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...

VI / CTL Totals VI Total (X) CTL Total (Z) VI Shell Total (I) CTRL Shell Total (I) CTRL Shell Total (I) CTRL Shell Total (I) 2 CTRL Shell Total (II) 2 CTRL Shell Total (III) 2 CTRL Shell Total (IIII) 2 CTRL Shell Total (IIIII (IIII (

Doc completed Pct 98.88% Optimization Pct 57.95%

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

'===== BASE

ANALOG DELAY	× Implemented	X Documented	X Not WPILIB	X Menu Item	- Execution Optimized	Test Routine		VI Name AnalogDelay_Execute.vi	Function Prototype	Notes Similar to interpolated tree map	Code Review	Test Program	Error Checking
ANALOG DELAT	^	_ ^	_ ^	^	,			Analoguelay_Execute.vi		Similar to interpolated tree map			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
BUMPLESS TRANSFER		$\overline{X}$	$\overline{x}$	$\overline{x}$	ī	T		BumplessTransfer Execute.vi	- undustri retetype	110100			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
FUNCTION GENERATOR	R X	X		Χ	1			FunctionGenerator_Add_Value.vi		Similar to interpolated tree map			
	Χ	X		Χ	1			FunctionGenerator_Add_XY.vi		Similar to interpolated tree map			
	Χ	X		X	1			FunctionGenerator_Calculate.vi		Similar to interpolated tree map			
	X	X		X	SI			FunctionGenerator_Clear.vi					
	X	X	X		- 1			FunctionGenerator_Execute.vi		Similar to interpolated tree map			
	X	X		X	SI			FunctionGenerator_New.vi		Similar to interpolated tree map			
INOTION OF MEDIATOR WATER	Implemented	Documented	Not WPILIB	Menu Item	- Execution Optimized	Test Routine		VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
INCTION GENERATOR MATRIX		X	X		1	-		FunctionGeneratorMatrix_Add.vi		Similar to interpolated tree map			
	X	X	X	X	SI	-	-	FunctionGeneratorMatrix_Calculate.vi FunctionGeneratorMatrix_New.vi		Similar to interpolated tree map			
	Λ.	_ X	_ ^	_ X	SI			runctionGeneratorMatrix_New.vi		Similar to interpolated tree map			

Revision 3.X 1/11/2023 – renamed library. Added additional documentation. Routine Function Prototype VI Name Notes LEAD LAG X X X X I LeadLag Execute.vi Routine VI Name Function Prototype Notes LINEAR FILTER X LinearFilter BackwardFiniteDifference.vi X I X X SI X X X X LinearFilter Calculate.vi X XX LinearFilter\_CutoffFrequency.vi X X X X I X LinearFilter\_Execute.vi Labview style helper AN INTERNAL ROUTINE XX No I LinearFilter Factorial.vi LinearFilter FiniteDifference.vi XX I X X LinearFilter HighPass.vi Χ X X X X X X X X LinearFilter HighPassBW1.vi LinearFilter\_HighPassBW2.vi X X X X LinearFilter LowPassBW1.vi LinearFilter LowPassBW2.vi X X X X X X X X LinearFilter\_MovingAverage.vi Χ LinearFilter New.vi LinearFilter Reset.vi LinearFilter\_ResetToValue.vi XX X LinearFilter SinglePoleIIR.vi LinearFilter TimeConst.vi  $X \mid X \mid X \mid X$ VI Name Function Prototype Notes MEDIAN FILTER X MedianFilter Calculate.vi X X X X X X MedianFilter\_Execute.vi Labview style helper XX X SI MedianFilter New.vi X SI MedianFilter Reset.vi X X X X SI MedianFilter ResetToValue.vi Function Prototype VI Name Notes SLEW RATE FILTER X X SlewRateLimiter Calculate.vi X XX 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 XX SlewRateLimiter New.vi Χ XX Χ SlewRateLimiter NewInitialZero.vi X I X SI X X X X SlewRateLimiter Reset.vi Х SlewRateLimiter SetRate.vi

Revision  $\overline{3.X}$  1/11/2023 – renamed library. Added additional documentation. Routine Function Prototype VI Name Notes TIMER X X X X Timer Close.vi releases semaphore Timer Get.vi XX X Timer GetAndReset.vi X X X No Timer GetInternal.vi Internal (private) only Timer\_HasPeriodPassed.vi  $X \mid X \mid$ X X X X X X Timer HasPeriodPassedOnce.vi X X Timer New.vi Timer Reset.vi X X X No Timer ResetInternal Internal (private) only X X X Timer Restart.vi X Timer Start.vi  $X \mid X \mid$ X X X X No Timer StartInternal.vi Χ Timer\_Stop.vi X X X No Timer\_StopInternal.vi Internal (private) only Function Prototype TimeInterpBoolean\_AddSample.vi TIME INTERPOLATABLE BOOLEAN X 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 TimeInterpBoolean\_GetSample.vi X X X X I TimeInterpBoolean GetTimeForValue.vi X X X X SI X X X X SI TimeInterpBoolean New.vi TimeInterpBoolean\_SetMaxTime.vi Function Prototype TIME INTERPOLATABLE DOUBLE X TimeInterpDouble AddSample.vi Update to use create matrix X X X X No I TimeInterpDouble CleanUp.vi Update to use create matrix X X X X SI TimeInterpDouble Clear.vi  $X \mid X \mid X \mid X \mid I$ TimeInterpDouble\_GetSample.vi TimeInterpDouble GetTimeForValue.vi X X X X X X SI TimeInterpDouble New.vi X X X X SI TimeInterpDouble SetMaxTime.vi Function Prototype TIME INTERPOLATABLE POSE2D TimeInterpPose2d\_AddSample.vi Χ  $X \mid X$ X 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 TimeInterpPose2d GetSample.vi  $X \mid X \mid X \mid X \mid I$ TimeInterpPose2d\_GetTimeForValue.vi X X X X SI X X X X X SI TimeInterpPose2d New.vi TimeInterpPose2d SetMaxTime.vi

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1/11/2023 – renamed library. Added additional do	ocumer	ntation.							-				
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	X	X	Χ		SI			TimeInterpVariant_Clear.vi					
	X	Χ	X		I			TimeInterpVariant_GetSample.vi					
,	3.6							TimeInterpVariant_GetTimeForValue.vi					
	X	X	X		1			TimeInterpVariant_Interpolate.vi		This is a template for a user created routine.			
	X	X	X		SI			TimeInterpVariant_New.vi		created routine.			
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	Χ	X		Χ				Debouncer_Calculate.vi					
		X		X				Debouncer_Execute.vi					
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WPILib LabVIEW Math Library – VI Implementation List
Revision 3.X 1/11/2023 – renamed library. Added additional documentation.
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CONTROLLER '========

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program				Code Review	Test Program	or Checking
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ARM FF		X	$\Box$	$\overline{X}$				ArmFF_Calculate.vi	71				
	X	X		X				ArmFF_CalculateVelocityOnly.vi					
			X				-	ArmFF_Execute.vi		LabVIEW style single call			
	X	X	X	X				ArmFF_ExecuteVelocityOnly.vi ArmFF MaxAchieveAccel.vi		LabVIEW style single call			
	X	X		X				ArmFF_MaxAchieveAccei.vi ArmFF_MaxAchieveVelocity.vi					
	X	X		X				ArmFF MinAchieveAccel.vi					
	X	X		X				ArmFF MinAchieveVelocity.vi					
	Χ	X		X				ArmFF_New_ZeroGravity.vi					
	X	X		X				ArmFF_New.vi					
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	X	X		X	SI			BangBang_Calculate_PV.vi					
	Χ	X		X	SI			BangBang_Calculate_SP_PV.vi					
	X	X	X		SI			BangBang_Execute.vi					
	X	X		X	SI SI			BangBang_GetAll.vi					
	X	X		X	SI			BangBang_GetError.vi BangBang_New.vi					
	X	$\frac{\hat{x}}{x}$		X	SI			BangBang_SetSetpoint.vi					
	X	X		X	SI			BangBang_SetTolerance.vi					
NTROLLER UTIL	× Implemented	X Documented	Not WPILIB	X Menu Item	⊘ Execution Optimized	Test Routine		VI Name  ControllerUtil_GetModulusError.vi	Function Prototype	Notes This was short lived in WPILIB, but still useful here.	Code Review	Test Program	Error Checking
ELEV FF	X X Implemented		Not WPILIB	X Menu Item	Execution Optimized	Test Routine		VI Name  ElevFF_Calculate.vi  ElevFF_CalculateVelocityOnly.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	^	<u> </u>	X					ElevFF Execute.vi		LabVIEW style single call			
			$\frac{x}{X}$					ElevFF ExecuteVelocityOnly.vi		LabVIEW style single call			
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HOL_DRV_C1	RL X	X		Χ			HolDrvCtrl_AdvCalculate_Trajectory.vi Added 1/24/2022			
		X		X			HolDrvCtrl_AdvCalculate.vi         Added 1/24/2022           HolDrvCtrl_AtReference.vi         Added 1/26/21			
		X	-	X SI			HolDrvCtrl_AtReference.vi Added 1/26/21 HolDrvCtrl_Calculate_Trajectory.vi Added 1/26/21			
	X	X		X			HolDrvCtrl Calculate.vi Added 1/26/21			
	X						HolDrvCtrl_Execute_Trajectory.vi Added 1/24/2022			
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	X		X	X SI			HolDrvCtrl PackExecuteSP.vi			
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PID AUTOTUN	IE X		X				PIDAutoTune_ClosedLoopStep.vi  PIDAutoTune_Convert_Academic_To_NonInteracting.vi			
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Revision 3.X 1/11/2023 – renamed library. Added additional d	documentatio

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	XX	X	No		PIDController_SetFFGain_OBSOLETE_DELETE.vi		Advanced PID, Obsolete –			
	X X		X	SI	PIDController Setl.vi		DELETE			
	XX		X	51	PIDController_Sett.vi PIDController_SettInputRange.vi		OBSOLETE – Removed			
	X X		Х	SI	PIDController_SetIntegratorRange.vi		OBOOLETE - Nemoved			
		X	X	SI	PIDController SetOutputLimits.vi		Advanced PID			
	XX		Χ	SI	PIDController_SetP.vi					
	X X	Χ	Χ	SI	PIDController_SetPeriod.vi					
	X X		Χ	SI	PIDController_SetPID.vi					
	XX	Χ	X	SI	PIDController_SetPIDF.vi		Advanced PID			
	X X X X		X	SI SI	PIDController_SetSetpoint.vi PIDController SetTolerance.vi					
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		$\hat{x}$	SI	PIDController SetTolerancePandV.vi					
	Implemented Documented	Not WPILIB	Menu Item		Sample Program  Sumple Program	Function Prototype	Notes	Code Review	Test Program	Error Checkina
LED PID CONTROLLER			Χ	SI	ProfiledPIDController_AtGoal.vi					
-	XX			SI	ProfiledPIDController_AtSetpoint.vi					
	X X X X		X X		ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController Calculate Meas StateGoal TrapCnsrt.vi					
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		X		ProfiledPIDController Calculate Meas StateGoal.vi					
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		X		ProfiledPIDController Calculate Meas.vi					
	XX			SI	ProfiledPIDController_DisableContInput.vi					
	XX		Χ	SI	ProfiledPIDController_EnableContInput.vi					
	XX	X	X	1	ProfiledPIDController_Execute.vi		Single call LabVIEW style function.			
	XX		X	SI	ProfiledPIDController GetGoal.vi					
	X X		X	SI	ProfiledPIDController_GetPeriod.vi					
		Χ	Χ	SI	ProfiledPIDController_GetPID.vi		WPILIB has separate getters.			
	X X		Χ	SI	ProfiledPIDController_GetPositionError.vi					
	X X		Χ	SI	ProfiledPIDController_GetSetpoint.vi					
	XX		V	SI	ProfiledPIDController_GetTolerance.vi					
	X X X X		X	SI	ProfiledPIDController_GetVelocityError.vi ProfiledPIDController New.vi					
	X X X X		$\hat{x}$	+	ProfiledPIDController NewPeriod.vi					
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$			SI	ProfiledPIDController Reset PosOnly.vi					
	$\begin{array}{c c} X & X \\ \hline X & X \\ \end{array}$			SI	ProfiledPIDController Reset PosVel.vi					
	XX		X	SI	ProfiledPIDController_Reset.vi					
	XX		X	SI	ProfiledPIDController_SetConstraints.vi					
	X X		Χ	SI	ProfiledPIDController_SetGoal_PosOnly.vi					
	XX		X	SI	ProfiledPIDController_SetGoal.vi					
-	XX		X	SI	ProfiledPIDController_SetIntegratorRange.vi					
	X X X X		X	SI SI	ProfiledPIDController_SetPID.vi ProfiledPIDController SetTolerance PosOnly.vi					
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		X	SI	ProfiledPIDController_SetTolerance_PosOnly.vi					
·	Implemented Documented	Not WPILIB	Menu Item	Execution Optimized	e Program		,	le Review	t Program	
	mp Joc	\o	Men	ě X	א או Name א או Name בישל	Function Prototype	Notes	Cod	Test	Erro
RAMSETE			X	SI	Ramsete AtReference.vi	AtReference	11000			<u> </u>
. 3 1 -	X X		Χ	X	Ramsete_Calculate_Trajectory.vi	calculate_trajectory				
	XX		Χ	X	Ramsete_Calculate.vi	calculate				
	X X	X	X	X	Ramsete_Diff_DO_Eng.vi					
	XX	X	X	X	Ramsete_Diff_DO_SI.vi	I I - A-i II				
	X X X X	X	X	SI	Ramsete_Execute_ENG.vi Ramsete_Execute_PackTuning_ENG.vi	Use this one!!				
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$	^ X	X	SI	Ramsete_Execute_PackTuning_ENG.VI  Ramsete Execute PackTuning.vi					
		^	^							
	XX	X	Χ	1	Ramsete Execute.vi					

1/2023 – renamed library. Added additional do	X	X	X	SI		Ramsete_New.vi	new				
	X		X	SI		Ramsete_SetEnabled.vi	SetEnabled				
	X		X	SI		Ramsete_SetTolerance.vi	SetTolerance				
	X	X	X	X		Ramsete_SINC.vi	sinc	internal			
SIMPLE MOTOR FEEDFORWARD	X X X	X X X X X	X	SI SI X	l est Koutine Sample Program	VI Name SimpleMotorFF_Calculate_CalcAccel.vi SimpleMotorFF_Calculate_NextV_Dt.vi SimpleMotorFF_Calculate.vi SimpleMotorFF_CalculateVelocityOnly.vi SimpleMotorFF_Ka_AutoTune.vi SimpleMotorFF_MaxAchieveAccel.vi SimpleMotorFF_MaxAchieveVel.vi SimpleMotorFF_MinAchieveAccel.vi	public double calculate(double velocity, double acceleration) public double calculate(double velocity)  public double maxAchievableAcceleration(double maxVoltage, double velocity) public double maxAchievableVelocity(double maxVoltage, double acceleration) public double minAchievableAcceleration(double maxVoltage,	Notes	Code Review	Test Program	2000
							double velocity)				
	X	X	X			SimpleMotorFF_MinAchieveVel.vi	public double minAchievableVelocity(double maxVoltage, double acceleration)				
	X	X	X	SI		SimpleMotorFF_New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)				
	X	XX		SI		SimpleMotorFF Pack Ka Tune Params.vi					
		- *									
				nized	u		public SimpleMotorFeedforward(double ks, double kv)				
COORDINATE AXIS	Implemented	Documented Not WPILIB	X Menu Item	Execution Optimized	lest Koutine Sample Program	VI Name		Notes	Code Review	Test Program	Error Checkina
COORDINATE AXIS	X X Implemented	X X Documented Not WPILIB	X Wenu	의 의 Execution Optimized	l est Routine Sample Program	VI Name CoordAxis_D.vi CoordAxis_E.vi		Notes	Code Review	Test Program	Frror Checkina
COORDINATE AXIS	X X Implemented	X X Documented Not WPILIB	X Wenu	S   S   S   S   S   S   S   S   S   S	Sample Program	VI Name  CoordAxis_D.vi  CoordAxis_E.vi  CoordAxis_N.vi		Notes	Code Review	Test Program	Frror Checking
COORDINATE AXIS	X X X Implemented	X X Documented Not WPILIB	X X X	S S Execution Optimized	Sample Program	VI Name  CoordAxis_D.vi CoordAxis_E.vi CoordAxis_N.vi CoordAxis_New.vi		Notes	Code Review	Test Program	Error Chacking
COORDINATE AXIS	X X Implemented	X X X X X X X X X X X X X X X X X X X	X X X X	19 19 19 19 19 19 19 19 19 19 19 19 19 1	Sample Program	VI Name  CoordAxis_D.vi CoordAxis_E.vi CoordAxis_N.vi CoordAxis_New.vi CoordAxis_S.vi		Notes	Code Review	Test Program	Error Obecking
COORDINATE AXIS	X X X Implemented	X X X X X X X X X X X X X X X X X X X	X X X X	S S Execution Optimized	Sample Program	VI Name  CoordAxis_D.vi CoordAxis_E.vi CoordAxis_N.vi CoordAxis_New.vi		Notes	Code Review	Test Program	7
COORDINATE AXIS	X X Implemented	umented X X X X Documented Not WPILIB	X X X X	IS I	est Koutine rest Routine ample Program	VI Name  CoordAxis_D.vi  CoordAxis_E.vi  CoordAxis_N.vi  CoordAxis_New.vi  CoordAxis_S.vi  CoordAxis_U.vi  CoordAxis_U.vi	Function Prototype		de Review Code	Program Test	rror Checking
	Implemented X X X X X Implemented	Documented X X X X X Documented  Not WPILIB	Menu Item X X X X	Execution Optimized 19 19 19 19 19 19 19 19 19 19 19 19 19	Sample Program Sample	VI Name  CoordAxis D.vi CoordAxis E.vi CoordAxis N.vi CoordAxis New.vi CoordAxis S.vi CoordAxis U.vi CoordAxis W.vi	Function Prototype	Notes	Review	Test Program	Error Chanking
COORDINATE AXIS	X   Implemented	X Documented X X X Documented Not WPILIB	X Wenu Item	Secution Optimized Secution Optimized Secution Optimized	Sample Program Sample Program	VI Name  CoordAxis_D.vi CoordAxis_E.vi CoordAxis_N.vi CoordAxis_New.vi CoordAxis_V.vi CoordAxis_V.vi CoordAxis_W.vi  CoordAxis_W.vi	Function Prototype		de Review Code	Program Test	Fror Checking
	X X X X X X X X X X X X X X X X X X X	X X Documented X X X X Nocumented Not WPILIB	X X Wenu Item	Solution Optimized Solution So	Sample Program Sample	VI Name  CoordAxis_D.vi CoordAxis_E.vi CoordAxis_N.vi CoordAxis_New.vi CoordAxis_S.vi CoordAxis_U.vi CoordAxis_U.vi CoordAxis_W.vi  VI Name  CoordSystem_Convert_Pose3d.vi CoordSystem_Convert_Rotation3d.vi	Function Prototype		de Review Code	Program Test	Error Chacking
	X X X Implemented X X X X Implemented	X X Documented X X X X X X Not WPILIB	X X X X X X X X X X X X X X X X X X X	Solution	Sample Program Sample	VI Name  CoordAxis D.vi  CoordAxis E.vi  CoordAxis N.vi  CoordAxis New.vi  CoordAxis S.vi  CoordAxis U.vi  CoordAxis W.vi  VI Name  CoordAxis W.vi  VI Name  CoordSystem Convert Pose3d.vi  CoordSystem Convert Rotation3d.vi  CoordSystem Convert Translation3d.vi  CoordSystem Convert Translation3d.vi	Function Prototype		de Review Code	Program Test	Frror Checkina
	X X X Implemented X X X X Implemented	X X Documented X X X Not WPILIB	X X X X X X X X X X X X X X X X X X X	S   S   S   S   S   S   S   S   S   S	X Y rest Koutine rest Koutine Sample Program	VI Name  CoordAxis D.vi CoordAxis E.vi CoordAxis N.vi CoordAxis New.vi CoordAxis S.vi CoordAxis U.vi CoordAxis U.vi CoordAxis W.vi  VI Name  CoordAxis W.vi  VI Name  CoordSystem Convert Pose3d.vi CoordSystem Convert Rotation3d.vi CoordSystem Convert Translation3d.vi CoordSystem Convert Transform3d.vi CoordSystem EDN.vi	Function Prototype		de Review Code	Program Test	Error Checking
	X X X Implemented X X X X Implemented	X X Documented X X X X X X X X X X X X X X X X X X X	X	Secution Optimized Secution Secution Secution Secution Secution Security Secution Security Secution Security Secution Security Security Security Security Security Secution Security Sec	X X X rest Koutine rest Koutine Sample Sample	VI Name  CoordAxis_D.vi CoordAxis_E.vi CoordAxis_N.vi CoordAxis_New.vi CoordAxis_S.vi CoordAxis_U.vi CoordAxis_W.vi  CoordAxis_W.vi  VI Name  CoordSystem_Convert_Pose3d.vi CoordSystem_Convert_avaluation3d.vi CoordSystem_Convert_Translation3d.vi CoordSystem_Convert_Transform3d.vi CoordSystem_EDN.vi CoordSystem_NED.vi	Function Prototype		de Review Code	Program Test	Error Checkina
	X X X Implemented X X X X Implemented	X X Documented X X X X X X X X X X X X X X X X X X X	X	S   S   S   S   S   S   S   S   S   S	X X X X X 1 est Routine rest Routine Sample Program	VI Name  CoordAxis D.vi CoordAxis E.vi CoordAxis N.vi CoordAxis New.vi CoordAxis S.vi CoordAxis U.vi CoordAxis U.vi CoordAxis W.vi  VI Name  CoordAxis W.vi  VI Name  CoordSystem Convert Pose3d.vi CoordSystem Convert Rotation3d.vi CoordSystem Convert Translation3d.vi CoordSystem Convert Transform3d.vi CoordSystem EDN.vi	Function Prototype		de Review Code	Program Test	Error Chacking

POSE20   X   X   X   X   X   X   X   X   X	can also use cluster unpack can also use cluster unpack can use cluster unpack can use cluster constant  Notes	Code Review Cod
X	can also use cluster unpack	Code Review
Note	can also use cluster unpack	Code Review
X	can also use cluster unpack	Code Review
X	can use cluster constant	Code Review
Pose2d getXYAngle.vi		Code Review
Note		Code Review
X		Code Review
A		Code Review
A		Code Review
Note		Code Review
A		Code Review
Pose2d   TransformBy.vi   pose2d transformby(transform2d other )		Code Review
POSE3D  Pose2d		Code Review
POSE3D  POSE3D		Code Review
POSE3D    V	Notes	Code Review
X         X         X         Pose3d_Exp.vi           X         X         X         SI         Pose3d_getRotation.vi           X         X         X         X         SI         Pose3d_getYYZ.vi           X         X         X         X         I         Pose3d_getYYZ.vi           X         X         X         I         Pose3d_getYYZ.vi           X         X         X         X         Pose3d_log.vi           X         X         X         X         Pose3d_log.vi           X         X         X         X         SI         Pose3d_log.vi           X         X         X         X         X         X         X           X		
X         X         X         SI         Pose3d_getRotation.vi           X		
X         X         X         X         SI         Pose3d_getXYZ.vi           X         X         X         I         Pose3d_Interpolate.vi           X         X         X         X         Pose3d_Log.vi           X         X         X         SI         Pose3d_Minus.vi           X         X         X         SI         Pose3d_New.vi           X         X         X         SI         Pose3d_New_Default.vi           X         X         X         SI         Pose3d_New_Pose2d.vi           X         X         X         SI         Pose3d_New_Trans3dRot3d.vi           X         X         X         SI         Pose3d_Plus.vi           X         X         X         SI         Pose3d_RelativeTo.vi		
X         X         X         X         X         Pose3d_Log.vi           X         X         X         X         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         SI         Pose3d_New_Pose2d.vi           X         X         X         X         SI         Pose3d_New_Trans3dRot3d.vi           X         X         X         X         X         X         X         X           X         X         X         X         X         X         X         X           X         X         X         X         X         X         X         X           X         X         X         X         X         X         X         X           X         X         X         X         X         X         X         X         X         X           X         X         X         X         X         X         X <td></td> <td></td>		
X         X		
X         X         X         SI         Pose3d_Minus.vi           X         X         X         SI         Pose3d_New.vi           X         X         X         SI         Pose3d_New_Default.vi           X         X         SI         Pose3d_New_Pose2d.vi           X         X         X         SI         Pose3d_New_Trans3dRot3d.vi           X         X         X         SI         Pose3d_Plus.vi           X         X         X         SI         Pose3d_RelativeTo.vi	1	
X         X         X         SI         Pose3d_New_Default.vi           X         X         SI         Pose3d_New_Pose2d.vi           X         X         X         SI         Pose3d_New_Trans3dRot3d.vi           X         X         X         SI         Pose3d_Plus.vi           X         X         X         SI         Pose3d_RelativeTo.vi		
X         X         SI         Pose3d_New_Pose2d.vi           X         X         X         SI         Pose3d_New_Trans3dRot3d.vi           X         X         X         SI         Pose3d_Plus.vi           X         X         X         SI         Pose3d_RelativeTo.vi		
X         X         X         SI         Pose3d_New_Trans3dRot3d.vi           X         X         X         SI         Pose3d_Plus.vi           X         X         X         SI         Pose3d_RelativeTo.vi		
X         X         SI         Pose3d_Plus.vi           X         X         SI         Pose3d_RelativeTo.vi		
X   X     IVO   SI       POSE30 KOTATION VECTOR I OMATRIX.VI		
X   X   SI		
X X SI Pose3d_Times.vi		
X X S/ Pose3d_TransformBy.vi		
Mocumented  You We will be wented with the work of the	<b>1</b>	- de Review
Z D Z Z W F 0) VINAILIE	Notes	ŏ
QUATERNION X X X SI Quaternion_Equals.vi		
X         X         SI         Quaternion_Get_All.vi           X         X         X         SI         Quaternion_Get_LVQuat.vi		
X X SI Quaternion_Get_LvQuat.vi		
X X X SI Quaternion_Get_W.vi		
X X X SI Quaternion_Inverse.vi		
X         X         SI         Quaternion_New.vi           X         X         X         SI         Quaternion_New_Default.vi		
X X X SI Quaternion_New_Delault.vi  X X X SI Quaternion_New_LVQuat.vi		

WPILib LabVIEW Math Library - VI Implementation List Revision 3.X 1/11/2023 – renamed library. Added additional documentation. X SI Quaternion Plus.vi XX XX X SI Quaternion Times.vi X SI XX Quaternion ToRotationVector.vi VI Name Function Prototype Notes ROTATION2D 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 SI Rotation2d CreateAngleRotations.vi XX X SI Rotation2d CreateXY.vi rotation2d new( double x, double y ) XX SI Rotation2d Div.vi X SI XX Rotation2d Equals.vi boolean equals( rotation2d other ) XX X SI Rotation2d GetAngleCosSin.vi New 1/26/21 Χ Rotation2d GetCos.VI double getCos() Χ SI use cluster unpack Χ Χ X SI Rotation2d GetDegrees.VI use cluster unpack, then convert to double getDegrees() X X X X X SI Rotation2d GetRadians.VI double getRadians() use cluster unpack X SI Rotation2d GetRotations.vi XX X SI Rotation2d GetSin.VI use cluster unpack double getSin() X X X X X SI Rotation2d GetTan.VI double getTan() can calculate X SI Rotation2d\_Interpolate.vi X X X X X SI Rotation2d Minus.vi rotation2d minus( rotation2d other ) Rotation2d Plus.vi X rotation2d plus( rotation2d other ) SI Rotation2d RotateBy.vi XX X SI rotation2d rotateby( rotation2d other ) XX X SI Rotation2d Times.vi rotation2d times( double scalar ) Rotation2d\_UnaryMinus.vi  $X \mid X$ X SI rotation2d unaryminus() rotation2d new() can use cluster constant Function Prototype VI Name Notes X SI ROTATION3D X X Rotation3d Create AxisAngle.vi X X X X Rotation3d Create Default.vi X SI X SI Rotation3d Create Quaternion.vi XX X I Rotation3d Create InitialFinalVector.vi X X X X Rotation3d Create RollPitchYaw.vi X SI Rotation3d Create RotMatrix.vi X I X X X X SI Rotation3d Div.vi X SI Rotation3d Equals.vi X X X X SI Rotation3d GetAxisAngle.vi X X X X X SI Rotation3d GetQuaternion.vi X SI Rotation3d\_GetXYZ.vi Χ Χ X SI Rotation3d Interpolate.vi Rotation3d Minus.vi Χ X SI XX Rotation3d Plus.vi X SI XX X SI Rotation3d RotateBy.vi  $X \mid X$ X SI Rotation3d\_Times.vi Rotation3d\_ToRotation2d.vi XX X SI X X SI Rotation3d UnaryMinus.vi

Function Prototype

transform2d new( pose2d, pose2d )

Notes

TRANSFORM2D X X

X SI

Transform2d Create PosePose.vi

W Math Library – VI Implementation L	ıst										
1/2023 – renamed library. Added additional				01		T ( 010 1 T D )				1	
	X	X	Х	SI		Transform2d_Create_TransRot.vi	transform2d new( translation2d, rotation2d )				
	X	X	V	SI		Transform2d_Div.vi	h     - +h h   \				
	X		X			Transform2d_Equals.VI	boolean equals( other transform2d )				
	X		X			Transform2d_GetRotation.VI	rotation2d getRotation()	use cluster unpack			
		X	X	SI		Transform2d_GetTranslation.VI	translation2d getTranslation()	use cluster unpack			
		X				Transform2d_GetXY.vi					
	X		X X			Transform2d_GetXYAngle.vi					
	X		X	SI		Transform2d_Inverse.vi	transform inverse()	new			
	X		X			Transform2d_Plus.vi					
	X	X	X	SI		Transform2d_Times.vi	transform2d times( double scalar )				
							transform2d new( )	can use cluster constant			
	Implemented	Documented	Not WPILIB Menu Item	Execution Optimizec	Test Routine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRANSFORM3D			X			Transform3d_Create_Default.vi					
	Χ		X			Transform3d_Create_Pose3dPose.3dvi					
	X		X			Transform3d_Create_Trans3dRot3d.vi					
		X		SI		Transform3d_Div.vi					
	X		X			Transform3d_Equals.VI					
	X		X			Transform3d_GetRotation3d.VI					1
	X		X	SI		Transform3d_GetTranslation3d.VI					1
		X				Transform3d_GetXYZ.vi					
		X	X			Transform3d_Inverse.vi					1
		X	X			Transform3d_Plus.vi					1
	X	X	X	SI		Transform3d_Times.vi					1
	nted	ited	BI. n	η Optimized	tine Program	·	L		view	yram	scking
	olemented	cumented	t WPILIB nu Item	scution Optimized	st Routine nple Program	.T			de Review	st Program	or Checking
	Implemented	Documented	Not WPILIB Menu Item	Execution Optimized	Test Routine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRANSLATION2	D X Implemented	X Documented	Not M Menu	SI	Test Routine Sample Program	VI Name Translation2d_Create_DistAng.vi		Notes	Code Review	Test Program	Error Checking
TRANSLATION2		X X Documented	Not M Menu	SI SI	Test Routine Sample Program		Function Prototype translation2d new( double x, double y )	Notes	Code Review	Test Program	Error Checking
TRANSLATION2	Χ		Not N X Wenu X	SI SI	Test Routine Sample Program	Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Div.vi		Notes	Code Review	Test Program	Error Checking
TRANSLATION2	X X X	X X X	X Not N	SI SI SI	Test Routine Sample Program	Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Div.vi Translation2d_Equals.vi		Notes	Code Review	Test Program	Error Checking
TRANSLATION2	X X X	X X X	X Wen X X	SI SI SI SI	Test Routine Sample Program	Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Div.vi Translation2d_Equals.vi Translation2d_GetAngle.vi	translation2d new( double x, double y ) boolean equals( translation other )	Notes	Code Review	Test Program	Error Checking
TRANSLATION2	X X X X	X X X X	X X X X X X	SI   SI   SI   SI   SI		Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Div.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other )		Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X	X X X X X	X   X   X   X   X   X   X   X   X   X	SI   SI   SI   SI   SI   SI		Translation2d Create_DistAng.vi Translation2d Create.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm()	can use cluster unpack	Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X X	X X X X X X	N	SI   SI   SI   SI   SI   SI   SI		Translation2d Create_DistAng.vi Translation2d Create.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other )		Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X X X	X X X X X X X	X   X   X   X   X   X   X   X   X   X	SI   SI   SI   SI   SI   SI   SI		Translation2d Create_DistAng.vi Translation2d Create.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI Translation2d GetXY.VI	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()	can use cluster unpack can use cluster unpack	Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X X X X	X X X X X X X X	X   X   X   X   X   X   X   X   X   X	SI   SI   SI   SI   SI   SI   SI   SI		Translation2d Create_DistAng.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI Translation2d GetXY.VI Translation2d GetY.VI Translation2d GetY.VI	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm()	can use cluster unpack	Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X X X X X	X X X X X X X X X	X	SI   SI   SI   SI   SI   SI   SI   SI		Translation2d Create_DistAng.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI Translation2d GetXY.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d Interpolate.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()	can use cluster unpack can use cluster unpack	Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X	SI   SI   SI   SI   SI   SI   SI   SI		Translation2d_Create_DistAng.vi Translation2d_Div.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetXY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_Interpolate.vi Translation2d_Minus.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other )	can use cluster unpack can use cluster unpack	Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X	SI   SI   SI   SI   SI   SI   SI   SI		Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Div.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetX.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_Minus.vi Translation2d_Plus.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other )	can use cluster unpack can use cluster unpack	Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X	SI   SI   SI   SI   SI   SI   SI   SI		Translation2d Create_DistAng.vi Translation2d Create.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI Translation2d GetX.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d Interpolate.vi Translation2d Interpolate.vi Translation2d Plus.vi Translation2d RotateBy.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other )	can use cluster unpack can use cluster unpack	Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X	SI   SI   SI   SI   SI   SI   SI   SI		Translation2d Create_DistAng.vi Translation2d Div.vi Translation2d Equals.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI Translation2d GetXY.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d Interpolate.vi Translation2d Minus.vi Translation2d RotateBy.vi Translation2d RotateBy.vi Translation2d Times.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar )	can use cluster unpack can use cluster unpack	Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X	SI   SI   SI   SI   SI   SI   SI   SI		Translation2d Create_DistAng.vi Translation2d Create.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI Translation2d GetX.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d Interpolate.vi Translation2d Interpolate.vi Translation2d Plus.vi Translation2d RotateBy.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar ) translation2d unaryminus( )	can use cluster unpack can use cluster unpack can use cluster unpack	Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X	SI   SI   SI   SI   SI   SI   SI   SI		Translation2d Create_DistAng.vi Translation2d Div.vi Translation2d Equals.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI Translation2d GetXY.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d Interpolate.vi Translation2d Minus.vi Translation2d RotateBy.vi Translation2d RotateBy.vi Translation2d Times.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar ) translation2d unaryminus( ) translation2d new()	can use cluster unpack can use cluster unpack can use cluster unpack can use cluster unpack	Code Review	Test Program	Error Checking
TRANSLATION2	X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X	SI   SI   SI   SI   SI   SI   SI   SI		Translation2d Create_DistAng.vi Translation2d Div.vi Translation2d Equals.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI Translation2d GetXY.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d Interpolate.vi Translation2d Minus.vi Translation2d RotateBy.vi Translation2d RotateBy.vi Translation2d Times.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar ) translation2d unaryminus( )	can use cluster unpack can use cluster unpack can use cluster unpack	Code Review	Test Program	Fror Checking
TRANSLATION2	X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		### ### ##############################	st Routine mple Program	Translation2d Create_DistAng.vi Translation2d Div.vi Translation2d Equals.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI Translation2d GetXY.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d Interpolate.vi Translation2d Minus.vi Translation2d RotateBy.vi Translation2d RotateBy.vi Translation2d Times.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar ) translation2d unaryminus( ) translation2d new() translation2d div( double scalar )	can use cluster unpack can use cluster unpack can use cluster unpack can use cluster unpack	Code Review	Test Program	Error Checking
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	Not WPILIB  Not WFILIB  Not W X X X X X X X X X X X X X X X X X X	Execution Optimized         0	st Routine mple Program	Translation2d_Create_DistAng.vi Translation2d_Div.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetX.VI Translation2d_GetY.VI Translation2d_Interpolate.vi Translation2d_Minus.vi Translation2d_Plus.vi Translation2d_Times.vi Translation2d_Times.vi Translation2d_UnaryMinus.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar ) translation2d unaryminus( ) translation2d new()	can use cluster unpack can use cluster unpack can use cluster unpack  can use cluster constant can multiply by 1/scalar	3	st Program	Error Checking
TRANSLATION3D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X			st Routine mple Program	Translation2d_Create_DistAng.vi Translation2d_Div.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetXY.VI Translation2d_GetY.VI Translation2d_Interpolate.vi Translation2d_Minus.vi Translation2d_Plus.vi Translation2d_RotateBy.vi Translation2d_UnaryMinus.vi Translation2d_UnaryMinus.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar ) translation2d unaryminus( ) translation2d new() translation2d div( double scalar )	can use cluster unpack can use cluster unpack can use cluster unpack  can use cluster constant can multiply by 1/scalar	3	st Program	Error Checking
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X			st Routine mple Program	Translation2d Create_DistAng.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetNorm.VI Translation2d GetX.VI Translation2d GetX.VI Translation2d GetX.VI Translation2d GetX.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d Jinterpolate.vi Translation2d Plus.vi Translation2d RotateBy.vi Translation2d Times.vi Translation2d UnaryMinus.vi  Translation2d Times.vi Translation2d Company Times.vi Translation2d Times.vi Translation2d Company Times.vi Translation3d Create.vi Translation3d Create_Default.vi Translation3d Create_Default.vi Translation3d Create_DistAng.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar ) translation2d unaryminus( ) translation2d new() translation2d div( double scalar )	can use cluster unpack can use cluster unpack can use cluster unpack  can use cluster constant can multiply by 1/scalar	3	st Program	Error Checking
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X			Test Routine Sample Program	Translation2d_Create_DistAng.vi Translation2d_Div.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetXY.VI Translation2d_GetY.VI Translation2d_Interpolate.vi Translation2d_Minus.vi Translation2d_Plus.vi Translation2d_Plus.vi Translation2d_Times.vi Translation2d_UnaryMinus.vi  Translation2d_UnaryMinus.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar ) translation2d unaryminus( ) translation2d new() translation2d div( double scalar )	can use cluster unpack can use cluster unpack can use cluster unpack  can use cluster constant can multiply by 1/scalar	3	st Program	Error Checking

Revision 3.X 1/11/2023 – renamed library. Added additional documentation.		-	,		
	Translation3d_GetDistance.vi Translation3d_GetNorm.VI				x x
X   X   X   X   SI	Translation3d_GetXYZ.vi				×
X   X   X   SI	Translation3d_Interpolate.vi				x
	Translation3d_Minus.vi Translation3d Plus.vi				x
X   X   X   SI	Translation3d_Fids.vi				x
X   X   X   SI	Translation3d Times.vi				x
	Translation3d_ToTranslation2d.vi				x
X X X SI	Translation3d_UnaryMinus.vi				x
TWIST2D X X X SI	VI Name Twist2d_Create.vi Twist2d_Equals.VI Twist2d_GetAll.VI	Function Prototype twist new( x, y, theta ) boolean equals( obj other )	Notes Ode Review	Test Program	x x x x x x x x x x x x x x x x x x x
TWIST3D   X   X   X   SI   X   X   X   X   SI   X   X   X   X   X   X   X   X   X	VI Name Twist3d_Create.vi Twist3d_Equals.VI Twist3d_GetAll.VI	Function Prototype	Notes OO	Test Program	X X X X X X X X X X X X X X X X X X X
Implemented Documented Not WPILIB Menu Item Execution Optimized Test Routine Sample Program			e Review	Program	· Checking × × × ×
mph Docc Vot I Test	VI Name	Function Prototype	Notes O	Test	Erro
CHASSIS SPEEDS X X X SI SI	ChassisSpeeds_FromFieldRelativeChassisSpeeds.VI				X
X   X   X   SI	ChassisSpeeds_FromFieldRelativeSpeeds.VI	chassisspeeds fromFieldRelativeSpeeds( double x, double y,			х
X X X X SI	ChassisSPeeds_GetXYOmega.vi	double angvel, rotation2d robotangle )			×
X   X   X   SI	ChassisSpeeds_New.vi	chassisspeeds new ( double xvel, double yvel, double angvel )			x
		chassisspeeds new ()	can use cluster constant		X
Implemented Documented Not WPILIB Menu Item Execution Optimized Test Routine Sample Program	VI Name	Function Prototype	Notes Co	Test Program	rror Checking x x
	DiffKinematics_New.vi	diffDriveKine new( double trackWidth )	INOTES	<u> </u>	щ
X X X X	DiffKinematics_toChassisSpeed.vi	chassisSpeeds toChassisSpeeds (diffDrWheelSpeeds )			×
X X SI	DiffKinematics_ToTwist2d.vi				x
X X X SI X	DiffKinematics_toWheelSpeed.vi	diffDriveWheelSpeed toWheelSpeeds( chassisSpeeds )			x
Implemented Documented Not WPILIB Menu Item Execution Optimized Test Routine Sample Program	VI Name	Function Prototype	Notes O	Test Program	Error Checking x x

Revision 3.X 1/11/2023 – renamed library. Added additional documentation. DIFFERENTIAL DRIVE ODOMETRY DiffOdometry\_Execute.vi DONT NEED Χ 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() Function Prototype Notes DIFFERENTIAL DRIVE ODOMETRY 2 DiffDrvOdom2 Execute.vi Χ Replacement for orig diff drive XX SI DiffDrvOdom2 GetPosevi X X X X DiffDrvOdom2\_New.vi 1 SI DiffDrvOdom2\_Reset.vi Χ DiffDrvOdom2 Update.vi Function Prototype Notes DIFFERENTIAL DRIVE WHEEL SPEEDS diffDrWheelSpeeds new() diffDrWheelSpeeds new( double leftVel, double rightVel ) XX DiffWheel Normalize.vi void normalize( double maxVel ) Function Prototype Notes MECANUM DRIVE KINEMATICS X X Χ MecaKinematics New.vi X X X X X X Χ MecaKinematics SetInverseKinematics.vi MecaKinematics\_ToChassisSpeeds.vi X MecaKinematics ToTwist2d.vi Χ Χ X X MecaKinematics ToWheelSpeeds.vi Χ MecaKinematics\_ToWheelSpeedsZeroCenter.vi Χ VI Name Function Prototype Notes MECANUM DRIVE MOTOR VOLTAGE VI Name Function Prototype Notes MECANUM DRIVE ODOMETRY MecaOdometry\_Execute.vi MecaOdometry GetKinematics.vi XX Χ MecaOdometry\_GetPose.vi XX X MecaOdometry New.vi

/2023 - renamed library. Added additional do													
ĺ	X		<u> </u>	Χ			-	MecaOdometry_NewDefaultPose.vi					
	$\hat{x}$			X				MecaOdometry_NewDelaultFose.vi					
	$\hat{x}$			X									
	<u> </u>	X		X				MecaOdometry_Update.vi		Demonstration			
l							ļ	MecaOdometry_UpdateWithTime.vi		Removed			
MECANUM DRIVE WHEEL POSITION	ted X X Implemented	X X	IB Not WPILIB	X X Menu Item	Optimized	ine Test Routine		/I Name MecaWheelPos_Get.vi MecaWheelPos_New.vi MecaWheelPos_Sub.vi	Function Prototype	Notes	iew Code Review	ram Test Program	cking Error Checking
	Jer	иeи	7/6	Item	ior	OU	O)				Şe.	90	She
	len	Documeni	WPILIE	ו עו	Execution	Test Routine	mple				le F	t P	۲,
	ldu	Ö	Vot	Menu	ě	esi		/I Name	Function Destatus	Nistan	p <sub>o</sub>	est	5
MECANUM DRIVE WHEEL SPEEDS		X		X	SI			MecaWheel_New.Vi	Function Prototype  public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond)	Notes	0	Τ	Ш
	X	X	X	X	SI		1	//lecaWheel_GetAll.vi	,				
	X	X		Χ	Χ			MecaWheel_Normalize.vi	public void normalize(double				
									attainableMaxSpeedMetersPerSecond)				
	nented	nented	VPILIB	u Item	ıtion Optir	Test Routine	ile Prograi				Review	rogram	Checking
	ımple.	Docur	Vot V	Menu	Exect	rest F	Samp	/I Name	Function Prototype	Notes	Code F	Test F	<b>Error</b> .
SWERVE DRIVE KINEMATICS	) Implei	Docui	× Not WPIL	Menu	Execution	Test F		/I Name SwerveKinematics New4 VI	Function Prototype		Code F	Test F	Error
SWERVE DRIVE KINEMATICS		Χ	Χ	Χ	Execu	Test R	,	SwerveKinematics_New4.VI		For 4 module drives	Code F	Test F	Error
SWERVE DRIVE KINEMATICS	Χ	X X	X	X	Exec	Test R			public static void normalizeWheelSpeeds(SwerveModuleState[]		Code F	Test F	Error
SWERVE DRIVE KINEMATICS	X	X X X	X X X	X X X	Exec	Test R	· ·	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi		For 4 module drives uses array as input	Code F	Test F	Error (
SWERVE DRIVE KINEMATICS	X X X	X X X	X X X	X X X	Execu	Test R		SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI	public static void normalizeWheelSpeeds(SwerveModuleState[]	For 4 module drives uses array as input  For 4 module drives	Code F	Test F	Error (
SWERVE DRIVE KINEMATICS	X X X	X X X X	X X X	X X X	Exec	Test R		SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds.	For 4 module drives uses array as input	Code F	Test F	Error
SWERVE DRIVE KINEMATICS	X X X X	X X X X X	X X X	X X X X	Execu	Test R		SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[]	For 4 module drives uses array as input  For 4 module drives	Code F	Test F	Error
	X X X X X	X X X X X X	X X X	X X X X X X	Execu	Test R		SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI SwerveKinematics_ToToSwerveModuleStatesZeroCenter.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters)	For 4 module drives uses array as input  For 4 module drives	Code F	Test F	Error
	X X X X X	X X X X X X	X X X	X X X X X	Execu	Test R		SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[]	For 4 module drives uses array as input  For 4 module drives uses array as input  variable parameters (replace with	Code F	Test F	Error
	X X X X X	X X X X X X	X X X	X X X X X X	Exec	Test R		SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI SwerveKinematics_ToToSwerveModuleStatesZeroCenter.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)  public SwerveDriveKinematics(Translation2d wheelsMeters) public ChassisSpeeds toChassisSpeeds(SwerveModuleState	For 4 module drives uses array as input  For 4 module drives uses array as input  variable parameters (replace with array and "4" calls) variable parameters (replace with	Code F	Test F	Error
	X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X	Y	Optimized	Routine	Program	SwerveKinematics New4.VI SwerveKinematics NewX.VI SwerveKinematics NormalizeWheelSpeeds.vi SwerveKinematics ToChassisSpeeds4.VI SwerveKinematics ToChassisSpeedsX.VI SwerveKinematics ToSwerveModuleStates.VI SwerveKinematics ToSwerveModuleStatesZeroCenter.VI SwerveKinematics ToTwist2d4.VI SwerveKinematics ToTwist2dX.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)  public SwerveDriveKinematics(Translation2d wheelsMeters)  public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)	For 4 module drives uses array as input  For 4 module drives uses array as input  variable parameters (replace with array and "4" calls) variable parameters (replace with array and "4" calls)	ode Review Code F	sst Program Test F	ror Checking Error
	X X X X X	X X X X X X	X X X X X	X X X X X X	Execution Optimized Execu		Sample Program	SwerveKinematics New4.VI SwerveKinematics NewX.VI SwerveKinematics NormalizeWheelSpeeds.vi SwerveKinematics ToChassisSpeeds4.VI SwerveKinematics ToChassisSpeedsX.VI SwerveKinematics ToSwerveModuleStates.VI SwerveKinematics ToSwerveModuleStatesZeroCenter.VI SwerveKinematics ToTwist2d4.VI SwerveKinematics ToTwist2dX.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)  public SwerveDriveKinematics(Translation2d wheelsMeters) public ChassisSpeeds toChassisSpeeds(SwerveModuleState	For 4 module drives uses array as input  For 4 module drives uses array as input  variable parameters (replace with array and "4" calls) variable parameters (replace with	Code Review Code F	Test Program Test F	Error Checking Error
	X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X	Y	Optimized	Routine	Sample Program	SwerveKinematics New4.VI SwerveKinematics NewX.VI SwerveKinematics NormalizeWheelSpeeds.vi SwerveKinematics ToChassisSpeeds4.VI SwerveKinematics ToChassisSpeedsX.VI SwerveKinematics ToSwerveModuleStates.VI SwerveKinematics ToSwerveModuleStatesZeroCenter.VI SwerveKinematics ToTwist2d4.VI SwerveKinematics ToTwist2dX.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)  public SwerveDriveKinematics(Translation2d wheelsMeters)  public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)	For 4 module drives uses array as input  For 4 module drives uses array as input  variable parameters (replace with array and "4" calls) variable parameters (replace with array and "4" calls)	Code Review Code F	Test Program Test F	Error Checking
	Implemented   X   X   X   X   X   X   X   X   X	Documented X X X X X X X X X X X X X X X X X X X	X X X X X	Menu Item  X  X  X  X  X  X	Optimized	Routine	Sample Program	SwerveKinematics New4.VI SwerveKinematics NewX.VI SwerveKinematics NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI SwerveKinematics_ToTwist2d4.VI SwerveKinematics_ToTwist2dX.VI SwerveKinematics_ToTwist2dX.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleStates[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleStates[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)  public SwerveDriveKinematics(Translation2d wheelsMeters)  public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)  Function Prototype	For 4 module drives uses array as input  For 4 module drives uses array as input  variable parameters (replace with array and "4" calls) variable parameters (replace with array and "4" calls)	Code Review Code F	Test Program Test F	Error Checking
	X   X   X   X   X   X   X   X   X   X	X X X X X X X X X X X X X X X X X X X	X X X X X	Menu Item  X  X  X  X  X  X  X	Optimized	Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI SwerveKinematics_ToTwist2d4.VI SwerveKinematics_ToTwist2dX.VI SwerveKinematics_ToTwist2dX.VI SwerveKinematics_ToTwist2dX.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)  public SwerveDriveKinematics(Translation2d wheelsMeters) public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)  Function Prototype  public Pose2d getPoseMeters()	For 4 module drives uses array as input  For 4 module drives uses array as input  variable parameters (replace with array and "4" calls) variable parameters (replace with array and "4" calls)	Code Review Code F	Test Frogram	Error Checking Error
	X   X   X   X   X   X   X   X   X   X	Documented X X X X X X X X X X X X X X X X X X X	X X X X X	Menu Item  X  X  X  X  X  X	Optimized	Routine	Sample Program	SwerveKinematics New4.VI SwerveKinematics NewX.VI SwerveKinematics NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI SwerveKinematics_ToTwist2d4.VI SwerveKinematics_ToTwist2dX.VI SwerveKinematics_ToTwist2dX.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleStates[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)  public SwerveDriveKinematics(Translation2d wheelsMeters)  public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)  Function Prototype  public Pose2d getPoseMeters() public SwerveDriveOdometry(SwerveDriveKinematics kinematics,	For 4 module drives uses array as input  For 4 module drives uses array as input  variable parameters (replace with array and "4" calls) variable parameters (replace with array and "4" calls)	Code Review Code F	Test F	Error Checking
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X	X X X X X X X X X X X X X X X X X X X	Optimized	Routine	Sample Program	SwerveKinematics_NewX.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI SwerveKinematics_ToTwist2d4.VI SwerveKinematics_ToTwist2dX.VI SwerveKinematics_ToTwist2dX.VI SwerveCodometry_Execute4.vi SwerveOdometry_Execute4.vi SwerveOdometry_GetPosition.VI SwerveOdometry_New.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleStates[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)  public SwerveDriveKinematics(Translation2d wheelsMeters)  public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)  Function Prototype  public Pose2d getPoseMeters() public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle, Pose2d initialPose)	For 4 module drives uses array as input  For 4 module drives uses array as input  variable parameters (replace with array and "4" calls) variable parameters (replace with array and "4" calls)	Code Review Code F	Test F	Error Checking
	X   X   X   X   X   X   X   X   X   X	X X X X X X X X X X X X X X X X X X X	X X X X X	Menu Item  X  X  X  X  X  X  X	Optimized	Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI SwerveKinematics_ToTwist2d4.VI SwerveKinematics_ToTwist2dX.VI SwerveKinematics_ToTwist2dX.VI SwerveKinematics_ToTwist2dX.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)  public SwerveModuleStates(ChassisSpeeds chassisSpeeds)  public SwerveDriveKinematics(Translation2d wheelsMeters)  public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)  Function Prototype  public Pose2d getPoseMeters() public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle, Pose2d initialPose) public SwerveDriveOdometry(SwerveDriveKinematics kinematics, public SwervePriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle, Pose2d initialPose) public SwerveDriveOdometry(SwerveDriveKinematics kinematics, kin	For 4 module drives uses array as input  For 4 module drives uses array as input  variable parameters (replace with array and "4" calls) variable parameters (replace with array and "4" calls)	Code Review Code F	Test Program Test F	Error Checking
SWERVE DRIVE ODOMETRY	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X	X X X X X X X X X X X X X X X X X X X	Optimized	Routine	Sample Program	SwerveKinematics_NewX.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI SwerveKinematics_ToTwist2d4.VI SwerveKinematics_ToTwist2dX.VI SwerveKinematics_ToTwist2dX.VI SwerveCodometry_Execute4.vi SwerveOdometry_Execute4.vi SwerveOdometry_GetPosition.VI SwerveOdometry_New.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)  public SwerveModuleStates[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)  public SwerveDriveKinematics(Translation2d wheelsMeters)  public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)  Function Prototype  public Pose2d getPoseMeters() public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle, Pose2d initialPose)	For 4 module drives uses array as input  For 4 module drives uses array as input  variable parameters (replace with array and "4" calls) variable parameters (replace with array and "4" calls)	Code Review Code F	Test Program Test F	Error Checking

	X	Χ	Χ	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)			
					þ			SwervelvioduleState moduleStates)	array and 4 calls)			
	mplemented	Documented	Vot WPILIB	Menu Item	Execution Optimize	l est Koutine	VI Name	Function Prototype	Notes	Sode Review	rest Program	Error Checking
SWERVE DRIVE MODULE POSITIONS	s x	$\overline{X}$			SI		SwerveModulePosition CompareTo.vi	- under receipe				
OVERVE BRIVE MODULE I COMOR		X		X	SI	_	SwerveModulePosition Get.vi					
		X			SI		SwerveModulePosition New.vi					
	^	^		^ '	31		SwelvelvloduleFosition_Ivew.vi					
	'mplemented	Documented	Not WPILIB	Menu Item	Execution Optimi	lest Koutine	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE MODULE STATE	FX	$\overline{X}$			SI		SwerveModuleState CompareTo.vi	public int compareTo(SwerveModuleState o)				_
OWERVE BRIVE MODULE OFFI		X			SI		SwerveModuleState Get.vi	public in compare reference and allocate of				
	X	$\hat{x}$			SI		SwerveModuleState_Get.vi	public SwerveModuleState(double speedMetersPerSecond,				
	^	^		^   '	31		SwervervioudleState_inew.vi	Rotation2d angle)				
	X	X		X .	SI		SwerveModuleState_Optimize.vi	public SwerveModuleState optimize( SwerveModuleState desired, Rotation2d angle )	,			
								i Notationizu arigie )			1	
					pa			irtotationizu arigie )				
	mplemented	Documented	Vot WPILIB		Execution Optimized	lest Koutine	VI Name		Notes	ode Review	est Program	error Checking
CUBIC HERMITE SPUIN	Implemented	Documented	Not WPILIB		Execution Optimized	l est Routine	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
CUBIC HERMITE SPLINE	X   Implemented	X Documented	Not WPILIB			lest Koutine	VI Name  CubicHermiteSpline_getControlVectorFromArrays.vi	Function Prototype protected SimpleMatrix getCoefficients()	Notes not needed, use cluster unpack	Code Review	Test Program	Error Checking
CUBIC HERMITE SPLINE	X		Not WPILIB	X Menu Item		lest Koutine	CubicHermiteSpline_getControlVectorFromArrays.vi	Function Prototype  protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays( double[] finalVector)		Code Review	Test Program	Error Checking
CUBIC HERMITE SPLINE	X	X	Not WPILIB	Menu Item		l est Koutine	`	Function Prototype  protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays( double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[]	not needed, use cluster unpack	Code Review	Test Program	Error Checking
CUBIC HERMITE SPLINE	X	X		ttem X X X Wenu Item	ution Optimized Execution	Koutine No Discussion	CubicHermiteSpline_getControlVectorFromArrays.vi  CubicHermiteSpline_makeHermiteBasis.vi	Function Prototype  protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays( double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public CubicHermiteSoline(double[] xlnitialControlVector, double[]	not needed, use cluster unpack	e Review Code Review	Program Test Program	r Checking Error Checking
CUBIC HERMITE SPLINE	X	X	WPILIB	ttem X X X Wenu Item	ecution Optimized Execution	ist Koutine	CubicHermiteSpline_getControlVectorFromArrays.vi  CubicHermiteSpline_makeHermiteBasis.vi  CubicHermiteSpline_New.vi	Function Prototype protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays( double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)	not needed, use cluster unpack	ode Review Code Review	est Program Test Program	rror Checking Error Checking
CUBIC HERMITE SPLINE	X   X   X   X   X   X   X   X   X   X	X		Menu Item X X X X Menu Item	ution Optimized Execution		CubicHermiteSpline_getControlVectorFromArrays.vi  CubicHermiteSpline_makeHermiteBasis.vi  CubicHermiteSpline_New.vi	Function Prototype  protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays( double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)  Function Prototype public PoseWithCurvature(Pose2d poseMeters, double	not needed, use cluster unpack	Code Review	Test Program	Error Checking
	X   X   X   X   X   X   X   X   X   X	No cumented X X X	WPILIB	Menu Item X X X X Menu Item	Execution Optimized Execution	ist Koutine	CubicHermiteSpline_getControlVectorFromArrays.vi  CubicHermiteSpline_makeHermiteBasis.vi  CubicHermiteSpline_New.vi	Function Prototype  protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays( double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)  Function Prototype public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter)	not needed, use cluster unpack  Notes	Code Review	Test Program	Error Checking Error Checking
	X   X   X   X   X   X   X   X   X   X	No cumented X X X	WPILIB	Menu Item X X X X Menu Item	Execution Optimized Execution	ist Koutine	CubicHermiteSpline_getControlVectorFromArrays.vi  CubicHermiteSpline_makeHermiteBasis.vi  CubicHermiteSpline_New.vi	Function Prototype  protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays( double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)  Function Prototype public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter) public PoseWithCurvature()	Notes  can use cluster constant	Code Review	Test Program  Test Program	Error Checking
	X   X   X   X   X   X   X   X   X   X	No cumented X X X	WPILIB	Menu Item X X X X Menu Item	Execution Optimized Execution	ist Koutine	CubicHermiteSpline_getControlVectorFromArrays.vi  CubicHermiteSpline_makeHermiteBasis.vi  CubicHermiteSpline_New.vi	Function Prototype  protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays( double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)  Function Prototype public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter) public PoseWithCurvature() public Pose2d poseMeters	not needed, use cluster unpack  Notes	Code Review Code Review	Test Program  Test Program	Error Checking Error Checking

ine Test Routine Sample Program	VI Name QuinticHermiteSpline_getControlVectorFromArrays.vi  QuinticHermiteSpline_makeHermiteBasis.vi QuinticHermiteSpline_New.vi  VI Name Spline_getPoint.vi	Function Prototype  private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector)  private SimpleMatrix makeHermiteBasis()  public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)  protected SimpleMatrix getCoefficients()  Function Prototype  public PoseWithCurvature getPoint(double t)  Spline(int degree)  public static class ControlVector  public ControlVector(double[] x, double[] y)	Notes  not needed, use cluster unpack  Notes  implemented as data structure	Code Review	Test Program 7.1	
ine Test Routine Sample Program	QuinticHermiteSpline_makeHermiteBasis.vi QuinticHermiteSpline_New.vi	initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) protected SimpleMatrix getCoefficients()  Function Prototype public PoseWithCurvature getPoint(double t) Spline(int degree) public static class ControlVector	Notes	Code Review	Test Program	
ine Test Routine Sample Program	QuinticHermiteSpline_New.vi  VI Name	public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) protected SimpleMatrix getCoefficients()  Function Prototype public PoseWithCurvature getPoint(double t) Spline(int degree) public static class ControlVector	Notes	Code Review	Test Program	
ine Test		Function Prototype  public PoseWithCurvature getPoint(double t)  Spline(int degree)  public static class ControlVector	Notes	Code Review	Test Program	
ine Test		public PoseWithCurvature getPoint(double t) Spline(int degree) public static class ControlVector		Code Review	Test Program	
ine	Spline_getPoint.vi	Spline(int degree) public static class ControlVector	implemented as data structure			
outine Program		public static class ControlVector	implemented as data structure			
outine Program			implemented as data structure			+
outine Program		W.A.				+
outine Program						
Test		Function Prototype  private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point)	Notes	Code Reviev	Test Prograr	
X     S	SplineHelp_GetCubicCtrlVectorsFromWayPts.vi	public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints( Pose2d start,				
	SplingHolp CatCubicCtrl\/actorsErom\/\/aightad\//avDts vi	Translation2d[] interiorWaypoints, Pose2d end )				+
			internal			+
5	SplineHelp_GetCubicSpline_Calc2.vi		internal			
9	SplineHelp_GetCubicSpline_Calc3.vi	- Julia - A-Ai- Oubi-Hameita Oulia - II	internal			_
	·	getCubicSplinesFromControlVectors( Spline.ControlVector start.				
	SplineHelp_GetQuinticCtrivector.vi	scalar, Pose2d point)				
S	SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi	public static List <spline.controlvector> getQuinticControlVectorsFromWaypoints( List<pose2d></pose2d></spline.controlvector>	REMOVED 2762			
S	SplineHelp_getQuinticSplinesFromControlVectors.vi	public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors( Spline.ControlVector[] controlVectors)				
5	SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi					+
		private static void thomasAlgorithm(double[] a, double[] b, double[] c, double[] d, double[] solutionVector)				
	X	SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi SplineHelp_GetCubicSpline_Calc1.vi SplineHelp_GetCubicSpline_Calc2.vi SplineHelp_GetCubicSpline_Calc3.vi SplineHelp_getCubicSplinesFromControlVectors.vi  SplineHelp_GetQuinticCtrlVector.vi  SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi SplineHelp_getQuinticSplinesFromControlVectors.vi  SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi SplineHelp_GetQuinticSplinesFromWayPts.vi SplineHelp_GetQuinticSplinesFromWayPts.vi SplineHelp_ThomasAlgorithm.vi	scalar, Pose2d point)  X SplineHelp_GetCubicCtrlVectorsFromWayPts.vi  SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi  SplineHelp_GetCubicSpline_Calc1.vi  SplineHelp_GetCubicSpline_Calc3.vi  SplineHelp_GetCubicSpline_Calc3.vi  SplineHelp_GetCubicSpline_Calc3.vi  SplineHelp_GetCubicSpline_Calc3.vi  SplineHelp_GetCubicSpline_Calc3.vi  SplineHelp_GetCubicSpline_Calc3.vi  SplineHelp_GetQuinticCtrlVectors.vi  SplineHelp_GetQuinticCtrlVector.vi  SplineHelp_GetQuinticCtrlVector.vi  SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi  SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi  SplineHelp_GetQuinticSplinesFromControlVectors.vi  SplineHelp_GetQuinticSplinesFromControlVectors.vi  SplineHelp_GetQuinticSplinesFromControlVectors.vi  SplineHelp_GetQuinticSplinesFromControlVectors.vi  SplineHelp_GetQuinticSplinesFromControlVectors.vi  SplineHelp_GetQuinticSplinesFromControlVectors.vi  SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi  SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi	SplineHelp_GetCubicCtrtVectorsFromWayPts.vi  SplineHelp_GetCubicCtrtVectorsFromWayPts.vi  SplineHelp_GetCubicSpline Calc1.vi  SplineHelp_GetCubicSpline Calc2.vi  SplineHelp_GetCubicSplinesFromControlVectors.vi  SplineHelp_GetCubicSplinesFromControlVectors.vi  SplineHelp_GetQuinticCtrtVector.vi  SplineHelp_GetQuinticCtrtVector.vi  SplineHelp_GetQuinticCtrtVectorsFromWayPts.vi  SplineHelp_GetQuinticCtrtVectorsFromWeightedWayPts.vi  SplineHelp_GetQuinticSplinesFromControlVectors.vi  SplineHelp_GetQuinticSplinesFromWayPts.vi  SplineHelp_GetQuinticSplinesFromWayPts.vi  SplineHelp_GetQuinticSplinesFromWayPts.vi  private static void thomasAlgorithm(double[] a, double[] b, double[] b, double[] c, double[] d, double[] solutionVector)	scalar, Pose2d point)  public static Spline Control/Vectors[ getCubicControl/VectorsFromWaypoints, Pose2d start, Translation2d[] interiorWaypoints, Pose2d end )  SplineHelp_GetCubicSpline_Calc1.vi  SplineHelp_GetCubicSpline_Calc2.vi  SplineHelp_GetCubicSpline_Calc3.vi  SplineHelp_GetCubicSpline Calc3.vi  SplineHelp_GetCubicSpline Calc3.vi  SplineHelp_GetCubicSpline Calc3.vi  SplineHelp_GetCubicSpline SplineFromControl/Vectors.vi  SplineHelp_GetCubicSplineSfromControl/Vectors.vi  SplineHelp_GetQuinticCtrrlVector.vi  SplineHelp_GetQuinticCtrrlVector.vi  SplineHelp_GetQuinticCtrrlVectorsFromWayPts.vi  SplineHelp_GetQuinticCtrrlVectorsFromWayPts.vi  SplineHelp_GetQuinticCtrrlVectorsFromWayPts.vi  SplineHelp_GetQuinticCtrrlVectorsFromWeightedWayPts.vi  SplineHelp_GetQuinticSplinesFromControl/Vectors vi  SplineHelp_GetQuinticSplinesFromControl/Vectors vi  SplineHelp_GetQuinticSplinesFromControl/Vectors vi  SplineHelp_GetQuinticSplinesFromControl/Vectors vi  SplineHelp_GetQuinticSplinesFromControl/Vectors vi  SplineHelp_GetQuinticSplinesFromControl/Vectors vi  SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi  SplineH	scalar, Pose2d point)  public static Spline ControlVectors[ getCubicControlVectorsFromWaypoints(Pose2d start, Translation2d[] interiorWaypoints(Pose2d start, Translation2d[] interiorWaypoints(Pose2d start, Translation2d[] interiorWaypoints(Pose2d start, Translation2d[] interiorWaypoints, Pose2d end )  SplineHelp_GetCubicSpline Calc1 vi SplineHelp_GetCubicSpline Calc2.vi Internal SplineHelp_GetCubicSpline Calc3.vi SplineHelp_GetCubicSpline Calc3.vi SplineHelp_GetCubicSpline Calc3.vi SplineHelp_GetCubicSpline Calc3.vi SplineHelp_GetCubicSpline Calc3.vi SplineHelp_GetCubicSpline SeromControlVectors vi SplineHelp_GetQuinticCtrtVector.vi SplineHelp_GetQuinticCtrtVector.vi SplineHelp_GetQuinticCtrtVectorsFromWayPts.vi SplineHelp_GetQuinticCtrtVectorsFromWayPts.vi SplineHelp_GetQuinticControlVectorsFromWaypoints(List <pose2d> SplineHelp_GetQuinticSplinesFromControlVectors.vi SplineHelp_GetQuinticSplinesFromControlVectors.vi SplineHelp_GetQuinticSplinesFromControlVectors.vi SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi SplineHelp_GetQu</pose2d>

WPILib LabVIEW Math Library - VI Implementation List Revision 3.X 1/11/2023 – renamed library. Added additional documentation. X X X No SplineParam StackPop.vi internal X X X No SplineParam StackPush.vi internal '======= **TRAJECTORY** '======= VI Name Function Prototype Notes **TRAJECTORY** Χ Trajectory Concatenate.vi boolean equals( other obj ) **FUTURE** Trajectory equals.vi Χ Χ Χ SI Trajectory GetStates.vi public List<State> getStates() not needed, use unpack Trajectory GetTotalTime.vi XX X SI public double getTotalTimeSeconds() not needed, use unpack Χ Χ No SI Trajectory lerp double.vi private static double lerp(double startValue, double endValue, double t) X Χ No SI private static Pose2d lerp(Pose2d startValue, Pose2d endValue, Trajectory\_lerp\_Pose.vi double t) X Χ Χ SI Trajectory\_New\_Empty.vi XX X SI Trajectory\_New.vi public Trajectory(final List<State> states) public Trajectory relativeTo(Pose2d pose) XX Trajectory RelativeTo.vi X Trajectory\_Sample.vi public State sample(double timeSeconds)  $X \mid X$ Χ Sample in reverse order. Negate X Trajectory\_SampleReverse.vi  $X \mid X$ Χ public Trajectory transformBy(Transform2d transform) XX Χ Trajectory TransformBy.vi public Pose2d getInitialPose() can use cluster unpack, array index Function Prototype Notes TRAJECTORY STATE X X SI TrajectoryState\_Equals.vi boolean equals( other obj ) Χ XX Χ SI TrajectoryState GetAll.vi XX X SI TrajectoryState GetPose.vi State interpolate(State endValue, double i) TrajectoryState\_Interpolate.vi  $X \mid X$ X public State(double timeSeconds, double TrajectoryState\_New.vi SI velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter) public State() Function Prototype TRAJECTORY CONFIG X TrajectoryConfig AddConstraint.vi public TrajectoryConfig addConstraint(TrajectoryConstraint Implemented differently, can't constraint) duplicate. Χ TrajectoryConfig\_AddConstraints.vi public TrajectoryConfig addConstraints(List<? extends Implemented differently, can't Χ X TrajectoryConstraint> constraints) Χ X Χ SI TrajectoryConfig Create.vi public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq) X TrajectoryConfig GetCentripetalAccel.vi X X X X TrajectoryConfig\_GetConstraints.vi public List<TrajectoryConstraint> getConstraints() Implemented differently, can't Χ duplicate. TrajectoryConfig\_GetEndVelocity.vi XX can use cluster unpack Χ public double getEndVelocity() Χ TrajectoryConfig GetKinematicsDiffDrive.vi Χ X X Χ X TrajectoryConfig GetKinematicsMecanumfDrive.vi X X TrajectoryConfig GetKinematicsSwerveDrive.vi Χ

public double getStartVelocity()

can use cluster unpack

X X X X

X

 $X \mid X \mid$ 

XX

TrajectoryConfig GetMaxVelAccel.vi

TrajectoryConfig\_GetStartVelocity.vi

TrajectoryConfig GetVoltageDiffDrive.vi

Х

No

TrajectoryParam enforceVelocity.vi

Χ

Χ

X No

WPILib LabVIEW Math Library - VI Implementation List Revision 3.X 1/11/2023 – renamed library. Added additional documentation. TrajectoryConfig IsReversed.vi public boolean isReversed() XX can use cluster unpack XXX X SI TrajectoryConfig setCentripetalAccel.vi TrajectoryConfig SetEndVelocity.vi public TrajectoryConfig setEndVelocity(double X X endVelocityMetersPerSecond) Χ X SI TrajectoryConfig setKinematicsDiffDrive.vi public TrajectoryConfig setKinematics(DifferentialDriveKinematics Χ Χ Χ SI TrajectoryConfig\_setKinematicsMecanumfDrive.vi X public TrajectoryConfig setKinematics(MecanumDriveKinematics X SI TrajectoryConfig setKinematicsSwerveDrive.vi public TrajectoryConfig setKinematics(SwerveDriveKinematics k<u>inematics)</u> public TrajectoryConfig setReversed(boolean reversed)  $X \mid X$ Χ SI TrajectoryConfig\_setReversed.vi public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond) TrajectoryConfig\_SetStartVelocity.vi X X X X X SI TrajectoryConfig setVoltageDiffDrive.vi public double getMaxVelocity() Created function to return both public double getMaxAcceleration() Created function to return both NOTE ADD OTHER "SET" ROUTINES FOR OTHER CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC. VI Name Function Prototype Notes TRAJECTORY GENERATE X TrajectoryGenerate Make Cubic CtrlVect.vi public static Trajectory generateTrajectory( Spline.ControlVector uses cubic splines initial, List<Translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config )

public static Trajectory generateTrajectory( Pose2d start,
List<Translation2d> interiorWaypoints, Pose2d end, X TrajectoryGenerate Make Cubic.vi X Χ uses cubic splines TrajectoryConfig config ) X X X XTrajectoryGenerate Make Generic.vi Helper to bring these all together. Use this one!!! public static Trajectory generateTrajectory( ControlVectorList TrajectoryGenerate\_Make\_Quintic\_CtrlVect.vi Χ X uses quintic splines controlVectors, TrajectoryConfig config)  $X \mid X \mid X$ TrajectoryGenerate Make Quintic Weighted.vi New 2762 Χ public static Trajectory generateTrajectory(List<Pose2d> X X TrajectoryGenerate Make Quintic.vi uses quintic splines waypoints, TrajectoryConfig config) Χ public static List<PoseWithCurvature> Χ Χ TrajectoryGenerate splinePointsFromSplines.vi splinePointsFromSplines(Spline[] splines) Function Prototype TRAJECTORY GENERATE (Control Vector) public ControlVectorList(int initialCapacity) may not need, just data public ControlVectorList() may not need, just data public ControlVectorList(Collection<? extends may not need, just data Spline.ControlVector> collection) Function Prototype Notes TRAJECTORY PARAMETERIZE X TrajectoryParam calcStuffFwd.vi X X No XX No TrajectoryParam calcStuffRev.vi X TrajectoryParam enforceAccel.vi private static void enforceAccelerationLimits(boolean reverse,

FRC\_LabVIEW\_Trajectory\_Library\_Routines.xlsx Page 18 / 39

List<TrajectoryConstraint> constraints, ConstrainedState state)

nis routines needs to be change

hen new constraints are added.

This routines needs to be change

nen new constraints are added.

evision 3.X 1/11/2023 – renamed library. Added addition	al docum	nentati	on.										
	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)</trajectoryconstraint></posewithcurvature>				
					þe				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
	mplemented	Documented	Vot WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRAJECTORY PARAMETERIZE CONSTRAINED STA	TE X			X				ConstrainedState_New.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)				
		X	X	X				ConstrainedState_SetMaxAccel.vi	maxAccelerationivieters rerseconds q)				
	X		X					ConstrainedState_SetMinAccel.vi					
	X	$\frac{X}{Y}$	X	X				ConstrainedState_SetVelAccel.vi ConstrainedState_SetVelocity.vi					
		1 ^		^				Oursilanicaotate_octvolocity.vi	ConstrainedState()				
	Implemented			Menu Item	Execution Opt	Test Routine		VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRAJECTORY U	TIL X			X				TrajectoryUtil_fromPathWeaverJSON.vi TrajectoryUtil_MakeWeightedWayPoint_ENG.vi	public static Trajectory fromPathweaverJson(Path path)				
	X			X	$\hat{x}$			TrajectoryUtil_MakeWeightedWayPoint.vi					
	X	X		X				TrajectoryUtil_toPathWeaverJSON.vi	public static void toPathweaverJson(Trajectory trajectory, Path path)				
									public static Trajectory deserializeTrajectory(String json)				
									public static String serializeTrajectory(Trajectory trajectory)				
	Implemented	a a	ž	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes			
TRAPEZOID PROF				X				TrapProfConstraint_New.vi					
	X	X	+-	X No				TrapProfile_Calculate.vi TrapProfile Direct.vi		Private, remove from menu	+		
	X	X	X	X				TrapProfile_Execute.vi		,			
		X	X	X	SI			TrapProfile_Execute_AtGoal.vi TrapProfile IsFinished.vi			-		
		X X		X				TrapProfile_IsFinished.vi TrapProfile_New_DefInitial.vi			-		
	X	X		X				TrapProfile_New.vi					
		X		No X				TrapProfile_ShouldFlipAcceleration.vi TrapProfile TimeLeftUntil.vi		Private, remove from menu	-		
	X	X		X				TrapProfile_TotalTime.vi					
	X	X		X				TrapProfState_Equals.vi			_		
	X	X		X				TrapProfState_New.vi					
 AJECTORY CONSTRAINT 													
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes			

	docume			1/			0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	18 1 11 (44 )// 24// 5 5 2	
RIPETAL ACCELERATION CONSTRAINT	X	X		X			CentripetalAccelConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X			CentripetalAccelConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI		CentripetalAccelConstraint_New.vi	public CentripetalAccelerationConstraint(double maxCentripetalAccelerationMetersPerSecondSq)	Can use cluster pack for now
	nented	Documented	Vot WPILIB	ltem	Execution Optimized Test Routine	le Program			
	nplei	ocar	ot N	Menu	Execu Test F	Sample	√l Name	Function Prototype	Notes
DIFF DRIVE KINEMATIC CONSTRAINT	ΓX	X		X	4 -		DiffDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	Notes
	X	X		X			DiffDriveKinematicsConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI		DiffDriveKinematicsConstraint_New.vi	public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond)	
DIFF DRIVE VOLTAGE CONSTRAINT	X Implemente	X Documented		X Menu Item	Execution Op Test Routine		/I Name DiffDriveVoltageConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double	Notes
	X	X		X			DiffDriveVoltageConstraint_getMinMaxAccel.vi	velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	-						DiffDriveVoltageConstraint_New.vi	public	
	X	X		X	SI		omblive voltage constraint_inew.vi	DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)	
ELLIPTICAL REGION CONSTRAINT	X   Implemented	X X Documented	Not WPILIB	X Menu Item	Execution Optimized 72	Sample Program	√I Name EllipRegionConstraint_getMaxVelocity.vi EllipRegionConstraint_getMinMaxAccel.vi	DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)	Notes
ELLIPTICAL REGION CONSTRAINT	X X Implemented	X Documented	Not WPILIB	X Menu Item	ecution Optimized	Sample Program	∕I Name EllipRegionConstraint_getMaxVelocity.vi	DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)	Notes
ELLIPTICAL REGION CONSTRAINT	X X Implemented	ocumented X X X Documented	Not WPILIB	X X Wenu Item	Solution Optimized Execution Optimized Test Routine	ple Program Sample Program	VI Name  EllipRegionConstraint_getMaxVelocity.vi  EllipRegionConstraint_getMinMaxAccel.vi  EllipRegionConstraint_IsPoseInRegion.vi  EllipRegionConstraint_New.vi	DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)  Function Prototype	
ELLIPTICAL REGION CONSTRAINT	Implemented X X X Implemented	X X Documented	X Not WPILIB	X X Wenu Item	on Optimized Execution Optimized Test Routine	Sample Program Sample Program	VI Name  EllipRegionConstraint_getMaxVelocity.vi  EllipRegionConstraint_getMinMaxAccel.vi  EllipRegionConstraint_IsPoseInRegion.vi  EllipRegionConstraint_New.vi	DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)  Function Prototype  Function Prototype  Function Prototype  Routine exists, it is just a shell	Notes FUTURE
	Implemented X X X Implemented	ocumented X X X Documented	Not WPILIB Not WPILIB	Menu Item X X X Menu Item	Solution Optimized Execution Optimized Test Routine	Sample Program Sample Program	VI Name  EllipRegionConstraint_getMaxVelocity.vi  EllipRegionConstraint_getMinMaxAccel.vi  EllipRegionConstraint_IsPoseInRegion.vi  EllipRegionConstraint_New.vi	DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)  Function Prototype  Function Prototype  Routine exists, it is just a shell Routine exists, it is just a shell	Notes

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	Implementea	Documentec	1	Not WPILIB Menu Item	tion	Test Routine	Sample Program			
	nplei	ocur		ot IV	Execution	est F	amp	MINGG	For the Postsky	Mata
MAX VELOCITY CONSTRAINT	X	<u>Р</u>		≥ ≥   X				VI Name MaxVelocityConstraint_getMaxVelocity.vi	Function Prototype	Notes
	X	X	(	X				MaxVelocityConstraint_getMinMaxAccel.vi MaxVelocityConstraint_New.vi		
	X	<u></u>	士		. 31			IMax velocity Constraint_New.vi		
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					imize		ш			
	ted	ted	<u>.</u>	ء <u>ہ</u>	o	ine	Progra			
	теп	men	Ī	VPIL Ifer	ution	Rout	Je P			
	Implementec	Documentea	1	Not WPILIB Menu Item	Execution Op	Test Routine	Sample	VI Name	Function Prototype	Notes
MECANUM DRIVE KINEMATICS CONSTRAINT	X	X	(	X		1	, , , , , , , , , , , , , , , , , , ,	MecaDriveKinematicsConstraint_getMaxVelocity.vi	Tanadari rototypo	110.00
	X	X	+	X	' SI			MecaDriveKinematicsConstraint_getMinMaxAccel.vi MecaDriveKinematicsConstraint_New.vi		
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					mize		E			
	pa	Þe		m	Opti	. e	Program			
	nent	nenta		PILII Ifem	tion	outii	e Pr			
	Implementec	Documentea	}	Not WPILIB Menu Item	Execution	Test Routine	Sample			
RECTANGULAR REGION CONSTRAINT	X			ž S X		<u> </u>		VI Name RectRegionConstraint_getRectRegion.vi	Function Prototype	Notes
	X	X		X	<u> </u>			RectRegionConstraint_getMinMaxAccel.vi		
	X	X	_	X	i i			RectRegionConstraint_IsPoseInRegion.vi RectRegionConstraint_New.vi		+
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					imize		ше			
	ted	ted.	1	, ھ	, o	ine	Program			
	mplementea	Documented	Ī	Not WPILIB Menu Item	Execution	Test Routine	le P			
	nple	טכמ		lot v Aenu	xec	est	Sample	VI Name	Function Prototype	Notes
SWERVE DRIVE KINEMATICS CONSTRAINT						<u> </u>		SwerveDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d	110.03
									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
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	ıplemented	ocumente		ot WPILII enu Item	ecution	st Rou	eldur			
TRAJECTORY CONSTRAINT	X Implemented			X Not WPILIB X Menu Item	Execu	Test Routine	Sample Prog	VI Name TrajConstraint_GetMaxVelocity.vi	Function Prototype	Notes

WPILib LabVIEW Math Library – VI Implementation List
Revision 3.X 1/11/2023 – renamed library. Added additional documentation.

Function Prototype
Constraint\_MinMax\_New VI Name Notes TRAJECTORY CONSTRAINT (Min Max) X X X X X SI X SI Constraint MinMax New.vi 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 Optimizea	Test Routine	Sample Program	VI Name	Function Prototype	Notes
UTIL	X	X	X	X	SI			Util ApproxEqual.vi	,.	
	Χ	Χ	Χ	Χ				Util Array PoseWCurv to XY.vi		
	Χ	Χ	Χ	Χ	SI			Util CalcDist.vi		
	X	X	X	Χ	SI			Util GetLibraryVersion.vi		
	X	X	Χ	Χ	SI			Util_GetLibUsage.vi		
	X	X	X	Х				Util_GetTime.vi		Once tested completely, this should be optimized!
	X	X	Χ	No	1			Util_GetTime_U32.vi		
	X	X	Χ	No	1			Util_GetTime_U64.vi		
	X	Χ	Χ	No	N/A			Util_LibraryGlobals.vi		Global Variables – no block diag.
	X	Χ	Χ	Χ				Util_Trajectory_Absolute_To_Relative.vi		
	X	Χ	Χ	Χ				Util_Trajectory_ReadFile.vi		
	Χ	Χ	Χ	Χ				Util_Trajectory_to_XY.vi		
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_Config.vi		internal
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_OneState.vi		internal
	Χ	Χ	Χ	Χ				Util_Trajectory_WriteFile_PathFinder.vi		
	X	Χ	Χ	No				Util_Trajectory_WriteFile_PathFinderConfig.vi		internal
	Χ	Χ	Χ	Χ				Util_Trajectory_WriteFile_Pathweaver.vi		
	X	Χ	Χ	No				Util_Trajectory_WriteFile_States.vi		internal
	X	Χ	Χ	No				Util_Trajectory_WriteFile_WayPoints.vi		internal
	X	Χ	Χ	Χ				Util_Trajectory_WriteFile.vi		
	Χ	Χ	Χ	Χ				Util_TrajectoryState_Meters_To_Inches.vi		
	Χ	Χ	Χ	Χ				Util_TrajState_to_DiffDrive_WheelPos.vi		
	X	Χ	Χ	Χ				Util_DispWaypoint_Eng_To_SI.vi		
L	Χ	Χ	Χ	Χ				Util_DispWaypoint_To_CubicInput.vi		
	Χ	Χ	Χ	Χ				Util_DispWaypoint_To_QuinticInput.vi		
	X	Χ	Χ	Χ				Util_DispWeightedWaypiont_Eng_To_WeightedWaypoint		
L	X	X	X	No				Util_DispWeightedWayPoint_To_WeightedWayPoint.vi		Sorry about the confusing name

'========

CONVERSIONS

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THESE ROUTINES ARE SPECIFIC TO LABVIEW. THEY DO NOT HAVE A

JAVA / C++ WPILIB EQUIVALENT

	mplemented	Oocumented	Vot WPILIB	Menu Item	Execution Optimized	Fest Routine	Sample Program	VI Name	Function Prototype	Notes
CONV	$\overline{x}$	$\overline{X}$	X	$\overline{x}$	SI			Conv_AngleDegrees_Heading.vi		
	Χ	Χ	Χ	Χ	SI			Conv_AngleRadians_Heading.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Centimeters_Meters.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Deg_Radians.vi		
	Χ	X	Χ	Χ	SI			Conv_Deg_Rotations.vi		
	Χ	X	Χ	Χ	SI			Conv_Feet_Meters.vi		

Revision 3.X	1/11/2023 - renamed library.	Added additional docum

l docume	entatio	n.			
X	X	X	Χ	SI	Conv_GyroDegrees_Heading.vi
X	X	X	Χ	SI	Conv_Heading_AngleRadians.vi
X	X	X	Χ	SI	Conv_Inches_Meters.vi
X	X	X	Χ	SI	Conv_Kilograms_Pounds.vi
X	X	X	Χ	SI	Conv_Meters_Feet.vi
X	X	X	Χ	SI	Conv_Meters_Inches.vi
X	X	X	Χ	SI	Conv_Pose2d_SI_Eng.vi
X	X	X	Χ	SI	Conv_Pounds_Kilograms.vi
X	X	X	Χ	SI	Conv_Radians_Deg.vi
X	X	X	Χ	SI	Conv_Radians_Rotations.vi
X	X	X	Χ	SI	Conv_Rotations_Deg.vi
X	X	X	Χ	SI	Conv_Rotations_Radians.vi
X	X	X	Χ	SI	Conv_Yards_Meters.vi

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

'===== PATHFINDER UTIL

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes
PATHFINDERUTIL	X	X	X	X			PathfinderUtil_Continuous_Heading_Difference.vi		
	Χ	Χ	Χ	Χ			PathfinderUtil_OptimizeTrajectoryStates.vi		
	Χ	Χ	Χ	Χ			PathfinderUtil_ToTrajectory.vi		
	Χ	X	X	X			PathfinderUtil_ToTrajectoryStates.vi		

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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	SI			DCMotor_GetAndymark9015.vi					
	Χ	X			SI			DCMotor_GetAndymarkAM2235A.vi					
	Χ	X			SI			DCMotor_GetAndymarkAM3493.vi					
	Χ	X		Χ	SI			DCMotor_GetAndymarkRs775_125.vi					
	X	X		X	SI			DCMotor_GetBag.vi					

vision 3.X 1/11/2023 – renamed library. Added additiona	i documentati							
		JII.				1		
	XX	/	X SI		DCMotor_GetBanebotsRs550.vi			
	XX		X SI		DCMotor_GetBanebotsRs775.vi			
	XX		X SI		DCMotor_GetCIM.vi			
	XX	)	X SI		DCMotor_GetCurrent.vi			
	$X \mid X$		X SI		DCMotor GetFalcon500.vi			
	XX		X SI		DCMotor GetMiniCIM.vi			
	$X \mid X$		X SI		DCMotor GetNEO.vi			
	X X	+ + ;	X SI		DCMotor GetNEO550.vi			
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$	+	X SI		DCMotor GetRomiBuiltIn.vi			
		+ + :	X 31					
	XX		X SI		DCMotor_GetVex775Pro.vi			
	XX	)	X SI		DCMotor_New.vi			
	$X \mid X$	>	X SI		DCMotor_PickMotor.vi			
LINEAR SYSTEM			X Menu Item Execution Optimized	Test Routine Sample Program	VI Name Function Prototype Notes  LinearSystemId_CreateDCMotorSystem.vi	Code Review	Test Program	Error Checking
	XX		X		LinearSystemId_CreateDriveTrainVelocitySystem.vi Update to use create matrix			
	$X \mid X$		X		LinearSystemId_CreateElevatorSystem.vi Update to use create matrix			
	X X	+ + ,	X		LinearSystemId_CreateFlywheelSystem.vi Update to use create matrix			
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		X			1		
		+ + (	^		LinearSystemId_CreateSingleJointedArmSystem.vi Update to use create matrix			
	XX		X		LinearSystemId_IdentifyDriveTrainSystem.vi Update to use create matrix			
	XX		X		LinearSystemId_IdentifyPositionSystem.vi Update to use create matrix			
	$X \mid X$	)	X		LinearSystemId_IdentifyVelocitySystem.vi Update to use create matrix			
			Ø					
	olemented cumented		enu item ecution Optimized	st Routine mple Program		de Review	st Program	or Checking
	Implemented Documented	Not WPILIB	5 3	Test Routine Sample Program	o - VI Name Function Prototype Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE POSE ESTIMAT	_m_ _Do	Not	Menu rem Execution	Test Routine Sample Program		Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	R X X	Not	X Menu item Execution	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi Notes	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	DR X X X X	Not	X X Menu rem	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi DiffDrivePoseEst_FillStateVector.vi	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	DR	Not	X X X Menu Item X X X Menu Item	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi   DiffDrivePoseEst_FillStateVector.vi   DiffDrivePoseEst_GetEstimatedPosition.vi   DiffDrivePoseEst_GetEstimatedPosition.v	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	)	Not	X X X Menu item	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	E 2 OR X X X X X X X X X X	Not	X X X Menu Item X X X Execution	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi SiffDrivePoseEst_FillStateVector.vi SiffDrivePoseEst_GetEstimatedPosition.vi SiffDrivePoseEst_Kalman_F_Callback.vi SiffDrivePoseEst_Kalman_H_Callback.vi SiffDrivePoseEst_Kalman_H_Callba	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	DR	Not	X X X X Menu item	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi  DiffDrivePoseEst_FillStateVector.vi  DiffDrivePoseEst_GetEstimatedPosition.vi  DiffDrivePoseEst_Kalman_F_Callback.vi  DiffDrivePoseEst_Kalman_H_Callback.vi  DiffDrivePoseEst_New.vi	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	E Q X X X X X X X X X X X X X X X X X	N S	X X X X Menu item	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi SiffDrivePoseEst_FillStateVector.vi SiffDrivePoseEst_GetEstimatedPosition.vi SiffDrivePoseEst_Kalman_F_Callback.vi SiffDrivePoseEst_Kalman_H_Callback.vi SiffDrivePoseEst_Kalman_H_Callback.vi SiffDrivePoseEst_New.vi SiffDrivePoseEst_New.vi SiffDrivePoseEst_ResetPosition.vi SiffDrivePoseEst_ResetPosition.v	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	E Q X X X X X X X X X X X X X X X X X X X	N S	X X X X X X X X X X X X X X X X X X X	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	E Q X X X X X X X X X X X X X X X	y 3	X X X X X X X X X X X X X X X X X X X	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi  DiffDrivePoseEst_FillStateVector.vi  DiffDrivePoseEst_GetEstimatedPosition.vi  DiffDrivePoseEst_Kalman_F_Callback.vi  DiffDrivePoseEst_Kalman_H_Callback.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_ResetPosition.vi  DiffDrivePoseEst_ResetPosition.vi  DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi  DiffDrivePoseEst_Update.vi	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	E Q X X X X X X X X X X X X X X X X X X X	y 3	X X X X X X X X X X X X X X X X X X X	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	E Q X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi  DiffDrivePoseEst_FillStateVector.vi  DiffDrivePoseEst_GetEstimatedPosition.vi  DiffDrivePoseEst_Kalman_F_Callback.vi  DiffDrivePoseEst_Kalman_H_Callback.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_ResetPosition.vi  DiffDrivePoseEst_ResetPosition.vi  DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi  DiffDrivePoseEst_Update.vi	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	E Q X X X X X X X X X X X X X X X	7	X X X X X X X X X X X X X X X X X X X	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi  DiffDrivePoseEst_FillStateVector.vi  DiffDrivePoseEst_GetEstimatedPosition.vi  DiffDrivePoseEst_Kalman_F_Callback.vi  DiffDrivePoseEst_Kalman_H_Callback.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_ResetPosition.vi  DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_UpdateWithTime.vi  DiffDrivePoseEst_VisionCorrect_Callback.vi	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	E Q X X X X X X X X X X X X X X X X X X	7	X X X X X X X X X X X X X X X X X X X	Test Routine Sample Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi  DiffDrivePoseEst_FillStateVector.vi  DiffDrivePoseEst_GetEstimatedPosition.vi  DiffDrivePoseEst_Kalman_F_Callback.vi  DiffDrivePoseEst_Kalman_H_Callback.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_ResetPosition.vi  DiffDrivePoseEst_ResetPosition.vi  DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_UpdateWithTime.vi	Code Review		Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	E Q X X X X X X X X X X X X X X X	N N S	Optimized Execution	ram	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi  DiffDrivePoseEst_FillStateVector.vi  DiffDrivePoseEst_GetEstimatedPosition.vi  DiffDrivePoseEst_Kalman_F_Callback.vi  DiffDrivePoseEst_Kalman_H_Callback.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_ResetPosition.vi  DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_UpdateWithTime.vi  DiffDrivePoseEst_VisionCorrect_Callback.vi	Review Code Review		hecking:
DIFFERENTIAL DRIVE POSE ESTIMATO	E Q X X X X X X X X X X X X X X X	PILIB	tion Optimized	Routine Je Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi  DiffDrivePoseEst_FillStateVector.vi  DiffDrivePoseEst_GetEstimatedPosition.vi  DiffDrivePoseEst_Kalman_F_Callback.vi  DiffDrivePoseEst_Kalman_H_Callback.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_ResetPosition.vi  DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_UpdateWithTime.vi  DiffDrivePoseEst_VisionCorrect_Callback.vi	Review	Program	r Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	E Q X X X X X X X X X X X X X X X	WPILIB	tion Optimized	Routine Je Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi DiffDrivePoseEst_FillStateVector.vi DiffDrivePoseEst_SetEstimatedPosition.vi DiffDrivePoseEst_Kalman_F_Callback.vi DiffDrivePoseEst_Kalman_H_Callback.vi DiffDrivePoseEst_New.vi DiffDrivePoseEst_New.vi DiffDrivePoseEst_ResetPosition.vi DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi DiffDrivePoseEst_Update.vi DiffDrivePoseEst_Update.vi DiffDrivePoseEst_VisionCorrect_Callback.vi DiffDrivePoseEst_VisionCorrect_Callback.vi DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi	Review	st Program Test	ror Checking
	SR	PILIB	Optimized Execution	ram	VI Name  DiffDrivePoseEst_AddVisionMeasurement.vi  DiffDrivePoseEst_FillStateVector.vi  DiffDrivePoseEst_GetEstimatedPosition.vi  DiffDrivePoseEst_Kalman_F_Callback.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_UpdateWithTime.vi  DiffDrivePoseEst_VisionCorrect_Callback.vi  DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi  DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi  DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi  DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi  Notes	Code Review Code Review	Program	Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATO	SR	WPILIB	tion Optimized	Routine Je Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi DiffDrivePoseEst_FillStateVector.vi DiffDrivePoseEst_SetEstimatedPosition.vi DiffDrivePoseEst_Kalman_F_Callback.vi DiffDrivePoseEst_Kalman_H_Callback.vi DiffDrivePoseEst_New.vi DiffDrivePoseEst_New.vi DiffDrivePoseEst_ResetPosition.vi DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi DiffDrivePoseEst_Update.vi DiffDrivePoseEst_Update.vi DiffDrivePoseEst_VisionCorrect_Callback.vi DiffDrivePoseEst_VisionCorrect_Callback.vi DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi	Review	st Program Test	rror Checking
	PR	WPILIB	tion Optimized	Routine Je Program	VI Name  VI Name  DiffDrivePoseEst_AddVisionMeasurement.vi  DiffDrivePoseEst_FillStateVector.vi  DiffDrivePoseEst_GetEstimatedPosition.vi  DiffDrivePoseEst_Stalman_F_Callback.vi  DiffDrivePoseEst_Kalman_F_Callback.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_ResetPosition.vi  DiffDrivePoseEst_StalvisionMeasurementStdDevs.vi  DiffDrivePoseEst_StalvisionMeasurementStdDevs.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_VisionCorrect_Callback.vi  DiffDrivePoseEst_VisionCorrect_Callback.vi  DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi  DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi  VI Name  Function Prototype  Notes	Review	st Program Test	rror Checking
	PR	Not WPILIB	tion Optimized	Routine Je Program	VI Name  VI Name  Function Prototype  Notes  Notes  Function Prototype  Notes	Review	st Program Test	rror Checking
	PR	WPILIB	tion Optimized	Routine Je Program	VI Name Function Prototype Notes  DiffDrivePoseEst_AddVisionMeasurement.vi  DiffDrivePoseEst_FillStateVector.vi  DiffDrivePoseEst_SetEstimatedPosition.vi  DiffDrivePoseEst_Kalman_F_Callback.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_New.vi  DiffDrivePoseEst_ResetPosition.vi  DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_Update.vi  DiffDrivePoseEst_VisionCorrect_Callback.vi  DiffDrivePoseEst_VisionCorrect_Callback.vi  DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi  VI Name Function Prototype Notes  Punction Prototype Notes  Notes  Notes  DiffDrivePoseEst2_AddVisionMeasurement.vi  DiffDrivePoseEst2_CetEstimatedPosition.vi  DiffDrivePoseEst2_CetEstimatedPosition.vi  DiffDrivePoseEst2_CetEstimatedPosition.vi	Review	st Program Test	rror Checking
	PR	Not WPILIB	tion Optimized X X X X X X X X X X X X X X X X X X X	Routine Je Program	VI Name Function Prototype Notes  DiffDrivePoseEst AddVisionMeasurement.vi DiffDrivePoseEst GetEstimatedPosition.vi DiffDrivePoseEst Kalman F_Callback.vi DiffDrivePoseEst Kalman H_Callback.vi DiffDrivePoseEst New.vi DiffDrivePoseEst New.vi DiffDrivePoseEst New.vi DiffDrivePoseEst SetVisionMeasurementStdDevs.vi DiffDrivePoseEst Update.vi DiffDrivePoseEst Update.vi DiffDrivePoseEst Update.vi DiffDrivePoseEst VisionCorrect Callback.vi DiffDrivePoseEst VisionCorrect Kalman H_Callback.vi DiffDrivePoseEst VisionCorrect VisionCorre	Review	st Program Test	rror Checking
	PR	Not WPILIB	tion Optimized X X X X X X X X X X X X X X X X X X X	Routine Je Program	VI Name DiffDrivePoseEst_AddVisionMeasurement.vi DiffDrivePoseEst_AddVisionMeasurement.vi DiffDrivePoseEst_AddVisionMeasurement.vi DiffDrivePoseEst_AddVisionMeasurement.vi DiffDrivePoseEst_Addman_H_Callback.vi DiffDrivePoseEst_Addman_H_Callback.vi DiffDrivePoseEst_Addman_H_Callback.vi DiffDrivePoseEst_Addman_H_Callback.vi DiffDrivePoseEst_Addvision.vi DiffDrivePoseEst_Addvision.vi DiffDrivePoseEst_AddvisionMeasurementStdDevs.vi DiffDrivePoseEst_AddvisionMeasurementStdDevs.vi DiffDrivePoseEst_Vpdate.vi DiffDrivePoseEst_VisionCorrect_Callback.vi	Review	st Program Test	rror Checking
	PR	Not WPILIB	tion Optimized X X X X X X X X X X X X X X X X X X X	Routine Je Program	VI Name Function Prototype Notes  DiffDrivePoseEst AddVisionMeasurement.vi DiffDrivePoseEst GetEstimatedPosition.vi DiffDrivePoseEst Kalman F_Callback.vi DiffDrivePoseEst Kalman H_Callback.vi DiffDrivePoseEst New.vi DiffDrivePoseEst New.vi DiffDrivePoseEst New.vi DiffDrivePoseEst SetVisionMeasurementStdDevs.vi DiffDrivePoseEst Update.vi DiffDrivePoseEst Update.vi DiffDrivePoseEst Update.vi DiffDrivePoseEst VisionCorrect Callback.vi DiffDrivePoseEst VisionCorrect Kalman H_Callback.vi DiffDrivePoseEst VisionCorrect VisionCorre	Review	st Program Test	rror Checking

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on 3.X 1/11/2023 – renamed library. Added additional do	X	tation.				DiffDrivePoseEst2 SetVisionMeasurementStdDevs.vi			
	X					DiffDrivePoseEst2_Update.vi			
	X					DiffDrivePoseEst2 UpdateWithTime.vi			
EXTENDED KALMAN FILTER	X X X X X	X X Documented X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	Execution Optimized	Test Routine	VI Name  ExtendedKalmanFilter_Correct_OnlyUY.vi  ExtendedKalmanFilter_Correct.vi  ExtendedKalmanFilter_GetP_Single.vi  ExtendedKalmanFilter_GetP.vi  ExtendedKalmanFilter_GetXHat_Single.vi  ExtendedKalmanFilter_GetXHat_vi  ExtendedKalmanFilter_New.vi  ExtendedKalmanFilter_New.vi  ExtendedKalmanFilter_New.vi  ExtendedKalmanFilter_New.vi	 Code Review	Test Program	Error Checking
}						-		+	+
}		X	X			ExtendedKalmanFilter_Reset.vi			
}		X	X			ExtendedKalmanFilter_SetP.vi			
		X X	X			ExtendedKalmanFilter_SetXHat_Single.vi  ExtendedKalmanFilter SetXHat.vi			
	^	^	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			LAGRICUTARINATIFILE SELVITAL VI			
KALMAN FILTER	X X X X X X	X X X X X X X	X X X X X X X X X X X X X X X X X X X	Execution Optin	X X X X X X X X X X X X X X X X X X X	VI Name Function Prototype Notes  KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetK Single.vi KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_Pedict.vi KalmanFilter_Pedict.vi KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat_Single	Code Review	Test Program	Error Checking
KALMAN FILTER LATENCY COMPENSATOR	X X X	X	X X Wenu Item	Execution Optimized	Test Routine	VI Name Function Prototype Notes  KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi  KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi  KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_New.vi  KalmanFilterLatencyComp_Observer_New.vi	Code Review	Test Program	Error Checking
	X	$\frac{\lambda}{X}$	X			KalmanFilterLatencyComp_Observer_New.vi  KalmanFilterLatencyComp_Reset.vi			+
	_	Documented Not WPILIB	•	Execution Optimized	Test Routine	VI Name  Function Prototype  Notes	Code Review	Test Program	Error Checking

1/2023 – renamed library. Added additional d	ocume	nialio	п.
MECANUM DRIVE POSE ESTIMATOR			Г

ii aoc	cume	ntation	1.			
R 📗					MecaDrivePoseEst_AddVisionMeasurement_StdDev.vi	
	X	X	X		MecaDrivePoseEst_AddVisionMeasurement.vi	
	X	Χ	X		MecaDrivePoseEst_GetEstimatedPosition.vi	
	X	Χ	No		MecaDrivePoseEst_Kalman_F_Callback.vi	
	X	Χ	No		MecaDrivePoseEst_Kalman_H_Callback.vi	
	X	X	X		MecaDrivePoseEst_New.vi	
	X	Χ	X		MecaDrivePoseEst_ResetPosition.vi	
	X	Χ	X		MecaDrivePoseEst_SetVisionMeasurementStdDevs.vi	
	X	X	X		MecaDrivePoseEst_Update.vi	
	X	Χ	X		MecaDrivePoseEst_UpdateWithTime.vi	
	X	X	No		MecaDrivePoseEst_VisionCorrect_Callback.vi	
	X	Χ	No		MecaDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi	

Implemented Documented Not WPILIB Menu Item	T Execution Optimized and the second of the	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR	SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi			
X X X	SwerveDrivePoseEst_AddVisionMeasurement.vi			
X   X   X	SwerveDrivePoseEst_GetEstimatedPosition.vi			
XXXX	SwerveDrivePoseEst_Kalman_F_Callback.vi			
X X X	SwerveDrivePoseEst_Kalman_H_Callback.vi			
XXXX	SwerveDrivePoseEst_New.vi			
X X X	SwerveDrivePoseEst_ResetPosition.vi			
X X X	SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi			
XXXX	SwerveDrivePoseEst_Update.vi			
X X X	SwerveDrivePoseEst_UpdateWithTime.vi			
X X X	SwerveDrivePoseEst_VisionCorrect_Callback.vi			
X X X	SwerveDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi			

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Sample Program  ample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER X			X		UnscentedKalmanFilter_Correct_FuncGroup.vi					
X	( X		X		UnscentedKalmanFilter_Correct_OnlyUY.vi					
X			X		UnscentedKalmanFilter_Correct_OnlyUYR.vi					
<u> </u>			X		UnscentedKalmanFilter_Correct.vi					
X			X		UnscentedKalmanFilter_GetP_Single.vi					
X			X		UnscentedKalmanFilter_GetP.vi					
X		_	X		UnscentedKalmanFilter_GetXHat_Single.vi					
X			X		UnscentedKalmanFilter_GetXHat.vi					
X	( X		X		UnscentedKalmanFilter_New_Default.vi					
X	( X		X		UnscentedKalmanFilter_New_FuncGroup.vi					
X	( X		X		UnscentedKalmanFilter_New.vi					
X			X		UnscentedKalmanFilter_Predict.vi					
X	( X		X		UnscentedKalmanFilter_Reset.vi					
X	( X		X		UnscentedKalmanFilter_SetP.vi					
X	( X		X		UnscentedKalmanFilter_SetXHat_Single.vi					
X	< X		X		UnscentedKalmanFilter_SetXHat.vi					
X	< X		X		UnscentedKalmanFilter_Transform.vi					

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

Revision 3.X 1/11/2023 – renamed library. Added additional documentation. Function Prototype VI Name Notes CONTROL AFFINE PLANT INVERSION FEEDFORWARD VI Name Function Prototype Notes DIFFERENTIAL DRIVE ACCELERATION LIMITER X DiffDrvAccelLimit Calculate.vi Χ Χ DiffDrvAccelLimit New.vi Function Prototype Notes VI Name IMPLICIT MODEL FOLLOWER X Χ ImplModelFollow Calculate.vi XX Χ ImplModelFollow\_GetU.vi X XX Χ Χ ImplModelFollow GetU Single.vi XX X Χ ImplModelFollow New.vi Χ ImplModelFollow\_New\_Plant.vi X Χ X ImplModelFollow Reset.vi Function Prototype Notes LINEAR PLANT INVERSION FEEDFORWARD X LinearPIntInvFF Calculate NextR.vi X X X X X LinearPIntInvFF Calculate.vi Χ LinearPIntInvFF\_GetR\_Single.vi XX Χ LinearPIntInvFF GetR.vi X X X X LinearPIntInvFF GetUff Single.vi Χ Χ LinearPIntInvFF GetUff.vi X X Χ LinearPIntInvFF New Plant.vi LinearPIntInvFF New.vi Χ LinearPIntInvFF\_Reset\_Initial.vi Χ X X XX X LinearPIntInvFF Reset Zero.vi Function Prototype Notes LINEAR QUADRATIC REGULATOR X LinearQuadraticRegulator Calculate NextR.vi X LinearQuadraticRegulator Calculate.vi Χ LinearQuadraticRegulator\_GetK\_Single.vi NOT ORIGINAL Χ Χ LinearQuadraticRegulator\_GetK.vi Χ LinearQuadraticRegulator\_GetR\_Single.vi Χ LinearQuadraticRegulator\_GetR.vi LinearQuadraticRegulator\_GetU\_Single.vi XX Χ XX LinearQuadraticRegulator\_GetU.vi

THE LAB VIET Main Library Trimplementation Library	
Revision 3.X 1/11/2023 – renamed library. Added additional documentation.	

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	X	X		X			LinearQuadraticRegulator_New_ELMS.vi LinearQuadraticRegulator_New_N.vi				
	^	^		_^			LinearQuadraticRegulator_New_N.vi LinearQuadraticRegulator_New_Raw.vi				
	Х	Y		X		X					
		X		X			LinearQuadraticRegulator New.vi				
	X	X		X			LinearQuadraticRegulator Reset.vi				
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype Notes	Code Review	Test Program	Error Checking
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		X		X	SI		LinearSystem_GetA.vi				
		Χ		X	SI		LinearSystem_GetAElement.vi				
		Χ		Χ			LinearSystem_GetB.vi				
	Χ	Χ		Χ			LinearSystem_GetBElement.vi				
		Χ		X	SI		LinearSystem_GetC.vi				
		X		X			LinearSystem_GetCElement.vi				
		X		X			LinearSystem_GetD.vi				
	X	X		X			LinearSystem_GetDElement.vi				
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FAR SYSTEM LOOP	< Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype Notes	Code Review	Test Program	Error Checking
	X	X Documented	Not WPILIB	X Menu Item	Execution Optimized		E E E E E E E E E E E E E E E E E E E	Function Prototype Notes	Code Review	Test Program	Error Checking
	$\overline{x}$	Documented	Not WPILIB	Menu Item	Execution Optimized		VI Name  LinearSystemLoop_ClampInput.vi  LinearSystemLoop_Correct.vi	Function Prototype Notes	Code Review	Test Program	Error Checking
	X	X X Documented	Not WPILIB	X Menu Item	Execution Optimized		VI Name  LinearSystemLoop_ClampInput.vi  LinearSystemLoop_Correct.vi  LinearSystemLoop_GetClampFunction.vi	Function Prototype Notes	Code Review	Test Program	Error Checking
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	X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	Not WPILIB	X X X X X X X X X X X X X X X X X X X	Execution Optimized		VI Name  LinearSystemLoop_ClampInput.vi LinearSystemLoop_Correct.vi LinearSystemLoop_GetClampFunction.vi LinearSystemLoop_GetCampFunction.vi LinearSystemLoop_GetController.vi LinearSystemLoop_GetError_Single.vi LinearSystemLoop_GetError.vi LinearSystemLoop_GetFeedForward.vi LinearSystemLoop_GetNextR_Single.vi LinearSystemLoop_GetNextR_Nvi LinearSystemLoop_GetObserver.vi LinearSystemLoop_GetObserver.vi LinearSystemLoop_GetU_Row.vi	Function Prototype Notes	Code Review	Test Program	Error Checking
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	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	Not WPILIB	X X X X X X X X X X X X X X X X X X X	Execution Optimized		VI Name  LinearSystemLoop_ClampInput.vi  LinearSystemLoop_Correct.vi  LinearSystemLoop_GetClampFunction.vi  LinearSystemLoop_GetController.vi  LinearSystemLoop_GetError_Single.vi  LinearSystemLoop_GetError.vi  LinearSystemLoop_GetFeedForward.vi  LinearSystemLoop_GetNextR_Single.vi  LinearSystemLoop_GetNextR.vi  LinearSystemLoop_GetObserver.vi  LinearSystemLoop_GetU_Row.vi  LinearSystemLoop_GetU_IRow.vi  LinearSystemLoop_GetVHat_Single.vi  LinearSystemLoop_GetXHat_Single.vi  LinearSystemLoop_GetXHat_Single.vi  LinearSystemLoop_GetXHat_Single.vi  LinearSystemLoop_GetXHat_Vi  LinearSystemLoop_New_BBB  LinearSystemLoop_New_BBB  LinearSystemLoop_New_LinearSystem_ClampFunc LinearSystemLoop_New_LinearSystem_ClampFunc LinearSystemLoop_New_LinearSystem_ClampVal.vi	Function Prototype Notes	Code Review	Test Program	Error Checking
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	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	Not WPILIB	X	Execution Optimized		VI Name  LinearSystemLoop_ClampInput.vi  LinearSystemLoop_Correct.vi  LinearSystemLoop_GetClampFunction.vi  LinearSystemLoop_GetClampFunction.vi  LinearSystemLoop_GetController.vi  LinearSystemLoop_GetError_Single.vi  LinearSystemLoop_GetFror.vi  LinearSystemLoop_GetFeedForward.vi  LinearSystemLoop_GetNextR_Single.vi  LinearSystemLoop_GetNextR.vi  LinearSystemLoop_GetObserver.vi  LinearSystemLoop_GetU_Row.vi  LinearSystemLoop_GetU_vi  LinearSystemLoop_GetXHat_Single.vi  LinearSystemLoop_GetXHat_Single.vi  LinearSystemLoop_GetXHat_Vi  LinearSystemLoop_GetXHat_Vi  LinearSystemLoop_New_BBB  LinearSystemLoop_New_LinearSystem_ClampFunc  LinearSystemLoop_New_LinearSystem_ClampFunc  LinearSystemLoop_New_Vi  LinearSystemLoop_New.vi  LinearSystemLoop_Predict.vi  LinearSystemLoop_Reset.vi  LinearSystemLoop_Reset.vi  LinearSystemLoop_SetClampFunction.vi	Function Prototype Notes	Code Review	Test Program	Error Checking
	X X X X X X X X X X X X X X X X X X X	X	Not WPILIB	X	Execution Optimized		VI Name  LinearSystemLoop_ClampInput.vi LinearSystemLoop_GetClampFunction.vi LinearSystemLoop_GetClampFunction.vi LinearSystemLoop_GetError_Single.vi LinearSystemLoop_GetError.vi LinearSystemLoop_GetFeedForward.vi LinearSystemLoop_GetNextR_Single.vi LinearSystemLoop_GetNextR_vi LinearSystemLoop_GetObserver.vi LinearSystemLoop_GetU_Row.vi LinearSystemLoop_GetV.vi LinearSystemLoop_GetXHat_Single.vi LinearSystemLoop_GetXHat_single.vi LinearSystemLoop_GetXHat_vi LinearSystemLoop_GetXHat.vi LinearSystemLoop_Mew_BBB LinearSystemLoop_New_LinearSystem_ClampFunc LinearSystemLoop_New_LinearSystem_ClampFunc LinearSystemLoop_New_LinearSystem_ClampFunc LinearSystemLoop_New_vi LinearSystemLoop_Predict.vi LinearSystemLoop_Reset.vi LinearSystemLoop_SetClampFunction.vi LinearSystemLoop_SetClampFunction.vi LinearSystemLoop_SetClampFunction.vi	Function Prototype Notes  Notes	Code Review	Test Program	Error Checking
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_abVIEW Math Library – VI Implementation L	ist										
3.X 1/11/2023 – renamed library. Added additional	docume	ntation.		ð							
LTV DIFFERENTIAL DRIVE CONTROLLE	X	$\overline{X}$	Not WPILIB X Menu Item	Execu	Test Routine	VI Name  LTVDiffDriveCtrl_Calculate.vi  LTVDiffDriveCtrl New.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	$\frac{x}{x}$	X			LTVDiffDriveCtrl_Calculate_TrajState.vi					
	X	X	X			LTVDiffDriveCtrl Calculate SetTolerance.vi					
	X	X	Χ	(		LTVDiffDriveCtrl_Calculate_AtReference.vi					
LTV UNICYCLE CONTROLLE	X X X X X X X X X X X X X X X X X X X	X X X X X X X	Not WPILIB X X X X X Menu Hea	Execu	X X X X X X X X X X X X X X X X X X X	VI Name  LTVUnicycleCtrl_AtReference.vi  LTVUnicycleCtrl_Calculate_TrajState.vi  LTVUnicycleCtrl_Calculate.vi  LTVUnicycleCtrl_New.vi  LTVUnicycleCtrl_SetEnabled.vi  LTVUnicycleCtrl_SetTolerance.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
===== PACE UTILITIES =====	olemented	Documented	Not WPILIB Menu Item	Execution Optimized	Test Routine	Sample Program Name			Code Review	st Program	or Checking
	<u> </u>	<u>8</u>	S 8		je Je	δ VI Name	Function Prototype	Notes	ပိ	Test	E
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	X	$\frac{\wedge}{X}$	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$			CallbackHelp_MatrixMult.vi					+
	X	X	X X			CallbackHelp_MatrixPlus.vi					
DISCRETIZATIO	N X X X X X X X X X X X X X X X X X X X	X X X X	Not WPILIB X X X X X		X X X X X X X X X X X X X X X X X X X	VI Name  Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
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Revision 3 X 1/11/2023 – renamed library. Added additional documentation

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

'===== SIMULATION

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Sample Program	VI Name	Function Prototype		Notes	Code Review	Test Program	Error Checking
DC MOTOR SIM	Χ	Χ		Χ				DCMotorSim_getAngularPositionRad.vi						
	Χ	Χ		Χ				DCMotorSim_getAngularPositionRotations.vi						
	Χ	Χ		Χ				DCMotorSim_getAngularVelocityRadPerSec.vi						
	Χ	Χ		Χ				DCMotorSim_getAngularVelocityRPM.vi						
	X	X		Χ				DCMotorSim_GetCurrentDrawAmps.vi						
	Χ	Χ		Χ				DCMotorSim_New_MOI.vi						
	Χ	Χ		Χ				DCMotorSim_New_Plant.vi						
	Χ	Χ		Χ				DCMotorSim_SetInputVoltage.vi						
	Χ	Χ		Χ				DCMotorSim_Update.vi						
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Implemented Documented Not WPILIB	Execution Optim	Sample Progran  amen IA	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE TRAIN SIM X X X		DiffDriveTrainSim_ClampInput.vi					
$X \mid X \mid X$		DiffDriveTrainSim_CreateKitbotSim_EstMass.vi					
X X X		DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi					
X X X		DiffDriveTrainSim_CreateKitbotSim.vi					
X X X		DiffDriveTrainSim_GetCurrentDrawAmps.vi					
X X X		DiffDriveTrainSim_GetCurrentGearing.vi					
X X X		DiffDriveTrainSim_GetDynamics.vi					
X X X		DiffDriveTrainSim_GetHeading.vi					
X X X		DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi					
X X X		DiffDriveTrainSim_GetLeftPositionMeters.vi					
X X X		DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi					
X X X		DiffDriveTrainSim_GetOutput_Single.vi					
X X X		DiffDriveTrainSim_GetPose.vi					
$X \mid X \mid X$		DiffDriveTrainSim_GetRightCurrentDrawAmps.vi					
X X X		DiffDriveTrainSim_GetRightPositionMeters.vi					
X X X		DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi					
X X X		DiffDriveTrainSim_GetState_Single.vi					
$X \mid X \mid X$		DiffDriveTrainSim_GetState.vi					

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1717/2020 Tollamod library. Added daditional de	X			Χ		DiffDriveTrainSim KitBotWheelSize.vi					
	X	X		X		DiffDriveTrainSim New Mass MOI.vi					
				X		DiffDriveTrainSim New.vi					
		X		Χ		DiffDriveTrainSim_SetCurrentGearing.vi					
		X		X		DiffDriveTrainSim_SetInputs.vi					
		X		X		DiffDriveTrainSim SetPose.vi					
	X			X		DiffDriveTrainSim SetState.vi					
		X		X		DiffDriveTrainSim_ToughBoxMiniGearRatio.vi					
		X		X		DiffDriveTrainSim_ToughBoxMiniMotor.vi					
	X			X		DiffDriveTrainSim_Update.vi					
		^		^		Dilibrive HairiSiiri_Opdate.vi					
ELEVATOR SIM	X X X X X	X X X X X	X	Χ	Execution Optimized Test Routine	ElevatorSim_GetCurrentDraw.vi  ElevatorSim_GetPositionMeters.vi  ElevatorSim_GetVelocityMetersPerSecond.vi  ElevatorSim_HasHitLowerLimit.vi  ElevatorSim_HasHitUpperLimit.vi  ElevatorSim_New_LinSys_NoNoise.vi  ElevatorSim_New_LinSys.vi  ElevatorSim_New_NoNoise.vi  ElevatorSim_New_NoNoise.vi  ElevatorSim_New.vi  ElevatorSim_New.vi  ElevatorSim_RKF45_Func.vi  ElevatorSim_SetInputVoltage.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		Χ		ElevatorSim SetState.vi					
		X		X		ElevatorSim_Update.vi		Needed because this doesn't			
	, 1	.									
		- 1						extend.			
	$\vdash_X$	X		X		ElevatorSim UpdateX.vi		extend.			
	X			X		ElevatorSim_UpdateX.vi FlevatorSim_WouldHitI owert imit vi		extend.			
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FLYWHEEL SIM	Implemented X X	X X X X X X X X X X X X X X X X X X X	Not WPILIB	Menu Item X	Execution Optimized Test Routine	ElevatorSim_WouldHitLowerLimit.vi	Function Prototype	Notes  Future Future Future	Code Review	Test Program	Error Checking
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VPILib LabVIEW Math Library – VI Implementation Li	ist									
Revision 3.X 1/11/2023 – renamed library. Added additional	documentat	on.								
	XX		X		LinearSystemSim_SetInput_Array.vi		Doesn't use clamp ?			
	XX		X		LinearSystemSim_SetInput_Single.vi					
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	X X X X	+	X	_	LinearSystemSim_Setstate.vi LinearSystemSim_Update.vi					
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	XX		X		SngJntArmSim_GetAngleRads.vi					
	XX		X		SngJntArmSim_GetCurrentDraw.vi					
	XX		X		SngJntArmSim_GetVelocityRadsPerSec.vi					
	XX		X		SngJntArmSim_HasHitLowerLimit.vi					
	X X X X		X		SngJntArmSim_HasHitUpperLimit.vi SngJntArmSim_New.vi					
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		No		SngJntArmSim_New.vi SngJntArmSim_Rkf45_Func.vi					
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	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		X		SngJntArmSim_Settriputvoltage.vi					
	X X		X		SngJntArmSim_Update.vi					
	XX		X		SngJntArmSim_UpdateX.vi					
	XX		Х		SngJntArmSim_WouldHitLowerLimit.vi					
	XX		X		SngJntArmSim_WouldHitUpperLimit.vi					
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IATRIX UTILITIES	K X X X X Documented	Not WPILIB	X Menu Item X X Menu Item O Execution Optimized O O Execution	Test Routine Test Routin	Watrix_ChangeBoundsUnchecked.vi  WatBuilder_Create.vi  MatBuilder_Fill.vi  Watrix_AssignBlock.vi  Matrix_ChangeBoundsUnchecked.vi  Matrix_Create.vi			Code Review Code Review	Program	Error Checking Error Checking
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MATRIX UTILITIES	R X X X X X X X X X X X X X X X X X X X	Not WPILIB	X X Menu Item X X Menu Item X X S S S Execution Optimized	Test Routine Test Routine	WatBuilder_Create.vi  MatBuilder_Fill.vi  WatBuilder_Fill.vi  Watrix_AssignBlock.vi Matrix_Block.vi Matrix_ChangeBoundsUnchecked.vi Matrix_Create.vi Matrix_Det.vi Matrix_Diag.vi Matrix_Diag.vi Matrix_ElementPower.vi Matrix_ElementSum.vi Matrix_ElementTimes.vi Matrix_Equals.vi Matrix_Equals.vi Matrix_Equals.vi Matrix_Equals.vi		Notes	Code Review Code Review	Program	Error Checking Error Checking
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MATRIX UTILITIES	R X X X X X X X X X X X X X X X X X X X	Not WPILIB	X X Menu Item X X Menu Item X X S S S Execution Optimized	Test Routine Test Routine	MatBuilder_Create.vi		Notes	Code Review Code Review	Program	Error Checking Error Checking
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023 – renamed library. Added additional do			1.								
	X	X		X	SI	Matrix_Fill.vi					4
	X	<del></del>		X		Matrix_Get.vi Matrix Ident.vi		labview has function WPILIB calls this EYE			+
		<del>^</del>				Matrix Inv.vi		WPILIB Calls this EYE			+
	X	$\overline{x}$	-	X	SI	Matrix_IsEqual.vi					+
						Matrix IsIdentical.vi					+
	Χ	X		Χ	1	Matrix_LLTDecompose.vi					
						Matrix_Max.vi					$\perp$
						Matrix_MaxAbs.vi					$\perp$
						Matrix_Mean.vi					$\bot$
	$\longrightarrow$					Matrix_MinInternal.vi					+
		$\longrightarrow$		$\rightarrow$	-+	Matrix_Minus_Matrix.vi Matrix_Minus_Scalar.vi					+
	X	$\overline{X}$	$\rightarrow$	X		Matrix NormF.vi					+
	$\stackrel{\wedge}{\longrightarrow}$		$\overline{}$			Matrix NormIndP1.vi					+
		$\overline{}$	. — †			Matrix Plus Matrix.vi					+
						Matrix_Plus_Scalar.vi					
		X		X	1	Matrix_Pow.vi		THIS NEEDS WORK!!!!			
		Χ		Χ	SI	Matrix_SetColumn.vi					$\perp$
	X	X	,	X	SI	Matrix_SetRow.vi	THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT				
	$\rightarrow$	+	$\rightarrow$		$\overline{}$	Matrix Solve.vi	SHOULD BE INCLUDED HERE FOR ISOLATION.				+
	$\rightarrow$	$\rightarrow$	$\rightarrow$	$\rightarrow$	-+	Matrix Times Matrix.vi					+
	-+	$\rightarrow$	$\rightarrow$	-+	-	Matrix_Times_Scalar.vi					+
						Matrix_Trace.vi					
	Χ	Χ		Χ	SI	Matrix_Transpose.vi					$\perp$
	X	Χ	X	X	$\perp$	Matrix_WithinTolerance.vi					4
SIMPLE MATRIX	X Implemente	X Documente	Not WPILIB	X Menu Item	S Execution Op	VI Name SimpleMatrix_ExtractMatrix.vi	Function Prototype	Notes  NOTE Matrix also has an ExtractMatrix with different calling parameters YUK.	Code Revie	Test Progran	
	lemented	umented	WPILIB	nu Item	cution Optimized	ple Program			le Review	t Program	
	du,	Рос	Not	Me.	Exec	S VI Name	Function Prototype	Notes	Code	Zes Tes	
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VECTOR BUILDER		X X Documented	WPILIB	X X Menu Item	So So Execution Optimized	Sample Program	Function Prototype	Notes	ge	Test Program	
VECTOR BUILDER	X X X	X X X	WPILIB	X X Wenu Item	일 일 일 Execution Optimized	VI Name  VecBuilder_1x1Fill.vi  VecBuilder_2x1Fill.vi  VecBuilder_3x1Fill.vi  VecBuilder_4x1Fill.vi	Function Prototype	Notes	ge	Test Program	
VECTOR BUILDER	X X X X	X X X	WPILIB	X X X X X X	S S S S Execution Optimized	VI Name  VecBuilder_1x1Fill.vi  VecBuilder_2x1Fill.vi  VecBuilder_3x1Fill.vi  VecBuilder_4x1Fill.vi  VecBuilder_5x1Fill.vi	Function Prototype	Notes	ge	Test Program	
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VECTOR BUILDER	X X X X X	X X X	WPILIB	X X X X X X X X X X X X X X X X X X X	S S S S S S S S S S S S S S S S S S S	VI Name  VecBuilder_1x1Fill.vi  VecBuilder_2x1Fill.vi  VecBuilder_3x1Fill.vi  VecBuilder_4x1Fill.vi  VecBuilder_5x1Fill.vi	Function Prototype	Notes	ge	Test Program	

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Revision 3.X 1/11/2023 – renamed library. Added additional do	ocume	ntation	n.				VecBuilder_10x1Fill.vi						v
	~	_		X	21		VecBuilder_ArrayBy1Fill.vi		_				× ×
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L													X
VECTOR [	X X Implemented		Not WPILIB		99 92 Execution Optimized	l est Routine	VI Name  Vector_Dot.vi  Vector_Norm.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking	x x x x x
MATH													X
'=========													X
ANGLE STATISTICS	X X X	X X X	Х	X X X	<i>X</i>	X	VI Name  AngleStats_AngleAdd_CallbackHelp.vi  AngleStats_AngleAdd.vi  AngleStats_AngleMean_CallbackHelp.vi  AngleStats_AngleMean.vi  AngleStats_AngleResidual_CallbackHelp.vi  AngleStats_AngleResidual_Vi	Function Prototype	Notes	Code Review	Test Program	Error Checking	x x x x x x x
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MATH UTILITY	X X Implemented	X X X	Not WPILIB	X	SI SI SI SI	l est Koutine	VI Name  MathUtil_AngleModulus.vi  MathUtil_ApplyDeadband.vi  MathUtil_Clamp_Int.vi  MathUtil_Clamp.vi  MathUtil_InputModulus.vi  MathUtil_InputModulus.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking	x x x x x x x
MERWE SCALED SIGMA POINTS	X / X / X / X / X / X / X / X / X / X /	X X X X X X	Not WPILIB	X X X X X		st Ro	VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts_GetWc.vi  MerweScSigPts_GetWm_Single.vi  MerweScSigPts_GetWm_single.vi  MerweScSigPts_GetWm.vi  MerweScSigPts_New_Default.vi  MerweScSigPts_New.vi  MerweScSigPts_SigmaPoints.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking	X X X X X X X X
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	lmp	Doc	Not	Men	Exe	Tesi		ତ୍ର VI Name	Function Prototype	Notes	Cod	Test	Frror
NUMERICAL INTEGRATION	X	Χ		X	I			NumIntegrate_Func_Ax_Bu_K.vi		NOT USED. Should this be used or abandoned???			
	X	Χ		X				NumIntegrate_Rk4_Dbl_X_U.vi		or abandoned : :			
		X		X				NumIntegrate_Rk4_Dbl_X.vi NumIntegrate_Rk4_Mat_X_U.vi					
		X		X				NumIntegrate_Rk4_Mat_X_0.vi NumIntegrate_Rk4_Mat_X.vi					
	X	Χ		No	S	I		NumIntegrate_Rkdp_Func_A.vi					
		X		No	S	<i>!</i>		NumIntegrate_Rkdp_Func_B1.vi					
		X		No	S	<i>!</i>		NumIntegrate_Rkdp_Func_B1B2.vi NumIntegrate_Rkdp_Func_B2.vi					
		X		No	1			Numintegrate_Rkdp_Impl.vi					
	X	Χ		X				NumIntegrate_RKDP_Mat_X_U.vi		New replacement for RKF45			
		X		No	S	<i>!</i>	-	NumIntegrate_Rkf45_Func_A.vi NumIntegrate_Rkf45_Func_B1.vi					
		$\hat{X}$		No	S	,		NumIntegrate_Rkf45_Func_B1B2.vi					
	Χ			No	S	ı		NumIntegrate Rkf45 Func B2.vi					
								NumIntegrate_RKf45_Func_Bs.vi		Removed. Replaced with newer functions.			
								NumIntegrate_RKf45_Func_Ch.vi		Removed. Replaced with newer			
										functions.			
								NumIntegrate_RKf45_Func_Ct.vi		Removed. Replaced with newer functions.			
	X	Χ		No				NumIntegrate_Rkf45_Impl.vi					
	X	X		X				NumIntegrate_Rkf45_Mat_X_U.vi		Note that this Feinberg method has been changed and a Dormand Price method has been			
								NumIntegrate_RKf45_New.vi		implemented TODO Removed. Never used.			
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	^		- ' '	_ ^	3	<i>'</i>		NumIntegrate_Trap_Dbl.vi					
	X	X	X	X	1			NumIntegrate_Trap_Mat.vi					
NGE KUTTA TIME VARYING	X	X Documented	Not WPILIB	X	Execution Optimized	Test Routine			Function Prototype	Notes	Code Review	Test Program	Error Cheoriting
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INGE KUTTA TIME VARYING NUMERICAL JACOBIAN	X   Implemented X   Implemented	X Documented X Documented	WPILIB Not WPILIB	X Menu Item ON Menu Item	Execution Optimized Execution Optimized	Routine Test Routine		NumIntegrate_Trap_Mat.vi			Code Review Code Review	Program Test	
UNGE KUTTA TIME VARYING NUMERICAL JACOBIAN	X   Implemented X   Implemented	Documented X Documented X	WPILIB Not WPILIB	Menu Item S Menu Item X	Execution Optimized Execution Optimized	Routine Test Routine		NumIntegrate_Trap_Mat.vi  Will Name RungeKuttaTimeVarying_RK4_Mat_T_Y.vi			Code Review Code Review	Program Test	Error Chacking
	X   Implemented X   Implemented X	ed X Documented X Documented	X Not WPILIB Not WPILIB	X   Menu Item   S   Menu Item	Optimized Execution Optimized Execution Optimized	Routine Test Routine		NumIntegrate_Trap_Mat.vi  WI Name RungeKuttaTimeVarying_RK4_Mat_T_Y.vi  WI Name NumJacobian_U.vi NumJacobian_X.vi			? Review Code Review	Test Program Test	
	X   Implemented X   Implemented X	ed X Documented X Documented	WPILIB Not WPILIB X	X   Menu Item   S   Menu Item	Optimized Execution Optimized Execution Optimized	Routine Test Routine		NumIntegrate_Trap_Mat.vi  WI Name RungeKuttaTimeVarying_RK4_Mat_T_Y.vi  WI Name NumJacobian_U.vi NumJacobian_X.vi	Function Prototype	Notes	e Review	Test Program Test	oriving do
NUMERICAL JACOBIAN	X   Implemented   X   Implemented   X   X   Implemented   X   X   X   X   X   X   X   X   X	Documented X X Documented X Documented X	X Not WPILIB Not WPILIB	Menu Item X X Menu Item S Menu Item	Execution Optimized Execution Optimized	Test Routine		NumIntegrate Trap Mat.vi  Wil Name RungeKuttaTimeVarying RK4_Mat_T_Y.vi  Wil Name NumJacobian_U.vi NumJacobian_X.vi		Notes	Code Review Code Review	Program Test	orizina di Cara
	X   Implemented   X   Implemented   X   X   Implemented   X   X   X   X   X   X   X   X   X	ed X Documented X Documented	WPILIB Not WPILIB X	X   Menu Item   S   Menu Item	Execution Optimized Execution Optimized -	Routine Test Routine		NumIntegrate_Trap_Mat.vi  WI Name RungeKuttaTimeVarying_RK4_Mat_T_Y.vi  WI Name NumJacobian_U.vi NumJacobian_X.vi	Function Prototype	Notes	e Review	Test Program Test	

WPILib LabVIEW Math Library – VI Implementation List Revision 3.X 1/11/2023 – renamed library. Added additional documentation.

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X	X	(	X		Riccati_DARE_N.vi		
X	λ	<i>(</i>	X	Х	Riccati_DARE.vi		
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COMPUTER VISION UTILITIES	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X		Test Routine	VI Name  CompVisionUtil_CalculateDistanceToTarget.vi CompVisionUtil_EstimateCameraToTarget.vi CompVisionUtil_EstimateFieldToCamera.vi CompVisionUtil_EstimateFieldToRobot.vi CompVisionUtil_EstimateFieldToRobot_Alt.vi CompVisionUtil_ObjectToRobotPose.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
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APRIL TAG	X X Implemented X X X Documented	( X	X X Menu Item	SI		VI Name  AprilTag_Equals.vi  AprilTag_GetAll.vi  AprilTag_New.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
				izec		_					
	mplemented	vot WPILIB	Venu Item	=xecution Optimizec	Fest Routine	Sample Program	Function Prototype	Notes	Sode Review	Test Program	Error Checking
APRIL TAG FIELD LAYOUT	X Implemented X Documented	(	X Menu Item	ত Execution	Test Routine	VI Name  AprilTagFieldLayout_GetField.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
APRIL TAG FIELD LAYOUT	X X X X	(	X	S S Execution		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
APRIL TAG FIELD LAYOUT	X		X   X   X	S S Execution		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
APRIL TAG FIELD LAYOUT	X X X X X X X X X X		X X X X	S S Execution		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
APRIL TAG FIELD LAYOUT	X X X X X X X X X X X X X X X X X X X		X X X X	IS IS Execution		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout New.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
APRIL TAG FIELD LAYOUT	X X X X X X X X X X X X X X X X X X X		X X X X X X	IS IS Execution		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi AprilTagFieldLayout_New2023.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
APRIL TAG FIELD LAYOUT	X X X X X X X X X X X X X X X X X X X		X X X X X X X	10   10   10   10   10   10   10   10		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi AprilTagFieldLayout_New2023.vi AprilTagFieldLayout_NewSelect.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
APRIL TAG FIELD LAYOUT	X X X X X X X X X X X X X X X X X X X		X X X X X X X X	10   10   10   10   10   10   10   10		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi AprilTagFieldLayout_New2023.vi AprilTagFieldLayout_NewSelect.vi AprilTagFieldLayout_SetOrigin.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
APRIL TAG FIELD LAYOUT	X X X X X X X X X X X X X X X X X X X		X X X X X X X X	10   10   10   10   10   10   10   10		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi AprilTagFieldLayout_New2023.vi AprilTagFieldLayout_NewSelect.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	Maplemented X X X X X X X X X X X X X X X X X X X	Not WPILIB	Wenu Item	Execution Optimized 999999999999999999999999999999999999	Test Routine	AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi AprilTagFieldLayout_New2023.vi AprilTagFieldLayout_NewSelect.vi AprilTagFieldLayout_SetOrigin.vi AprilTagFieldLayout_SetOrigin_Position.vi	Function Prototype  Function Prototype	Notes	Code Review  Code Review	Test Program	Error Checking
APRIL TAG FIELD LAYOUT	X X X X X X X X X X X X X X X X X X X	Not WPILIB	X X X X X X X X X X X X X X X X X X X	9         9	Test Routine	AprilTagFieldLayout_GetField.vi  AprilTagFieldLayout_GetOriginPosition.vi  AprilTagFieldLayout_GetTagPose.vi  AprilTagFieldLayout_GetTags.vi  AprilTagFieldLayout_New.vi  AprilTagFieldLayout_New2022.vi  AprilTagFieldLayout_New2023.vi  AprilTagFieldLayout_NewSelect.vi  AprilTagFieldLayout_SetOrigin.vi  AprilTagFieldLayout_SetOrigin_Position.vi				Program	
	Maplemented X X X X X X X X X X X X X X X X X X X	Not WPILIB	Wenu Item		Test Routine	AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi AprilTagFieldLayout_New2023.vi AprilTagFieldLayout_NewSelect.vi AprilTagFieldLayout_SetOrigin.vi AprilTagFieldLayout_SetOrigin_Position.vi				Program	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program NA IA Na Na N	me	Function Prototype	Notes	Code Review	Test Program	Error Checking
NETWORK UDP	Χ	X	X	X	SI		Networ	rkUDP_Close.vi					
	X	X	X	Χ	1		Networ	rkUDP_Receive.vi					
	X	X	X	Χ	1		Networ	orkUDP_Send.vi					

					_								
		Implemented	Documented	NOT WITTE	Menu Item	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	:
٦	TypeDef	Z	$\overline{z}$	X	X N			AprilTag.ctl	,				
			z		X N	Ά		AprilTagFieldLayout,ctl					
		Z	z	Υ .	X N	Ά		AprilTagFieldLayoutOriginPosition_ENUM.ctl					
		z	z	Υ .	X N	Ά		AprilTagFields_ENUM.ctl					
					X N			AprilTagPoseEstimate.ctl					
		z	z	Χ .	X N	Ά		ARM_FF.CTL					
		z	z		X N			BANG_BANG.CTL					
		1			X N			BICon-Matrix_FUNC_TYPE.CTL		NOT USED. Should this be deleted or abandoned???			
					X N			CALLBACK_FUNC_TYPE.CTL					
		Z	$Z \mid Z$	X .	X N	Ά		CHASSIS_SPEEDS.CTL					
		<u>Z</u> 2	Z   2	Χ .	X N	Ά		CONTRAINED_STATE.CTL					
		<u>Z                                     </u>	Z /	X .	X N	Ά		COORDINATE_AXIS.CTL					
		<i>Z</i> 2	<u> </u>	Χ .	X N	A		COORDINATE_SYSTEM.CTL					
		Z / /	Z /	Χ .	X N	A		DCMOTOR_SIM.CTL					
		Z	Z /	Χ .	X N	A		DCMOTOR_TYPES_ENUM.CTL					
		$\begin{bmatrix} Z & Z \\ Z & Z \end{bmatrix}$	7 7	X .	X N X N	A		DCMOTOR.CTL DEBOUNCER TYPE ENUM.Ctl					
					X N			DEBOUNCER.CTL					
		$\frac{Z}{Z}$	7	^ ·	X N	<u>α</u>		DIFF_DRIVE_ACCEL_LIMIT.CTL					
		$\frac{z}{z}$	7	X	X N	/A		DIFF DRIVE KINEMATICS.CTL					
		z	z   2	X	X N	Ά.		DIFF DRIVE Kitbot WheelSize ENUM.ctl					
			z		N			DIFF DRIVE ODOM2.ctl					
					X N			DIFF DRIVE Pose EST.ctl					
		Z	,	X	N			DIFF_DRIVE_POSE_EST2.ctl					
		Z	j	X	N.	Ά		DIFF_DRIVE_POSE_EST2_INTERP_RECORD.CTL					
					X N			DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl					
					X N			DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl					
					X N			DIFF_DRIVE_TRAIN_SIM_STATE_ENUM.CTL					
		<u>Z</u> 2	Z /	Χ .	X N	A		DIFF_DRIVE_TRAIN_SIM.ctl		W UTI WAYDON'T VI			
					X N			DISPLAY_WAYPOINT.ctl		Was UTIL_WAYPOINT.VI			
			_ /		X	A		DISPLAY_WEIGHTED_WAYPOINT.ctl		New V1.5. was UTIL_WEIGHTED_WAYPOINIT.VI			
		z	z	X .	X N	Ά		ELEV FF.CTL					
					X N			ELEVATOR_SIM.CTL					
					X N			EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL					
		Z			X N			EXTENDED_KALMAN_FILTER.CTL					
		$Z \mid Z$	$Z \mid Z$	Χ .	X N	Ά		FLYWHEEL_SIM.ctl					
					X N			FUNCTION_GENERATOR_MATRIX.ctl					
					X N			FUNCTION_GENERATOR.ctl					
					X N X N			HOLONOMIC_DRV_CTRL.CTL KALMAN_FILTER_LATENCY_COMP_FUNC_GROUP.CTL		New 1/26/21			

WPILib LabVIEW Math Library – VI Implementation List Revision 3.X 1/11/2023 – renamed library. Added additional documentation.

docume	ntatior	n.				
Ζ	Ζ	Χ	Χ	N/A	KALMAN FILTER LATENCY COMP.CTL	
Z	Z	Χ	X	N/A	KALMAN FILTER.ctl	
Z	Z	X	X	N/A	LINEAR FILTER.CTL	
Z	Z	$\overline{x}$	X	N/A	LINEAR PLANT INV FF.ctl	
Z	Z	$\hat{x}$	X	N/A	LINEAR QUADRATIC REGULATOR.ctl	
Z	Z	$\hat{x}$	X	N/A	LINEAR SYSTEM LOOP.ctl	
Z	Z	X	X	N/A	LINEAR_SYSTEM_SIM.ctl	
Z	Ζ	Χ	X	N/A	LINEAR_SYSTEM.ctl	
Z	Ζ	Χ	X	N/A	LTV_DIFF_DRIVE_CTRL_STATE_ENUM.ctl	
Z	Ζ	Χ	X	N/A	LTV_DIFF_DRIVE_CTRL.ctl	
N/A		N/A		N/A		OBSOLETE – Removed
Z	Ζ	Χ	Χ		LTV_UNICYCLE_CONTROLLER_STATE_ENUM.ctl	
Z	Z	X	X	N/A	LTV_UNICYCLE_CONTROLLER.CTL	
Ζ	Z	Χ	X	N/A	MECA DRIVE KINEMATICS.CTL	
Z	Ζ	Χ	Χ	N/A	MECA DRIVE ODOMETRY.CTL	
Z	Ζ	Χ	Χ	N/A	MECA DRIVE POSE EST.CTL	
Z	Z	Χ	Х	N/A	MECA WHEEL POSITIONS.CTL	
Z	Z	X	X	N/A	MECA WHEEL SPEEDS.CTL	
Z	Z	X	X	N/A	MEDIAN FILTER.CTL	
Z	Z	$\frac{\lambda}{X}$	X	N/A	MERWE SCALED SIGMA PTS.ctl	
Z	Z	$\hat{x}$	X	N/A	OBSERVER SNAP LIST ITEM.CTL	
Z	Z	$\frac{\lambda}{X}$	X	N/A N/A	OBSERVER_SNAP_LIST_TIEW.CTL OBSERVER_SNAPSHOT.CTL	
		X	X			
Z	Z			N/A	PARAM_STACK_ITEM.CTL	
Z	Z	X	X	N/A	PARAM_STACK.CTL	
Z	Z	X	X	N/A	PID_ADV_LIMITS.CTL	
Z	Z	Χ	X	N/A	PID_ADV_TUNING.CTL	
Z	Ζ	Χ	X	N/A	PID_CONTROLLER.CTL	
Ζ	Ζ	Χ	Χ	N/A	PID_ERROR_TOLERANCE.CTL	
Z	Ζ	X	X	N/A	PID_INPUT_LIMITS.CTL	
Z	Z	Χ	X	N/A	PID TUNING.CTL	
Ζ	Z	Χ	Χ	N/A	POSE2D.CTL	
Z	Ζ	Χ	Χ	N/A	POSE3D.CTL	
Z	Z	Χ	Х	N/A	POSEWCURVATURE.CTL	
Z	Z	X	X	N/A	PROFILED_PID_CONTROLLER.CTL	
Z	Z	X	X	N/A	QUATERNION.CTL	
Z	Z	$\overline{x}$	X	N/A	RAMSETE EXE TUNING.CTL	
Z	Z	$\hat{X}$	X	N/A	RAMSETE_EXE_TONING:GTE	
Z	Z	$\hat{X}$		N/A	ROTATION2D.CTL	
	Z		X	N/A N/A		
Z		X	X		ROTATION3D.CTL	
Z	Z	X		N/A	SIMPLE_MOTOR_FF_KA_TUNE_PARAMS.CTL	
Z	Ζ	Χ	X	N/A	SIMPLE_MOTOR_FF.CTL	
Z	Ζ	Χ	Χ	N/A	SINGLE_JOINT_ARM_SIM.CTL	
Z	Ζ	X	X	N/A	SLEW_RATE_LIMITER.CTL	
Ζ	Ζ	Χ	X	N/A	SPLINE_CTRL_VECTOR.CTL	
Z	Ζ	Χ	X	N/A	SPLINE.CTL	i
Z	Ζ	Χ	X	N/A	SWERVE_DRIVE_KINEMATICS.CTL	
Z	Z	X	X	N/A	SWERVE_DRIVE_MODULE_POSITION.CTL	
Z	Ζ	Χ	Χ	N/A	SWERVE_DRIVE_MODULE_STATE.CTL	
Z	Z	Χ	Χ	N/A	SWERVE_DRIVE_ODOMETRY.CTL	
Z	Ζ	Χ	Χ	N/A	SWERVE_DRIVE_Pose_EST.CTL	
Z	Z	X	X	N/A	TIME INTERPOLATABLE BOOLEAN.CTL	
Z	Z	X	X	N/A	TIME INTERPOLATABLE DOUBLE.CTL	
Z	Z	X	X	N/A	TIME INTERPOLATABLE POSE2D.CTL	
Z	Z	$\overline{X}$	X	N/A	TIME INTERPOLATABLE ROTATION2D.CTL	
Z	Z	X		N/A	TIME_INTERN GEATABLE_NOTATION2B.GTE  TIME INTERPOLATABLE VARIANT.CTL	
Z	Z	$\hat{x}$	X	N/A	TIMER.CTL	
Z	Z	$\frac{\hat{x}}{x}$	X	N/A	TRAJ CONFIG.CTL	
	Z	X	X	N/A N/A	TRAJ_CONFIG.CTL  TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL	
Z 7						
Z	Z	X	X	N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_KINEMATICS.CTL	
Z	Z	X	X	N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_VOLTAGE.CTL	
Z	Ζ	X	Χ	N/A	TRAJ_CONSTRAINT_ELLIP_REGION.CTL	
1		X		N/A		Routine exists, it is just a shell
Z	Z	Χ	X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL	
Z	Ζ	Χ	X	N/A	TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL	
Z	Ζ	Χ	X	N/A	TRAJ_CONSTRAINT_MINMAX.CTL	
Z	Ζ	Χ	Χ	N/A	TRAJ_CONSTRAINT_RECT_REGION.CTL	
Z	Ζ	Χ	Χ	N/A	TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	
Z	Ζ	Χ	Χ	N/A	TRAJ_STATE.CTL	
Z	Ζ	Χ	Х	N/A	TRAJECTORY SPLINE TYPE ENUM.CTL	
Z	Z	X	X	N/A	TRAJECTORY.CTL	
					1	

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docume	ntatio	n.				
Z	Ζ	X	Χ	N/A	TRANSFORM2D.CTL	
Z	Ζ	X	Χ	N/A	TRANSFORM3D.CTL	
Z	Ζ	X	Χ	N/A	TRANSLATION2D.CTL	
Z	Ζ	X	Χ	N/A	TRANSLATION3D.CTL	
Z	Ζ	X	Χ	N/A	TRAPEZOID_PROFILE_CONSTRAINT.CTL	
Z	Ζ	X	Χ	N/A	TRAPEZOID_PROFILE_STATE.CTL	
Z	Ζ	X	Χ	N/A	TRAPEZOID_PROFILE.CTL	
Z	Ζ	X	Χ	N/A	TWIST2D.CTL	
Z	Ζ	X	Χ	N/A	TWIST3D.CTL	
Z	Ζ	X	Χ	N/A	UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL	
Z	Ζ	X	Χ	N/A	UNSCENTED_KALMAN_FILTER.ctl	
Z	Ζ	X	Χ	N/A	UNSCENTED_KALMAN_NEW_FUNC_GROUP.CTL	
Z	Ζ	X	Χ	N/A	UTIL_PATHFINDER_CONFIG.CTL	
N/A		N/A		N/A	WAYPOINTS.CTL	Delete – obsolete
Z	Ζ	X	Χ	NA	WEIGHTED_WAYPOINT.CTL	New V1.5
N/A		N/A		N/A	X_Y_HEADINGS.CTL	Delete – obsolete
Z	Ζ	X	Χ	N/A	X_Y_PAIR.CTL	

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