	X	X		X	SI			Matrix_ElementSum.vi					x
								Matrix_ElementTimes.vi					x
								Matrix_Equals.vi					x
	X	X		X	I			Matrix_Exp.vi					x
	X	X		X	SI			Matrix_ExtractColumnVector.vi					x
	X	X		X	SI			Matrix_ExtractFrom.vi					x
								Matrix_ExtractMatrix.vi					x
	X	X		X	SI			Matrix_ExtractRowVector.vi					x

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

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	SI			Matrix_Fill.vi					x
							Matrix_Get.vi		labview has function			x
X	X		X	I			Matrix_Ident.vi		WPILIB calls this EYE			x
							Matrix_Inv.vi					x
X	X		X	SI			Matrix_IsEqual.vi					x
							Matrix_IsIdentical.vi					x
X	X		X	I			Matrix_LLTDecompose.vi					x
							Matrix_Max.vi					x
							Matrix_MaxAbs.vi					x
							Matrix_Mean.vi					x
							Matrix_MinInternal.vi					x
							Matrix_Minus_Matrix.vi					x
							Matrix_Minus_Scalar.vi					x
X	X		X	I			Matrix_NormF.vi					x
							Matrix_NormIndP1.vi					x
							Matrix_Plus_Matrix.vi					x
							Matrix_Plus_Scalar.vi					x
X	X		X	I			Matrix_Pow.vi		THIS NEEDS WORK!!!!			x
X	X		X	SI			Matrix_SetColumn.vi					x
X	X		X	SI			Matrix_SetRow.vi		THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT SHOULD BE INCLUDED HERE FOR ISOLATION.			x
							Matrix_Solve.vi					x
							Matrix_Times_Matrix.vi					x
							Matrix_Times_Scalar.vi					x
							Matrix_Trace.vi					x
X	X		X	SI			Matrix_Transpose.vi					x
X	X	X	X				Matrix_WithinTolerance.vi					x

SIMPLE MATRIX

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	SI			SimpleMatrix_ExtractMatrix.vi		NOTE Matrix also has an ExtractMatrix with different calling parameters…. YUK.			x

MATRIX HELPER

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

VECTOR BUILDER

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	SI			VecBuilder_1x1Fill.vi					x
X	X		X	SI			VecBuilder_2x1Fill.vi					x
X	X		X	SI			VecBuilder_3x1Fill.vi					x
X	X		X	SI			VecBuilder_4x1Fill.vi					x
X	X		X	SI			VecBuilder_5x1Fill.vi					x
X	X		X	SI			VecBuilder_6x1Fill.vi					x
X	X		X	SI			VecBuilder_7x1Fill.vi					x
X	X		X	SI			VecBuilder_8x1Fill.vi					x
							VecBuilder_9x1Fill.vi					x

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

							VI Name	Function Prototype	Notes			
							VecBuilder_10x1Fill.vi						x
X	X	X	X	SI			VecBuilder_ArrayBy1Fill.vi						x
													x
													x
													x

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
VECTOR	X	X		X	SI			Vector_Dot.vi						x
	X	X		X	Si			Vector_Norm.vi						x
														x

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

							x
							x
							x
							x

	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		X	I	X		AngleStats_AngleAdd.vi						x
	X	X	X	X	X			AngleStats_AngleMean_CallbackHelp.vi						x
	X	X		X	I	X		AngleStats_AngleMean.vi						x
	X	X	X	X	X			AngleStats_AngleResidual_CallbackHelp.vi						x
	X	X		X	I	X		AngleStats_AngleResidual.vi						x
														x
														x

	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		X	SI			MathUtil_ApplyDeadband.vi						x
	X	X		X	SI			MathUtil_Clamp_Int.vi						x
	X	X		X	SI			MathUtil_Clamp.vi						x
	X	X		X	SI			MathUtil_InputModulus.vi						x
	X	X		X	Si			MathUtil_Interpolate.vi						x
														x
														x

	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		X	SI			MerweScSigPts_GetNumSigmas.vi						x
	X	X		X	SI			MerweScSigPts_GetWc_Single.vi						x
	X	X		X	SI			MerweScSigPts_GetWc.vi						x
	X	X		X	SI			MerweScSigPts_GetWm_Single.vi						x
	X	X		X	SI			MerweScSigPts_GetWm.vi						x
	X	X		X	I			MerweScSigPts_New_Default.vi						x
	X	X		X	I			MerweScSigPts_New.vi						x
	X	X		X	I			MerweScSigPts_SigmaPoints.vi						x
														x
														x

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

x

	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		X				NumIntegrate_Rk4_Dbl_X_U.vi						x
	X	X		X				NumIntegrate_Rk4_Dbl_X.vi						x
	X	X		X				NumIntegrate_Rk4_Mat_X_U.vi						x
	X	X		X				NumIntegrate_Rk4_Mat_X.vi						x
	X	X		No	SI			NumIntegrate_Rkdp_Func_A.vi						x
	X	X		No	SI			NumIntegrate_Rkdp_Func_B1.vi						x
	X	X		No	SI			NumIntegrate_Rkdp_Func_B1B2.vi						x
	X	X		No	SI			NumIntegrate_Rkdp_Func_B2.vi						x
	X	X		No	I			NumIntegrate_Rkdp_Impl.vi						x
	X	X		X				NumIntegrate_RKDP_Mat_X_U.vi		New replacement for RKF45				x
	X	X		No	SI			NumIntegrate_Rkf45_Func_A.vi						x
	X	X		No	SI			NumIntegrate_Rkf45_Func_B1.vi						x
	X	X		No	SI			NumIntegrate_Rkf45_Func_B1B2.vi						x
	X	X		No	SI			NumIntegrate_Rkf45_Func_B2.vi						x
								NumIntegrate_RKf45_Func_Bs.vi		Removed. Replaced with newer functions.				x
								NumIntegrate_RKf45_Func_Ch.vi		Removed. Replaced with newer functions.				x
								NumIntegrate_RKf45_Func_Ct.vi		Removed. Replaced with newer functions.				x
	X	X		No	I			NumIntegrate_Rkf45_Impl.vi						x
	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				x
								NumIntegrate_RKf45_New.vi		Removed. Never used.				x
	X	X	X	X	SI			NumIntegrate_Trap_Dbl.vi						x
	X	X	X	X	I			NumIntegrate_Trap_Mat.vi						x
														x
														x
														x

	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						x
														x
														x
														x

	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		X				NumJacobian_X.vi						x
														x
														x
														x

	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		X				Riccati_Check_Stabilizable.vi		Not really done !!!				x
								Riccati_DARE_Choose.vi		Intended to allow DARE method testing.				x

WPILib LabVIEW Math Library – VI Implementation List

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking	
X	X	X	X			X	Riccati_DARE_Iterate.vi						x
X	X	X	X			X	Riccati_DARE_StructDoubling.vi						x
X	X		X				Riccati_DARE_N.vi						x
X	X		X			X	Riccati_DARE.vi						x
X	X		X				Riccati_Input_Check.vi						x

'===========
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		X				CompVisionUtil_EstimateCameraToTarget.vi						x
	X	X		X				CompVisionUtil_EstimateFieldToCamera.vi						x
	X	X		X				CompVisionUtil_EstimateFieldToRobot.vi						x
	X	X		X				CompVisionUtil_EstimateFieldToRobot_Alt.vi						x

'===========
COMMUNICATIONS
'===========

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking	
NETWORK UDP	X	X	X			S/		NetworkUDP_Close.vi						x
	X	X	X			/		NetworkUDP_Receive.vi						x
	X	X	X			/		NetworkUDP_Send.vi						x

'===========
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	Z	X	X	N/A			ARM_FF.CTL						x
	Z	Z	X	X	N/A			BANG_BANG.CTL						x
	\		X	X	N/A			BICon-Matrix_FUNC_TYPE.CTL		NOT USED. Should this be deleted or abandoned???				x
	Z	Z	X	X	N/A			CALLBACK_FUNC_TYPE.CTL						x
	Z	Z	X	X	N/A			CHASSIS_SPEEDS.CTL						x
	Z	Z	X	X	N/A			CONTRAINED_STATE.CTL						x
	Z	Z	X	X	N/A			COORDINATE_AXIS.CTL						x
	Z	Z	X	X	N/A			COORDINATE_SYSTEM.CTL						x
	Z	Z	X	X	N/A			DCMOTOR_TYPES_ENUM.CTL						x
	Z	Z	X	X	N/A			DCMOTOR.CTL						x
	Z	Z	X	X	N/A			DCMOTOR_SIM.CTL						x
	Z	Z	X	X	N/A			DEBOUNCER_TYPE_ENUM.Ctl						x
	Z	Z	X	X	N/A			DEBOUNCER.CTL						x
	Z	Z	X	X	N/A			DIFF_DRIVE_ACCEL_LIMIT.CTL						x
	Z	Z	X	X	N/A			DIFF_DRIVE_KINEMATICS.CTL						x
	Z	Z	X	X	N/A			DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl						x
	Z	Z	X	X	N/A			DiFF_DRIVE_Pose_EST.ctl						x

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

Z	Z	X	X	N/A		DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl		x
Z	Z	X	X	N/A		DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl		x
Z	Z	X	X	N/A		DIFF_DRIVE_TRAIN_SIM_STATE_ENUM.CTL		x
Z	Z	X	X	N/A		DIFF_DRIVE_TRAIN_SIM.ctl		x
Z	Z	X	X	NA		DISPLAY_WAYPOINT.ctl	Was UTIL_WAYPOINT.VI	x
Z	Z	X	X	NA		DISPLAY_WEIGHTED_WAYPOINT.ctl	New V1.5. was UTIL_WEIGHTED_WAYPOINIT.VI	x
Z	Z	X	X	N/A		ELEV_FF.CTL		x
Z	Z	X	X	N/A		ELEVATOR_SIM.CTL		x
Z	Z	X	X	N/A		EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL		x
Z		X	X	N/A		EXTENDED_KALMAN_FILTER.CTL		x
Z	Z	X	X	N/A		FLYWHEEL_SIM.ctl		x
Z	Z	X	X	N/A		FUNCTION_GENERATOR.ctl		x
Z	Z	X	X	N/A		FUNCTION_GENERATOR_MATRIX.ctl		x
Z	Z	X	X	N/A		HOLONOMIC_DRV_CTRL.CTL	New 1/26/21	x
Z	Z	X	X	N/A		TIME_INTERPOLATABLE_BOOLEAN.CTL		x
Z	Z	X	X	N/A		TIME_INTERPOLATABLE_DOUBLE.CTL		x
Z	Z	X	X	N/A		TIME_INTERPOLATABLE_POSE2D.CTL		x
Z	Z	X	X	N/A		TIME_INTERPOLATABLE_ROTATION2D.CTL		x
Z	Z	X	X	N/A		KALMAN_FILTER_LATENCY_COMP_FUNC_GROUP.CTL		x
Z	Z	X	X	N/A		KALMAN_FILTER_LATENCY_COMP.CTL		x
Z	Z	X	X	N/A		KALMAN_FILTER.ctl		x
Z	Z	X	X	N/A		LINEAR_FILTER.CTL		x
Z	Z	X	X	N/A		LINEAR_PLANT_INV_FF.ctl		x
Z	Z	X	X	N/A		LINEAR_QUADRATIC_REGULATOR.ctl		x
Z	Z	X	X	N/A		LINEAR_SYSTEM_LOOP.ctl		x
Z	Z	X	X	N/A		LINEAR_SYSTEM_SIM.ctl		x
Z	Z	X	X	N/A		LINEAR_SYSTEM.ctl		x
Z	Z	X	X	N/A		LTV_DIFF_DRIVE_CTRL.ctl		x
Z	Z	X	X	N/A		LTV_DIFF_DRIVE_CTRL_STATE_ENUM.ctl		x
Z	Z	X	X	N/A		LTV_UNICYCLE_CONTROLLER.CTL		x
N/A		N/A		N/A		LTV_UNICYCLE_CONTROLLER_INPUT_ENUM.ctl	OBSOLETE – Removed	x
Z	Z	X	X	N/A		LTV_UNICYCLE_CONTROLLER_STATE_ENUM.ctl		x
Z	Z	X	X	N/A		MECA_DRIVE_KINEMATICS.CTL		x
Z	Z	X	X	N/A		MECA_DRIVE_ODOMETRY.CTL		x
Z	Z	X	X	N/A		MECA_DRIVE_POSE_EST.CTL		x
Z	Z	X	X	N/A		MECA_WHEEL_POSITIONS.CTL		x
Z	Z	X	X	N/A		MECA_WHEEL_SPEEDS.CTL		x
Z	Z	X	X	N/A		MEDIAN_FILTER.CTL		x
Z	Z	X	X	N/A		MERWE_SCALED_SIGMA_PTS.ctl		x
Z	Z	X	X	N/A		OBSERVER_SNAP_LIST_ITEM.CTL		x
Z	Z	X	X	N/A		OBSERVER_SNAPSHOT.CTL		x
Z	Z	X	X	N/A		PARAM_STACK_ITEM.CTL		x
Z	Z	X	X	N/A		PARAM_STACK.CTL		x
Z	Z	X	X	N/A		PID_ADV_LIMITS.CTL		x
Z	Z	X	X	N/A		PID_ADV_TUNING.CTL		x
Z	Z	X	X	N/A		PID_CONTROLLER.CTL		x
Z	Z	X	X	N/A		PID_ERROR_TOLERANCE.CTL		x
Z	Z	X	X	N/A		PID_INPUT_LIMITS.CTL		x
Z	Z	X	X	N/A		PID_TUNING.CTL		x
Z	Z	X	X	N/A		POSE2D.CTL		x
Z	Z	X	X	N/A		POSE3D.CTL		x
Z	Z	X	X	N/A		POSEwCURVATURE.CTL		x
Z	Z	X	X	N/A		PROFILED_PID_CONTROLLER.CTL		x
Z	Z	X	X	N/A		QUATERNION.CTL		x
Z	Z	X	X	N/A		RAMSETE_EXE_TUNING.CTL		x
Z	Z	X	X	N/A		RAMSETE.CTL		x
Z	Z	X	X	N/A		ROTATION2D.CTL		x
Z	Z	X	X	N/A		ROTATION3D.CTL		x
Z	Z	X	X	N/A		SIMPLE_MOTOR_FF.CTL		x
Z	Z	X		N/A		SIMPLE_MOTOR_FF_KA_TUNE_PARAMS.CTL		x
Z	Z	X	X	N/A		SINGLE_JOINT_ARM_SIM.CTL		x
Z	Z	X	X	N/A		SLEW_RATE_LIMITER.CTL		x
Z	Z	X	X	N/A		SPLINE_CTRL_VECTOR.CTL		x
Z	Z	X	X	N/A		SPLINE.CTL		x
Z	Z	X	X	N/A		SWERVE_DRIVE_KINEMATICS.CTL		x
Z	Z	X	X	N/A		SWERVE_DRIVE_MODULE_POSITION.CTL		x
Z	Z	X	X	N/A		SWERVE_DRIVE_MODULE_STATE.CTL		x
Z	Z	X	X	N/A		SWERVE_DRIVE_ODOMETRY.CTL		x
Z	Z	X	X	N/A		SWERVE_DRIVE_Pose_EST.CTL		x

Z	Z	X	X	N/A		TIMER.CTL			x
Z	Z	X	X	N/A		TRAJ_CONFIG.CTL			x
Z	Z	X	X	N/A		TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL			x
Z	Z	X	X	N/A		TRAJ_CONSTRAINT_DIIF_DRIVE_KINEMATICS.CTL			x
Z	Z	X	X	N/A		TRAJ_CONSTRAINT_DIIF_DRIVE_VOLTAGE.CTL			x
Z	Z	X	X	N/A		TRAJ_CONSTRAINT_ELLIP_REGION.CTL			x
\		X		N/A		TRAJ_CONSTRAINT_JERK.CTL		Routine exists, it is just a shell	x
Z	Z	X	X	N/A		TRAJ_CONSTRAINT_MAX_VELOCITY.CTL			x
Z	Z	X	X	N/A		TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL			x
Z	Z	X	X	N/A		TRAJ_CONSTRAINT_MINMAX.CTL			x
Z	Z	X	X	N/A		TRAJ_CONSTRAINT_RECT_REGION.CTL			x
Z	Z	X	X	N/A		TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL			x
Z	Z	X	X	N/A		TRAJ_STATE.CTL			x
Z	Z	X	X	N/A		TRAJECTORY_SPLINE_TYPE_ENUM.CTL			x
Z	Z	X	X	N/A		TRAJECTORY.CTL			x
Z	Z	X	X	N/A		TRANSFORM2D.CTL			x
Z	Z	X	X	N/A		TRANSFORM3D.CTL			x
Z	Z	X	X	N/A		TRANSLATION2D.CTL			x
Z	Z	X	X	N/A		TRANSLATION3D.CTL			x
Z	Z	X	X	N/A		TRAPEZOID_PROFILE_CONSTRAINT.CTL			x
Z	Z	X	X	N/A		TRAPEZOID_PROFILE_STATE.CTL			x
Z	Z	X	X	N/A		TRAPEZOID_PROFILE.CTL			x
Z	Z	X	X	N/A		TWIST2D.CTL			x
Z	Z	X	X	N/A		TWIST3D.CTL			x
Z	Z	X	X	N/A		UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL			x
Z	Z	X	X	N/A		UNSCENTED_KALMAN_FILTER.ctl			x
Z	Z	X	X	N/A		UNSCENTED_KALMAN_NEW_FUNC_GROUP.CTL			x
Z	Z	X	X	N/A		UTIL_PATHFINDER_CONFIG.CTL			x
N/A		N/A		N/A		WAYPOINTS.CTL		Delete – obsolete	x
Z	Z	X	X	NA		WEIGHTED_WAYPOINT.CTL		New V1.5	x
N/A		N/A		N/A		X_Y_HEADINGS.CTL		Delete – obsolete	x
Z	Z	X	X	N/A		X_Y_PAIR.CTL			x