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 (/)
CTRL Shell Total (\)
2

Doc completed Pct 91.58% Optimization Pct 56.92%

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

'======== BASE

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ANALOG DELAY			X Not WPILIB	Menu Item	- Execution Optimized	Test Routine	E B VI Name F AnalogDelay.vi	Function Prototype	Notes Similar to interpolated tree map	Code Review	Test Program	Error Checking
		_	Not WPILIB	Menu Item	Execution Optimized	Test Routine		Function Prototype	Notes	Code Review	Test Program	Error Checking
FUNCTION GENERATOR		Χ		Χ	I		FunctionGenerator_Add_Value.vi		Similar to interpolated tree map			
		Χ		Χ	1		FunctionGenerator_Add_XY.vi		Similar to interpolated tree map			
	X	X		X	1		FunctionGenerator_Calculate.vi		Similar to interpolated tree map			
		X		X	SI		FunctionGenerator_Clear.vi					
			X	X	1		FunctionGenerator_Execute.vi		Similar to interpolated tree map			
	Χ	Χ		Χ	SI		FunctionGenerator_New.vi		Similar to interpolated tree map			
	Implemented		Not WPILIB	Menu Item	Execution Optimized	Test Routine		Function Prototype	Notes	Code Review	Test Program	Error Checking
FUNCTION GENERATOR MATRIX			Χ	Χ	1		FunctionGeneratoMatrixr_Add.vi		Similar to interpolated tree map			
				X	1		FunctionGenerator_Calculate.vi		Similar to interpolated tree map			
	Χ	X	X	Χ	SI		FunctionGenerator_New.vi		Similar to interpolated tree map			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking

model follower and time	interpolatable routines.							
LINEAR FILTER		1	LinearFilter_BackwardFiniteDifference.vi					
	X X X	SI	LinearFilter_Calculate.vi					
	X X X X	X	LinearFilter_CutoffFrequency.vi					
	X X X X	1	X LinearFilter Execute.vi		Labview style helper			
	X X No		LinearFilter Factorial.vi		AN INTERNAL ROUTINE			
	X X X	X	LinearFilter HighPass.vi					
	X X X X	X	LinearFilter_HighPassBW1.vi					
	X X X X		LinearFilter_HighPassBW2.vi					
	X X X X	X	LinearFilter LowPassBW1.vi					
	X X X X	X	LinearFilter LowPassBW2.vi					
	XXXX		LinearFilter_MovingAverage.vi					
	X X X		LinearFilter New.vi					
	X X X	SI	LinearFilter Reset.vi					
	X X X X	SI	LinearFilter ResetToValue.vi					
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		LinearFilter_SinglePoleIIR.vi					
	X X X X	X	LinearFilter TimeConst.vi					
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MEDIAN EU TER	Implemented Documented Not WPILIB	Execution Optimiza		Function Prototype	Notes	Code Review	Test Program	Error Checking
MEDIAN FILTER			MedianFilter_Calculate.vi		Laber Sanca et da Bada an			
	X X X X	01	X MedianFilter_Execute.vi MedianFilter New.vi		Labview style helper			
	X X X							
	X X X X X X X X X X	SI	MedianFilter_Reset.vi MedianFilter_ResetToValue.vi					
	X	31						
SLEW RATE FILTER		1	SlewRateLimiter_Calculate.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X X X X	SI	SlewRateLimiter_Close.vi					
	X X X X		X SlewRateLimiter_Execute.vi		Labview style helper			
	X X X X	SI	SlewRateLimiter_GetRate.vi					
	X X X	1	SlewRateLimiter_New.vi					
	X X X X X X X X X X	I	SlewRateLimiter_NewInitialZero.vi					
	X X X		SlewRateLimiter_Reset.vi					
	X X X	SI	SlewRateLimiter_SetRate.vi					
	Implemented Documented Not WPILIB Menu Item	Execution Optimized Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
TIMER		E 7	Timer Close.vi	i unouon i rototype	releases semaphore		7	H H
INVER	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		X Timer Get.vi		посазез зептарноге			
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		Timer_GetAndReset.vi					
	X X X No		Timer GetInternal.vi		Internal (private) only			
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		X Timer HasPeriodPassed.vi		internal (private) only			
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		X Timer HasPeriodPassedOnce.vi					
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		X Timer_New.vi					
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		X Timer_Reset.vi					
	X X X No		Timer_ResetInternal		Internal (private) only			
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		X Timer_Start.vi		internal (private) only			
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		X Timer_Stop.vi					
			Timer StopInternal.vi			-		
	X X X No		Timer Stopiniemai vi		Internal (private) only			

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. Not Function Prototype TIME INTERPOLATABLE BOOLEAN $\begin{array}{c|cccc} \ddot{X} & \ddot{X} \\ \hline \ddot{X} & \ddot{X} \end{array}$ TimeInterpBoolean AddSample.vi Update to use create matrix Χ X No TimeInterpBoolean_CleanUp.vi Update to use create matrix X X X X I TimeInterpBoolean Clear.vi X X X X SI TimeInterpBoolean_GetSample.vi X X X X SI TimeInterpBoolean New.vi **Function Prototype** Notes TIME INTERPOLATABLE DOUBLE $X \mid X$ X TimeInterpDouble AddSample.vi Update to use create matrix TimeInterpDouble CleanUp.vi X No I Χ Update to use create matrix X X X I TimeInterpDouble_Clear.vi X X X SI X TimeInterpDouble_GetSample.vi X X X X SI TimeInterpDouble New.vi Function Prototype Notes TIME INTERPOLATABLE POSE2D X X TimeInterpPose2d AddSample.vi XX Update to use create matrix TimeInterpPose2d CleanUp.vi X X No Update to use create matrix X X X X I TimeInterpPose2d Clear.vi X X X X SI TimeInterpPose2d_GetSample.vi X X X X SI TimeInterpPose2d New.vi **Function Prototype** Notes TIME INTERPOLATABLE ROTATION2D Χ X TimeInterpRotation2d AddSample.vi Update to use create matrix TimeInterpRotation2d CleanUp.vi $X \mid X \mid X \mid No \mid I$ Update to use create matrix XXXI TimeInterpRotation2d_Clear.vi TimeInterpRotation2d_GetSample.vi X X X SI X X X TimeInterpRotation2d New.vi Execution Optimized Function Prototype Notes DIGITAL SEQUENTIAL LOGIC X X X DigSeqLogic_Delay.vi X $X \mid X$ DigSeqLogic On Delay.vi X X X X DigSeqLogic_Off_Delay.vi X X X X DigSeqLogic_One_Shot.vi X X X X DigSeqLogic_SR_Flip_Flop.vi

Revision 2.X 5/2/2022 – added implicit m	nodel follower and time	interp	olatabl	le routi	ines.	_								
kevision 2.X - <i>5/2/2</i> 022 – added implicit m	DEBOUNCER	X X X Implemented	X X Documented	Not WPILIB	X X X No No	Execution Optimized	Test Routine		VI Name Debouncer_New.vi Debouncer_Calculate.vi Debouncer_Execute.vi Debouncer_Reset.vi Debouncer_HasElapsed.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
======= CONTROLLER														
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		X	X	X	X				ArmFF_CalculateVelocityOnly.vi ArmFF_Execute.vi ArmFF_ExecuteVelocityOnly.vi		LabVIEW style single call LabVIEW style single call			
		X	X		X				ArmFF_MaxAchieveAccel.vi ArmFF_MaxAchieveVelocity.vi					
		X	X		X				ArmFF_MinAchieveAccel.vi					
		X	X		X				ArmFF_MinAchieveVelocity.vi ArmFF_New_ZeroGravity.vi					
		Χ	Χ		Χ				ArmFF_New.vi					
		Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	BANG BANG	X	X		X	SI SI			BangBang_AtSetpoint.vi BangBang_Calculate_PV.vi					
		X	X	V	X	SI			BangBang Calculate SP PV.vi					
		X	X	X	X	SI SI			BangBang_Execute.vi BangBang_GetAll.vi					
		X	X		X	SI			BangBang_GetError.vi					
		X	X		X	SI SI			BangBang_New.vi BangBang_SetSetpoint.vi					
		X	X		X	SI			BangBang_SetTolerance.vi					
		Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	CONTROLLER UTIL	X	X		X	SI			ControllerUtil_GetModulusError.vi		This was short lived in WPILIB, but still useful here.			
										1	Jun usciul licie.			

FRC LabVIEW Trajectory Library – VI Implementation List			_				
Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines.	p						
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	Exec	δ VI Name	Function Prototype	Notes	_ ც	Test	Err
ELEV FF X X X X X		ElevFF_Calculate.vi ElevFF_CalculateVelocityOnly.vi					
X		ElevFF_Execute.vi		LabVIEW style single call			
X X X X		ElevFF_ExecuteVelocityOnly.vi ElevFF MaxAchieveAccel.vi		LabVIEW style single call			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		ElevFF_MaxAchieveVelocity.vi					
X X X		ElevFF_MinAchieveAccel.vi					
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HOL_DRV_CTRL X X X X		HolDrvCtrl_AdvCalculate_Trajectory.vi		Added 1/24/2022			
$egin{array}{ c c c c c c c c c c c c c c c c c c c$	21	HolDrvCtrl_AdvCalculate.vi HolDrvCtrl_AtReference.vi		Added 1/24/2022 Added 1/26/21			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1	HolDrvCtrl_Calculate_Trajectory.vi		Added 1/26/21			
X X X	1	HolDrvCtrl_Calculate.vi		Added 1/26/21			
$egin{array}{ c c c c c c c c c c c c c c c c c c c$		HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl Execute.vi		Added 1/24/2022 Future			
	SI	HolDrvCtrl New.vi		Added 1/26/21			
X X X X	SI	HolDrvCtrl_PackExecuteSP.vi					
		HolDrvCtrl_PackPID.vi HolDrvCtrl_PackProfPID.vi		Added 1/24/2022 Added 1/24/2022			
X X X	SI	HolDrvCtrl_SetEnabled.vi		Added 1/26/21			
X X X	SI	HolDrvCtrl_SetTolerance.vi		Added 1/26/21			
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	Exec	νι Name	Function Prototype	Notes	<u> </u>		En
PID CONTROLLER X X X X X X X X X		PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi		Advanced PID Advanced PID			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		X PIDController_AdvExecute.vi		Labview style helper. Advanced			
X X X X	21	PIDController AtSetpoint.vi		PID			
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X X X		PIDController_Calculate_SP_PV.vi					
$egin{array}{ c c c c c c c c c c c c c c c c c c c$		PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		X PIDController Execute.vi		Labview style helper			
		PIDController_GetContinuousError.vi		OBSOLETE – Removed			
$egin{array}{ c c c c c c c c c c c c c c c c c c c$	SI SI	PIDController_GetPeriod.vi PIDController GetPID.vi					
X X X	SI	PIDController_GetPositionError.vi					
X X X	SI	PIDController_GetSetpoint.vi					
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X X X	1	PIDController_New.vi					
X X X	1	PIDController_NewPeriod.vi					
X X X X	SI	PIDController_Pack_AdvLimits.vi					

IEW Trajectory Library – VI Implementatio 5/2/2022 – added implicit model follower and tin	ime interpolatable routines.				
	X X X X SI	PIDController_Pack_AdvTuning.vi			
	X X X X SI	PIDController_Pack_ErrorTolerance.vi			
	X X X X SI	PIDController_Pack_InputLimits.vi PIDController_Pack_Tuning.vi			-
	X X X X SI	PIDController Reset.vi			
	X X X SI	PIDController SetD.vi			
	X X X X SI	PIDController SetDerivativeFilter.vi	Advanced PID		
	X X X No	PIDController_SetFeedForward_OBSOLETE_DELETE.vi	Advanced PID, Obsolete – DELETE		\top
	X X X No	PIDController_SetFFGain_OBSOLETE_DELETE.vi	Advanced PID, Obsolete – DELETE		
	X X X SI	PIDController_Setl.vi			
		PIDController_SetInputRange.vi	OBSOLETE – Removed		
	X X X SI	PIDController_SetIntegratorRange.vi			
	X X X X SI	PIDController_SetOutputLimits.vi	Advanced PID		
	X X X SI	PIDController_SetP.vi			-
	X X X X SI	PIDController_SetPeriod.vi			-
	X X X SI X X SI	PIDController_SetPID.vi PIDController SetPIDF.vi	Advanced DID		+
		PIDController_SetPiDF.vi PIDController_SetSetpoint.vi	Advanced PID		
	X X X SI X SI X SI	PIDController_SetSetpoint.vi PIDController SetTolerance.vi			+
	X X X X SI	PIDController SetTolerancePandV.vi			
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PROFILED PID CONTROLLE	ER X X X SI	ProfiledPIDController_AtGoal.vi			
	X X X SI	ProfiledPIDController_AtSetpoint.vi			
	X X X	ProfiledPIDController_Calculate_Meas_Goal.vi			
	X X X	ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi			
	X X X X X X X X X X X X X X X X X X X	ProfiledPIDController_Calculate_Meas_StateGoal.vi			
	X X X	ProfiledPIDController_Calculate_Meas.vi			- 1
		Destillad DIDC entroller. Disable Continuet vi			+
	X X X SI	ProfiledPIDController_DisableContInput.vi			
	X X X SI X X SI X X X SI X X SI X X X X X X X X X	ProfiledPIDController_EnableContInput.vi	Single call LabVIEW style function.		
	X X X SI X X X SI X X X X X I	ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi	Single call LabVIEW style function.		
	X X X SI	ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi ProfiledPIDController_GetGoal.vi	Single call LabVIEW style function.		
	X X X SI	ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi			
	X	ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPID.vi	Single call LabVIEW style function. WPILIB has separate getters.		
	X	ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPositionError.vi			
	X	ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi			
	X	ProfiledPIDController_Execute.vi ProfiledPIDController_Execute.vi ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPlD.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetVelocityError.vi			
	X	ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_New.vi			
	X	ProfiledPIDController_Execute.vi ProfiledPIDController_Execute.vi ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPlD.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_New.vi ProfiledPIDController_New.vi			
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	X	ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_New.vi ProfiledPIDController_New.vi ProfiledPIDController_NewPeriod.vi ProfiledPIDController_Reset_PosOnly.vi ProfiledPIDController_Reset_PosVel.vi ProfiledPIDController_Reset.vi ProfiledPIDController_SetConstraints.vi ProfiledPIDController_SetConstraints.vi ProfiledPIDController_SetGoal_PosOnly.vi ProfiledPIDController_SetGoal.vi ProfiledPIDController_SetGoal.vi ProfiledPIDController_SetTolerance_PosOnly.vi ProfiledPIDController_SetTolerance_PosOnly.vi		we.	
	X	ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_New.vi ProfiledPIDController_NewPeriod.vi ProfiledPIDController_Reset_PosOnly.vi ProfiledPIDController_Reset_PosVel.vi ProfiledPIDController_Reset.vi ProfiledPIDController_SetConstraints.vi ProfiledPIDController_SetGoal_PosOnly.vi ProfiledPIDController_SetGoal_PosOnly.vi ProfiledPIDController_SetGoal.vi ProfiledPIDController_SetGoal.vi ProfiledPIDController_SetGoal.vi ProfiledPIDController_SetTolerance_PosOnly.vi		Test Program	

calculate trajectory

_ ^	^	_ ^	_ ^		calculate_trajectory		
X	Χ	X	Χ	Ramsete_Calculate.vi	calculate		
X	XX	X	Χ	Ramsete_Diff_DO_Eng.vi			
X	XX	X	Χ	Ramsete_Diff_DO_SI.vi			
X	XX	X	1	Ramsete_Execute_ENG.vi	Use this one!!		
X	XX	X	SI	Ramsete_Execute_PackTuning_ENG.vi			
X	XX	X	SI	Ramsete_Execute_PackTuning.vi			
X	XX	X	1	Ramsete_Execute.vi			
X	Χ	X	SI	Ramsete_New_B_Z.vi	new(b, zeta)		
X	X	X	SI	Ramsete_New.vi	new		
X	X	X	SI	Ramsete_SetEnabled.vi	SetEnabled		
X	X	Χ	SI	Ramsete_SetTolerance.vi	SetTolerance		
X	X	Χ	X	Ramsete_SINC.vi	sinc	internal	

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

'========= **GEOMETRY** '========

> Function Prototype VI Name Notes | X | SI | X CoordAxis_D.vi CoordAxis_E.vi CoordAxis_N.vi CoordAxis_New.vi X SI CoordAxis_S.vi X X X X X SI CoordAxis_U.vi X SI CoordAxis_W.vi

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
COORDINATE SYSTEM	X	X		X	SI	X	CoordSystem_Convert_Pose3d.vi					
	X	Χ		X	SI		CoordSystem_Convert_Rotation3d.vi					
	X	Χ		X	SI		CoordSystem_Convert_Translation3d.vi					
	X	Χ		X	SI	X	CoordSystem_EDN.vi					
	X	Χ		X	SI	X	CoordSystem NED.vi			-		

el follower and time	interp	olatab	le rout										
	X	X		X	SI	X		CoordSystem_New.vi					
	X	X		X	SI	X		CoordSystem_NWU.vi					
POSE2D	X X X X X X X X X X X X X X 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	S S S S S S S S S S	Test Routine	Sample Program	VI Name Pose2d_Equals.VI Pose2d_Exp.vi Pose2d_getRotation.vi Pose2d_getTranslation.vi Pose2d_getXY.vi Pose2d_getXYAngle.vi Pose2d_Interpolate.vi Pose2d_Log.vi Pose2d_Minus.vi	Function Prototype boolean equals(other obj) pose2d exp(twist2d twist) rotation2d getRotation() translation2d getTranslation() twist2d log(pose2d end) transform2d minus(pose2d other)	Notes can also use cluster unpack can also use cluster unpack	Code Review	Test Program	Error Checking
	X	X		Χ	SI			Pose2d New TRRO.vi	pose2d new(translation2d, rotation2d)				
	X	X		X	SI			Pose2d_New.vi	pose2d new(double x, double y, rotation2d)				
	X	X		X	SI			Pose2d_Plus.vi	pose2d plus(transform2d other)				
	X	Χ		Χ	SI			Pose2d_RelativeTo.vi	pose2d relativeto(pose2d other)				
	X	X		X	SI			Pose2d_TransformBy.vi	pose2d transformby(transform2d other)				
									pose2d new()	can use cluster constant			
POSE3D	X	X	X Not WPILIB	X	SI S	Test Routine	Sample Program	VI Name Pose3d_Equals.VI Pose3d_Exp.vi Pose3d_getRotation.vi Pose3d_getTranslation.vi Pose3d_getXYZ.vi Pose3d_Interpolate.vi Pose3d_Log.vi Pose3d_Minus.vi Pose3d_New.vi Pose3d_New_Default.vi Pose3d_New_Trans3dRot3d.vi Pose3d_Plus.vi Pose3d_RelativeTo.vi Pose3d_RotationVectorToMatrix.vi Pose3d_TransformBy.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
QUATERNION	X X X Implemented	Documented	Not WPILIB	X X Wenu Item	의 일 일 Execution Optimized	Test Routine	Sample Program	VI Name Quaternion_Equals.vi Quaternion_Get_All.vi Quaternion_Get_LVQuat.vi Quaternion_Get_Vect.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X			X	SI			Quaternion_Get_W.vi					
	X			Χ	SI			Quaternion_Inverse.vi					
	X	X		X	SI			Quaternion_New.vi					
	X	X		Χ	SI			Quaternion_New_Default.vi					

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X	X	X	SI		Quaternion_New_LVQuat.vi								
X		X	SI		Quaternion_Normalize.vi								
X		X	SI		Quaternion_Plus.vi								
X		X	SI		Quaternion_Times.vi								
X		X	SI		Quaternion ToRotationVector.vi								

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimizec	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
ROTATION3D	X			X	SI		Rotation3d_Create_AxisAngle.vi					
	X			X	SI		Rotation3d_Create_Default.vi					
	X			Χ	SI		Rotation3d_Create_Quaternion.vi					
	X			Χ	SI		Rotation3d_Create_RollPitchYaw.vi					
	X			Χ	SI		Rotation3d_Equals.vi					
	X		Χ	Χ	SI		Rotation3d_GetAxisAngle.vi					
	Χ			Χ	SI		Rotation3d_GetQuaternion.vi					
	X			Χ	SI		Rotation3d_GetXYZ.vi					
	Χ			Χ	SI		Rotation3d_Interpolate.vi					
	Χ			Χ	SI		Rotation3d_Minus.vi					
	Χ			Χ	SI		Rotation3d_Plus.vi					
	Χ			Χ	SI		Rotation3d_RotateBy.vi					
	X			Χ	SI		Rotation3d_Times.vi					
	Χ			Χ			Rotation3d_ToRotation2d.vi					
	Χ			Χ	SI		Rotation3d_UnaryMinus.vi					

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lmp Doc	Not	Me. Exe	ď	S VI Name	Function Prototype	Notes	Ç	Tes	Errc

nodel follower and time	interpo	olatable	routine	S.								
TRANSFORM2D				X S	<i>i</i>		Transform2d Create PosePose.vi	transform2d new(pose2d, pose2d)			1	
	X	X		X SI	,		Transform2d Create TransRot.vi	transform2d new(translation2d, rotation2d)			· · · · · · · · · · · · · · · · · · ·	
	X	X		X Si	,		Transform2d_Equals.VI	boolean equals(other transform2d)			-	
	X	X		X Si			Transform2d GetRotation.VI	rotation2d getRotation()	use cluster unpack		'	
	X	X		X SI	,	_	Transform2d GetTranslation.VI	translation2d getTranslation()	use cluster unpack		'	
	X			X SI	,		Transform2d GetXY.vi	translation2d getrianslation()	use cluster unpack		'	
											<u>'</u>	
	X			X SI	<u>' </u>		Transform2d_GetXYAngle.vi				'	
	X	X		X Si			Transform2d_Inverse.vi	transform inverse()	new		'	
	X	X		X Si	<u> </u>		Transform2d_Plus.vi				1	
	X	Χ		X SI			Transform2d_Times.vi	transform2d times(double scalar)			1	
								transform2d new()	can use cluster constant		'	
TRANSFORM3D	X		X .	X X X Si X X Si X X X X X X X X X X X X			VI Name Transform3d_Create_Default.vi Transform3d_Create_Pose3dPose.3dvi Transform3d_Create_Trans3dRot3d.vi Transform3d_Equals.VI Transform3d_GetRotation3d.VI Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
				Optimized		8						
TRANSLATION2D	X X X X X	X X X X X		X X SIX SIX X SIX	Test Routi		VI Name Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetXY.VI	Function Prototype translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other) double getNorm() double getX()	Notes can use cluster unpack can use cluster unpack	Code Review	Test Program	Error Checking
TRANSLATION2D	X X X X X X X	X X X X X X X		Weeld Head of the	Test Routi	Sample	Translation2d_Create_DistAng.vi Translation2d_Create.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	
TRANSLATION2D	X X X X X X X X	X X X X X X X	X .	Si X	Test Routi	Sample	Translation2d_Create_DistAng.vi Translation2d_Create.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	
TRANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X	X .	Signature of the state of the s	Test Routi	Sample	Translation2d_Create_DistAng.vi Translation2d_Create.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	
TRANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X .	Signature of the state of the s	Test Routi	Sample	Translation2d_Create_DistAng.vi Translation2d_Create.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	
TRANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X	SIZ	Test Routi	Sample	Translation2d_Create_DistAng.vi Translation2d_Create.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_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	
TRANSLATION2D	X X X X X X X X X X X 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 Routi	Sample	Translation2d_Create_DistAng.vi Translation2d_Create.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 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	
TRANSLATION2D	X X X X X X X X X X X X X X X 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 Routi	Sample	Translation2d Create_DistAng.vi Translation2d Create.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 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	
TRANSLATION2D	X X X X X X X X X X X 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 Routi	Sample	Translation2d_Create_DistAng.vi Translation2d_Create.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 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	
TRANSLATION2D	X X X X X X X X X X X X X X X 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 Routi	Sample	Translation2d Create_DistAng.vi Translation2d Create.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 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	
TRANSLATION2D	X X X X X X X X X X X X X X X 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 Routi	Sample	Translation2d Create_DistAng.vi Translation2d Create.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 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	
TRANSLATION2D	Implemented X X X X X X X X X X X X X X 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	Menu item Menu item Execution Optimized Execution Temporary A	Test Routine	mple Program Sample	Translation2d_Create_DistAng.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_Interpolate.vi Translation2d_Minus.vi Translation2d_Plus.vi Translation2d_RotateBy.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 unpack	Code Review	Test Program	
TRANSLATION2D	Implemented X X X X X X X X X X X X X X 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	Menu item Menu item Execution Optimized Execution Temporary A	Test Routine	pple Program Sample	Translation2d_Create_DistAng.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_Interpolate.vi Translation2d_Minus.vi Translation2d_Plus.vi Translation2d_RotateBy.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() 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 can use cluster constant can multiply by 1/scalar		Test Program	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 X X X 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	pple Program Sample	Translation2d_Create_DistAng.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_Interpolate.vi Translation2d_Minus.vi Translation2d_Plus.vi Translation2d_RotateBy.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() 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 can use cluster constant can multiply by 1/scalar		Test Program	Error
	Implemented X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X 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 Menu item Execution Optimized Execution Temporary A	Test Routine	pple Program Sample	Translation2d_Create_DistAng.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_Interpolate.vi Translation2d_Minus.vi Translation2d_Plus.vi Translation2d_RotateBy.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() 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 can use cluster constant can multiply by 1/scalar		Test Program	Error

FRC LabVIEW Trajectory Library – VI Implementation L	ist										
Revision 2.X 5/2/2022 – added implicit model follower and time in	nterpo	latable									
	Χ			X SI		Translation3d_Div.vi					
	X X			X SI		Translation3d_Equals.vi Translation3d GetDistance.vi					
	X			X SI		Translation3d_GetDistance.vi					
	X		X	X SI	+	Translation3d_GetXYZ.vi					
-	X		^ /	X SI		Translation3d_Interpolate.vi					
	X			X SI		Translation3d_Minus.vi					
	Χ		7	X SI		Translation3d Plus.vi					
	Χ		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	X SI		Translation3d_RotateBy.vi					
	Χ			X SI		Translation3d_Times.vi					
	Χ			X SI		Translation3d_ToTranslation2d.vi					
	Χ		>	X SI		Translation3d_UnaryMinus.vi					
	X X X X X X X X X X	lented X X Doc	X X	irem tion Optimized		Wist2d_Create.vi Twist2d_Equals.VI Twist2d_GetAll.VI	Function Prototype twist new(x, y, theta) boolean equals(obj other) Function Prototype	Notes	Code Review Code Review	Test Program Test Program	Error Checking
TWIST3D	X	Δ .		<u>≷ щ</u> Х <i>SI</i>	<u> X </u>	Twist3d Create.vi	Function Prototype	Notes			Щ
TWIOTSE	X			X SI	$\frac{1}{X}$	Twist3d_Equals.VI					
	X		X	X SI	X	Twist3d GetAll.VI					
_											
'======= KINEMATICS '========				70							
CHASSIS SPEEDS	Ш	X Documented	Š Š	X Iwenu Item Q Execution Optimized	Test Routin	War was a second of the second	Function Prototype chassisspeeds fromFieldRelativeSpeeds(double x, double y,	Notes	Code Review	Test Program	Error Checking
_	.,					01 100 100 100	double angvel, rotation2d robotangle)				
		X	$\frac{x}{x}$	$X \mid SI$		ChassisSPeeds_GetXYOmega.vi	phonoicoppode now (devible wiel devible in all devible as with				
	X	X		X SI		ChassisSpeeds_New.vi	chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds new ()	can use cluster constant			
							chassisspeeds new ()	can use cluster constant			
	mplemented		Not WPILIB	ivienu item Execution Optimized	Test Routine	Sample Program ample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE KINEMATICS	X	X		<u>≥ W</u> X <i>I</i>		DiffKinematics_New.vi	diffDriveKine new(double trackWidth)	NOIGS		7	E
		X			X	DiffKinematics_toChassisSpeed.vi	chassisSpeeds toChassisSpeeds (diffDrWheelSpeeds)				
	X			X SI	X	DiffKinematics_toWheelSpeed.vi	diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds)				
L				, 5,				1	1		

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FRC LabVIEW Trajectory Library – VI Implementation L	₋ist											
Revision 2.X 5/2/2022 – added implicit model follower and time	Implemented Implemented	Documented	Not WPILIB		Execution Optimized Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE ODOMETRY		X	X	X	X		DiffOdometry_Execute.vi DiffOdometry_Update.vi	pose2d update(rotation2d gyro, double leftdist, double right dist)	DONT NEED			
	^	^		^			DiffOdometry_opuate.vi	diffDrOdom new(rotation gyro, pose initial) diffDrOdom new(rotation gyro) void resetPosition(pose2d, rotation2d) pose2d getPoseMeters()	incorporated into "update"			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized Test Routine	Sample Program	VI Name		Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE WHEEL SPEEDS								diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel)				
	X	X		X	X		DiffWheel_Normalize.vi	void normalize(double maxVel)				
MECANUM DRIVE KINEMATICS	X X X	X X X	Not W	X X X	X X X I Execution Optimize		VI Name MecaKinematics_New.vi MecaKinematics_SetInverseKinematics.vi MecaKinematics_ToChassisSpeeds.vi MecaKinematics_ToWheelSpeeds.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	Χ	X		Χ	X		MecaKinematics_ToWheelSpeedsZeroCenter.vi					
MECANUM DRIVE MOTOR VOLTAGE			Not WPILIB	enu Item	Execution Optimized Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
noth	hing dor	ne										
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
MECANUM DRIVE ODOMETRY			X				MecaOdometry_Execute.vi	71				
	X		Χ		X		MecaOdometry_GetKinematics.vi					
	X	X		X			MecaOdometry_GetPose.vi MecaOdometry_New.vi					
	X	X		X			MecaOdometry_NewDefaultPose.vi					
	X			X			MecaOdometry_Reset.VI					
-	X			X			MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi					
	^	^		^			INICOACUOMERY_OPUAREVVIRITIME.VI				<u> </u>	

FRC LabVIEW Trajectory Library – VI Implementation	List												
Revision 2.X 5/2/2022 – added implicit model follower and time		olatabl	le routi	ines.					_				
MECANUM DRIVE WHEEL SPEEDS	X	X Documented	X Not WPILIB	X Menu Item	SI	Test Routine		VI Name MecaWheel_New.Vi MecaWheel_GetAll.vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond)	Notes	Code Review	Test Program	Error Checking
	X	X		X	X			MecaWheel_Normalize.vi	public void normalize(double attainableMaxSpeedMetersPerSecond)				
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Fest Program	Error Checking
SWERVE DRIVE KINEMATICS				X				SwerveKinematics New4.VI	T unction 1 lototype	For 4 module drives			Щ
	Χ	Χ	Χ	Χ			,	SwerveKinematics_NewX.VI		uses array as input			
	X	X	X	X				SwerveKinematics_NormalizeWheelSpeeds.vi	public static void normalizeWheelSpeeds(SwerveModuleState[]				
	X	X	X	X				SwerveKinematics_ToChassisSpeeds4.VI	moduleStates, double attainableMaxSpeedMetersPerSecond)	For 4 module drives			
	X	X	X	X				SwerveKinematics_ToChassisSpeedsX.VI		uses array as input			
	X	X		X				SwerveKinematics_ToSwerveModuleStates.VI	public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters)				
	X	X		X				SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI	public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)				
									public SwerveDriveKinematics(Translation2d wheelsMeters)	variable parameters (replace with			
									public ChassisSpeeds toChassisSpeeds(SwerveModuleState	array and "4" calls) variable parameters (replace with			
									wheelStates)	array and "4" calls)			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	v)		VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE ODOMETRY								SwerveOdometry_Execute4.vi SwerveOdometry ExecuteX.vi					
	X	X		X				SwerveOdometry_Excedtex.vi	public Pose2d getPoseMeters()				
	X	X		X				SwerveOdometry_New.VI	public SwerveDriveOdometry(SwerveDriveKinematics kinematics,				
	X	X		X				SwerveOdometry_NewZeroCenter.VI	Rotation2d gyroAngle, Pose2d initialPose) public SwerveDriveOdometry(SwerveDriveKinematics kinematics,				
									Rotation2d gyroAngle)				
	X			X				SwerveOdometry_ResetPosition.VI	public void resetPosition(Pose2d pose, Rotation2d gyroAngle)				
	X	X	X	X				SwerveOdometry_Update4.VI SwerveOdometry_UpdateWithTime4.VI		For 4 module drives For 4 module drives			
	X		X					SwerveOdometry_UpdateWithTime4.VI		uses array as input			
	\overline{X}	X	X	X				SwerveOdometry UpdateX.VI		uses array as input			
									public Pose2d updateWithTime(double currentTimeSeconds,	variable parameters (replace with			
									Rotation2d gyroAngle, SwerveModuleState moduleStates)	array and "4" calls)			
									public Pose2d update(Rotation2d gyroAngle, SwerveModuleState moduleStates)	variable parameters (replace with array and "4" calls)			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. SWERVE DRIVE MODULE STATE X X SwerveModuleState CompareTo.vi public int compareTo(SwerveModuleState o) X SI SwerveModuleState Get.vi Χ X Χ SI SwerveModuleState_New.vi public SwerveModuleState(double speedMetersPerSecond, public SwerveModuleState optimize(SwerveModuleState desired, X Χ X SI SwerveModuleState Optimize.vi Rotation2d angle) '======== SPLINE '======== Menu Item Function Prototype VI Name Notes **CUBIC HERMITE SPLINE** protected SimpleMatrix getCoefficients() not needed, use cluster unpack CubicHermiteSpline_getControlVectorFromArrays.vi private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) X X X CubicHermiteSpline makeHermiteBasis.vi private SimpleMatrix makeHermiteBasis() public CubicHermiteSpline(double[] xInitialControlVector, double[] X X X CubicHermiteSpline New.vi xFinalControlVector, double[] yInitialControlVector, double[] vFinalControlVector) ltem VI Name Function Prototype Notes POSE WITH CURVATURE X public PoseWithCurvature(Pose2d poseMeters, double PoseWithCurve New.vi curvatureRadPerMeter) public PoseWithCurvature() can use cluster constant public Pose2d poseMeters not needed, use cluster unpack public double curvatureRadPerMeter. not needed, use cluster unpack Execution Optin Routin Menu Item Function Prototype Notes QUINTIC HERMITE SPLINE X QuinticHermiteSpline getControlVectorFromArrays.vi private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) QuinticHermiteSpline makeHermiteBasis.vi private SimpleMatrix makeHermiteBasis() X X Χ QuinticHermiteSpline_New.vi public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)
protected SimpleMatrix getCoefficients() not needed, use cluster unpack Execution Optimized Function Prototype VI Name Notes SPLINE (Abstract class) X X Spline getPoint.vi public PoseWithCurvature getPoint(double t) Spline(int degree) public static class ControlVector public ControlVector(double[] x, double[] y) implemented as data structure

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	ente	nte	1	ltem	, <u>, , , , , , , , , , , , , , , , , , </u>	Progr				ević	gra	Checking
	ž.	<i>m</i> e	WP		i riti)e				Ř	Pro	Ò
	Implemente	Documente	Not 1	Menu	Execution Op	Sample				эрс	est	707
			Ž			, v	VI Name		Notes	<u>ŭ</u>	76	Em
SPLINE HELPER	X	X		X	SI		SplineHelp_GetCubicCtrlVector.vi	private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point)				
	X	Χ		X		(SplineHelp_GetCubicCtrlVectorsFromWayPts.vi	public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints(Pose2d start, Translation2d[] interiorWaypoints, Pose2d end)				
								getCubicControlVectorsFromWaypoints(Pose2d start,				
	Χ	X	X	_	_		SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi	Translation2d[] interiorWaypoints, Pose2d end)				
	X		X				SplineHelp GetCubicSpline Calc1.vi		internal			
		X	X	No			SplineHelp_GetCubicSpline_Calc2.vi		internal			
			X				SplineHelp_GetCubicSpline_Calc3.vi		internal			
	X	X		X			SplineHelp_getCubicSplinesFromControlVectors.vi	public static CubicHermiteSpline[]				
				-				getCubicSplinesFromControlVectors(Spline.ControlVector start.				
								Translation2d[] waypoints, Spline.ControlVector end) private static Spline.ControlVector getQuinticControlVector(double				
	X	X		X	SI		SplineHelp_GetQuinticCtrlVector.vi	private static Spline.ControlVector getQuinticControlVector(double				
					_		SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi	scalar, Pose2d point) public static List <spline.controlvector></spline.controlvector>	REMOVED 2762			
							Spiller leip_GetQuirtitCCttTvectorsi TofftvayFts.vi	getQuinticControlVectorsFromWaypoints(List <pose2d></pose2d>	INCINIOVED 2702			
								waypoints)				
							SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi		REMOVED 2762			
	X	X		X			SplineHelp_getQuinticSplinesFromControlVectors.vi	public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors(Spline.ControlVector[]				
								controlVectors)				
	Χ	X	Χ	X			SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi	Control v Cotors)	New 2762			
	Χ	Χ		X			SplineHelp_GetQuinticSplinesFromWayPts.vi		New 2762			
	Χ	X		No			SplineHelp_ThomasAlgorithm.vi	private static void thomasAlgorithm(double[] a, double[] b, double[]	internal			
								c, double[] d, double[] solutionVector)				
	X X Implemented	Χ	X X X	X X No	Execution Optim	Sample Program	VI Name SplineParam_Spline_T0_T1.vi SplineParam_Spline.vi SplineParam_StackGet.vi SplineParam_StackPop.vi SplineParam_StackPush.vi	public static List <posewithcurvature> parameterize(Spline spline, double t0, double t1) public static List<posewithcurvature> parameterize(Spline spline)</posewithcurvature></posewithcurvature>	Notes internal internal internal	Code Review	Test Program	Error Checking
'======= TRAJECTORY '========					ized							
TRAJECTORY	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optim	Sample Program	VI Name Trajectory Concatenate.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
		X		X			Trajectory_equals.vi	boolean equals(other obj)	FUTURE			
	X	X			SI	+	Trajectory_GetStates.vi		not needed, use unpack			
	X	X			SI	\top	Trajectory_GetTotalTime.vi		not needed, use unpack			
		X			SI		Trajectory_lerp_double.vi	private static double lerp(double startValue, double endValue,	internal			
	Χ	X		No	SI		Trajectory_lerp_Pose.vi	double t) private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t)	internal			
	X	X		X	SI	\top	Trajectory_New_Empty.vi	we would by				
	Χ	Χ		X	SI		Trajectory_New.vi	public Trajectory(final List <state> states)</state>				
	Χ	X		Χ			Trajectory_RelativeTo.vi	public Trajectory relativeTo(Pose2d pose)				

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. XX Trajectory Sample.vi public State sample(double timeSeconds) X X X X Trajectory_SampleReverse.vi Sample in reverse order. Negate XX Trajectory_TransformBy.vi public Trajectory transformBy(Transform2d transform) Χ public Pose2d getInitialPose() can use cluster unpack, array index Jot WPILIB Routin Menu Item Function Prototype Notes TRAJECTORY STATE X X Χ SI TrajectoryState_Equals.vi boolean equals(other obj) Χ X X X SI TrajectoryState GetAll.vi X SI TrajectoryState_GetPose.vi XX Χ TrajectoryState Interpolate.vi State interpolate(State endValue, double i) Χ X TrajectoryState_New.vi X X SI public State(double timeSeconds, double X velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter) public State() Not WPILIB Routin Venu Item VI Name Function Prototype Notes public TrajectoryConfig(double maxVelocityMetersPerSecond, TRAJECTORY CONFIG X X Χ SI TrajectoryConfig Create.vi double maxAccelerationMetersPerSecondSq) X X X X SI TrajectoryConfig_setCentripetalAccel.vi Χ TrajectoryConfig setKinematicsDiffDrive.vi SI public TrajectoryConfig setKinematics(DifferentialDriveKinematics kinematics) TrajectoryConfig setKinematicsMecanumfDrive.vi X SI public TrajectoryConfig setKinematics(MecanumDriveKinematics X Χ kinematics) XX X SI TrajectoryConfig setKinematicsSwerveDrive.vi public TrajectoryConfig setKinematics(SwerveDriveKinematics kinematics) X X SI TrajectoryConfig setReversed.vi public TrajectoryConfig setReversed(boolean reversed) X X X X X SI TrajectoryConfig setVoltageDiffDrive.vi public TrajectoryConfig addConstraint(TrajectoryConstraint Implemented differently, can't constraint) duplicate. public TrajectoryConfig addConstraints(List<? extends Implemented differently, can't TrajectoryConstraint> constraints)
public double getStartVelocity() can use cluster unpack public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond) public double getEndVelocity() can use cluster unpack public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond) public double getMaxVelocity() can use cluster unpack public double getMaxAcceleration() can use cluster unpack public List<TrajectoryConstraint> getConstraints() Implemented differently, can't public boolean isReversed() can use cluster unpack NOTE ADD OTHER "SET" ROUTINES FOR OTHER CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC. Execution Optimized est Routine Not WPILIB Wenu Item

Function Prototype

Notes

FRC LabVIEW Trajectory Library – VI Implementation I													
Revision 2.X 5/2/2022 – added implicit model follower and time							I		1				
TRAJECTORY GENERATE	Х	X		X				rajectoryGenerate_Make_Cubic_CtrlVect.vi	initial, List <translation2d> interiorWaypoints, Spline.ControlVector</translation2d>	uses cubic splines			
	X	X		X			Т	rajectoryGenerate_Make_Cubic.vi	public static Trajectory generateTrajectory(Pose2d start, List <translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config)</translation2d>	uses cubic splines			
	Χ	X	X	X			T	rajectoryGenerate Make Generic.vi	Helper to bring these all together	Use this one!!!			
	X	X		X				rajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config)	uses quintic splines			
	X	X	X	X			T	rajectoryGenerate_Make_Quintic_Weighted.vi	control of vocations, Thajottony Conting Conting	New 2762			
	X	X		X				rajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(List <pose2d> waypoints, TrajectoryConfig config)</pose2d>	uses quintic splines			
	Χ	X		X			Т	rajectoryGenerate_splinePointsFromSplines.vi	public static List <posewithcurvature> splinePointsFromSplines(Spline[] splines)</posewithcurvature>				
TRAJECTORY GENERATE (Control Vector)	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	′I Name	Function Prototype public ControlVectorList(int initialCapacity) public ControlVectorList()	Notes may not need, just data may not need, just data	Code Review	Test Program	Error Checking
									<pre>public ControlVectorList(Collection<? extends Spline.ControlVector> collection)</pre>	may not need, just data			
TRAJECTORY PARAMETERIZE	X Implemented	X Documented	X Not WPILIB	S Menu Item	Execution Optin	Test Routine		/I Name rajectoryParam_calcStuffFwd.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
11010201011171101112121122		X						rajectoryParam_calcStuffRev.vi					
	X	X		No				rajectoryParam_enforceAccel.vi	private static void enforceAccelerationLimits(boolean reverse, List <trajectoryconstraint> constraints, ConstrainedState state)</trajectoryconstraint>	This routines needs to be changed when new constraints are added.			
	X	X	X	No				rajectoryParam_enforceVelocity.vi		This routines needs to be changed when new constraints are added.			
	X	X		X			T	rajectoryParam_timeParam.vi	public static Trajectory timeParameterizeTrajectory(List <posewithcurvature> points. List<trajectoryconstraint> constraints, double startVelocityMetersPerSecond, double endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq, boolean reversed)</trajectoryconstraint></posewithcurvature>				
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		′I Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRAJECTORY PARAMETERIZE CONSTRAINED STATE		X		X				ConstrainedState_New.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)				
+	Χ	X	X	X				ConstrainedState_SetMaxAccel.vi ConstrainedState_SetMinAccel.vi					
	Χ	X	X	X				ConstrainedState_SetVelAccel.vi					
			X					ConstrainedState_SetVelocity.vi					
									ConstrainedState()				
•	,								· · · · · · · · · · · · · · · · · · ·			-	

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

Revision 2.X 5/2/2022 – added implicit model follower and time	interp	olatab	ble rou	tines.	7-			_			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimizec	Test Routine	Nample Program	Function Prototype	Notes	Code Review	Test Program
TRAJECTORY UTIL		X		_ <u><</u>			TrajectoryUtil fromPathWeaverJSON.vi	public static Trajectory fromPathweaverJson(Path path)	Notes		
	X	X	X	X			TrajectoryUtil_MakeWeightedWayPoint_ENG.vi				
	X	X		X	X		TrajectoryUtil_MakeWeightedWayPoint.vi	Delta de la constante de la co			
	X	X		X			TrajectoryUtil_toPathWeaverJSON.vi	public static void toPathweaverJson(Trajectory trajectory, Path path)			
								public static Trajectory deserializeTrajectory(String json)			
								public static String serializeTrajectory(Trajectory trajectory)			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program				
					Ĕ			Function Prototype	Notes		
TRAPEZOID PROFILE	X	X		X			TrapProfConstraint_New.vi TrapProfile Calculate.vi				
	Χ	X		No			TrapProfile_Direct.vi		Private, remove from menu		
	X	X		X	01		TrapProfile_Execute.vi				
	X	X		X	SI		TrapProfile_Execute_AtGoal.vi TrapProfile IsFinished.vi				
	Χ	X		X			TrapProfile_New_DefInitial.vi				
	X	X		X No			TrapProfile_New.vi TrapProfile_ShouldFlipAcceleration.vi		Private, remove from menu		
	X	X		X			TrapProfile_SnouldFilpAcceleration.vi TrapProfile_TimeLeftUntil.vi		Private, remove from menu		
	Χ	X		X			TrapProfile_TotalTime.vi				
	X	X		X			TrapProfState_Equals.vi TrapProfState_New.vi				
'======= TRAJECTORY CONSTRAINT '=========		, ,					Trapi Tolotate_New.vi				
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype	Notes		
CENTRIPETAL ACCELERATION CONSTRAINT		X		<u>≥</u>	Ш_	7	CentripetalAccelConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d	110103		
								poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)			
	X	X		X			CentripetalAccelConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)			
	X	Χ		X	SI		CentripetalAccelConstraint_New.vi	public CentripetalAccelerationConstraint(double maxCentripetalAccelerationMetersPerSecondSq)	Can use cluster pack for now		
DIFF DRIVE KINEMATIC CONSTRAINT	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine	VI Name DiffDriveKinematicsConstraint_getMaxVelocity.vi	Function Prototype public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	Notes		
		1		1				<u>Ivelocityivieteishei Seconu j</u>			

X 5/2/2022 – added implicit model follower and time			bie rot		1	1		DiffDrivakinamaticaCapatraint gatMinMayAccal vi	public MinMax	T
	X	X		X				DiffDriveKinematicsConstraint_getMinMaxAccel.vi	getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI			DiffDriveKinematicsConstraint_New.vi	public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond)	
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
DIFF DRIVE VOLTAGE CONSTRAINT		X	_ <	X		7		DiffDriveVoltageConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	Notes
	X	X		X				DiffDriveVoltageConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI			DiffDriveVoltageConstraint_New.vi	public DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)	
IEDY CONSTRAINT	Implemented	Documented	< Not WPILIB	Menu Item	Execution Optimized	Test Routine		VI Name		Notes
JERK CONSTRAINT	/		X		-			JerkConstraint_getMaxVelocity.vi JerkConstraint_getMinMaxAccel.vi		FUTURE FUTURE
	/		X		SI			JerkConstraint_getininMaxAccel.vi JerkConstraint_New.vi		FUTURE
MECANUM DRIVE KINEMATICS CONSTRAINT	X Implemented	X Documented	Not W	X Menu Item	Execution Optimized	Test Routine		VI Name MecaDriveKinematicsConstraint_getMaxVelocity.vi	Function Prototype	Notes
	Χ	X		X				MecaDriveKinematicsConstraint_getMinMaxAccel.vi		
	X	X		X	SI			MecaDriveKinematicsConstraint_New.vi		
					Optimized		ogram			
	plemented	cumented	ot WPILIB	ənu Item	_	st Routine	ample Pro			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Opti	Test Routine	mple	VI Name		Notes
SWERVE DRIVE KINEMATICS CONSTRAINT	X	X	Not WPILIB	X	_	Test Routine	Sample	SwerveDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	Notes
SWERVE DRIVE KINEMATICS CONSTRAINT			Not WPILIB		_	Test Routine	Sample		public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double	Notes

TRAJECTORY CONSTRAINT

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
TRAJECTORY CONSTRAINT (Min Max) X	X		X	SI			Constraint_MinMax_New.vi	Constraint_MinMax_New	
X	X		Χ	SI			Constraint MinMax NewMinMax.VI	Constraint MinMax New	

'========

UTILITY

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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	VI Name	Function Prototype	Notes
UTIL	Χ	Χ	Χ	X	SI			Util ApproxEqual.vi		
	Χ	Χ	Χ	X				Util Array PoseWCurv to XY.vi		
	Χ	Χ	Χ	X	SI			Util CalcDist.vi		
	Χ	Χ	X	X	SI			Util_GetLibraryVersion.vi		
	Χ	Χ	X	X	SI			Util_GetLibUsage.vi		
	Χ	Χ	X	Х				Util_GetTime.vi		Once tested completely, this should be optimized!
	Χ	Χ	X	No	N/A			Util_LibraryGlobals.vi		Global Variables – no block diag.
	Χ	Χ	X	X				Util_Trajectory_Absolute_To_Relative.vi		
	Χ	Χ	X	X				Util_Trajectory_ReadFile.vi		
	Χ	Χ	X	X				Util_Trajectory_to_XY.vi		
	Χ	Χ	X	No				Util_Trajectory_WriteFile_Config.vi		internal
	Χ	Χ	X	No				Util_Trajectory_WriteFile_OneState.vi		internal
	Χ	Χ	Χ	X				Util_Trajectory_WriteFile_PathFinder.vi		
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_PathFinderConfig.vi		internal
	Χ	Χ	X	X				Util_Trajectory_WriteFile_Pathweaver.vi		
	Χ	Χ	X	No				Util_Trajectory_WriteFile_States.vi		internal
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_WayPoints.vi		internal
	Χ	Χ	X	X				Util_Trajectory_WriteFile.vi		
	Χ	Χ	X	X				Util_TrajectoryState_Meters_To_Inches.vi		
	Χ	Χ	X	X				Util_TrajState_to_DiffDrive_WheelPos.vi		
	Χ	Χ	Χ	X				Util_DispWaypoint_Eng_To_SI.vi		
	X	X	X	X				Util_DispWaypoint_To_CubicInput.vi		
-	X	X	X	X			-	Util_DispWaypoint_To_QuinticInput.vi		
	X	X	X	X			-	Util_DispWeightedWaypiont_Eng_To_WeightedWaypoint		
	X	Χ	X	No				Util_DispWeightedWayPoint_To_WeightedWayPoint.vi		Sorry about the confusing name

'========

CONVERSIONS

'========

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program ame	Function Prototype	Notes
CONV	Χ	X	X	X	SI		Conv_AngleDegrees_Heading.vi		
	Χ	X	X	X	SI		Conv_AngleRadians_Heading.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Centimeters_Meters.vi		

ne interp	olatabl	e routi	nes.		
X	Χ	X	Χ	SI	Conv_Deg_Radians.vi
X	Χ	Χ	Χ	SI	Conv_Deg_Rotations.vi
X	Χ	Χ	Χ	SI	Conv_Feet_Meters.vi
X	Χ	Χ	Χ	SI	Conv_GyroDegrees_Heading.vi
X	Χ	X	Χ	SI	Conv_Heading_AngleRadians.vi
X	Χ	Χ	Χ	SI	Conv_Inches_Meters.vi
X	Χ	Χ	Χ	SI	Conv_Kilograms_Pounds.vi
X	Χ	X	Χ	SI	Conv_Meters_Feet.vi
X	Χ	X	Χ	SI	Conv_Meters_Inches.vi
X	Χ	Χ	Χ	SI	Conv_Pose2d_SI_Eng.vi
X	Χ	Χ	Χ	SI	Conv_Pounds_Kilograms.vi
X	Χ	X	Χ	SI	Conv_Radians_Deg.vi
X	Χ	X	Χ	SI	Conv_Radians_Rotations.vi
X	Χ	Χ	Χ	SI	Conv_Rotations_Deg.vi
X	Χ	Χ	Χ	SI	Conv_Rotations_Radians.vi
X	Χ	Χ	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	Χ		X	SI			Units_DegreesToRadians.vi		
	Χ	Χ		Χ	SI			Units_DegreesToRotations.vi		
	X	Χ		X	SI			Units_FeetToMeters.vi		
	Χ	Χ		X	SI			Units_InchesToMeters.vi		
	Χ	Χ		Χ	SI			Units_MetersToFeet.vi		
	Χ	Χ		X	SI			Units_MetersToInches.vi		
	Χ	Χ		X	SI			Units_MillisecondsToSeconds.vi		
	Χ	Χ		X	SI			Units_RadiansPerSecondToRotationsPerMinute.vi		
	Χ	Χ		X	SI			Units_RadiansToDegrees.vi		
	Χ	Χ		X	SI			Units_RadiansToRotations.vi		
	Χ	Χ		Χ	SI			Units_RotationsPerMinuteToRadiansPerSecond.vi		
	Χ	Χ		Χ	SI			Units_RotationsToDegrees.vi		
	Χ	Χ		Χ	SI			Units_RotationsToRadians.vi		
	Χ	Χ		X	SI			Units_SecondsToMilliseconds.vi		

'======== PATHFINDER UTIL

'========

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	
PATHFINDERUTIL	X	X	X	X				I
	X	X	X	X				İ

Function Prototype Notes PathfinderUtil_Continuous_Heading_Difference.vi
PathfinderUtil_OptimizeTrajectoryStates.vi
PathfinderUtil_ToTrajectory.vi
PathfinderUtil_ToTrajectoryStates.vi X X X X X X X X

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

FRC_LabVIEW_Trajectory_Library_Routines.xlsx Page 21 / 36

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

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t model follower and time	interp	olatab	le rout	ines.									
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name Fr	unction Prototype	Notes	Code Review	Test Program	Error Checking
DC MOTOR	X	X		X	SI			DCMotor_GetAndymark9015.vi	,				
	X	Χ		X	SI			DCMotor_GetAndymarkRs775_125.vi					
	Χ	Χ		X	SI			DCMotor_GetBag.vi					
	Χ	Χ		X	SI			DCMotor_GetBanebotsRs550.vi					
	Χ	Χ		Χ	SI			DCMotor GetBanebotsRs775.vi					
	X	Χ		X	SI			DCMotor_GetCIM.vi					
	Χ	Χ		X	SI			DCMotor GetCurrent.vi					
	Χ	Χ		X	SI			DCMotor GetFalcon500.vi					
	Χ	Χ		X	SI			DCMotor_GetMiniCIM.vi					
	Χ	Χ		X	SI			DCMotor_GetNEO.vi					
	Χ	Χ		Χ	SI			DCMotor GetNEO550.vi					
	Χ	Χ		X	SI			DCMotor GetRomiBuiltIn.vi					
	Χ	Χ		X	SI			DCMotor GetVex775Pro.vi					
	Χ	Χ		X	SI			DCMotor_New.vi					
	X	Χ		X	SI			DCMotor_PickMotor.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine			unction Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM ID		X		X				LinearSystemId_CreateDCMotorSystem.vi					
		V	1				1	Linear Cystem Id Creets Drive Train Valenity Cystem vi		Undata to usa areata matrix			

Update to use create matrix

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

> Menu Item Function Prototype Notes DIFFERENTIAL DRIVE POSE ESTIMATOR X X Χ DiffDrivePoseEst AddVisionMeasurement.vi XX Χ DiffDrivePoseEst FillStateVector.vi X X Χ DiffDrivePoseEst GetEstimatedPosition.vi XX DiffDrivePoseEst Kalman F Callback.vi X XX X DiffDrivePoseEst Kalman H Callback.vi XX DiffDrivePoseEst New.vi Χ XX DiffDrivePoseEst ResetPosition.vi Χ Χ Χ X DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi Χ Χ Χ DiffDrivePoseEst_Update.vi X X X DiffDrivePoseEst UpdateWithTime.vi DiffDrivePoseEst VisionCorrect Callback.vi X X X DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi XX X

LinearSystemId CreateDriveTrainVelocitySystem.vi

LinearSystemId_CreateSingleJointedArmSystem.vi

LinearSystemId CreateElevatorSystem.vi

LinearSystemId CreateFlywheelSystem.vi

LinearSystemId_IdentifyDriveTrainSystem.vi

LinearSystemId_IdentifyPositionSystem.vi

LinearSystemId_IdentifyVelocitySystem.vi

abVIEW Trajectory Library – VI Implementation I	List										
2.X 5/2/2022 – added implicit model follower and time	interpol	latable	routin	es.							
				mize		Ē					
	þ	þ	m	Optii	. e	ogra			×	ШE	Checking
	ente	ocumente	Not WPILIB	Item Ition (Test Routine	Sample Prog			Revie	Progra	hec
	olem	unc	Ŋ.	enu Iten ecution	st Re	эJdи			de F	st Pı	9, 0
		Ď		E K	Tes	Sar	71	Notes		Test	Err
EXTENDED KALMAN FILTER				X			ExtendedKalmanFilter_Correct_OnlyUY.vi	luck a aball making stignal			
	X	X		X X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter GetP Single.vi	Just a shell, not functional!			
	X	X		X			ExtendedKalmanFilter_GetP.vi				
	X			X			ExtendedKalmanFilter_GetXHat_Single.vi				
	X	X		X X			ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter New.vi				
		X		X			ExtendedKalmanFilter_Predict.vi				
		X		Χ			ExtendedKalmanFilter_Reset.vi				
		X		X X			ExtendedKalmanFilter_SetP.vi ExtendedKalmanFilter_SetXHat_Single.vi				
	X			X			ExtendedKalmanFilter SetXHat.vi				
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	plement	ocnmen	WPILIB	nu Item cution	Test Routine	mple			e A	Progr	ર્ટ
	Jdu)))	\ot	Menu Execu	rest	Sam	VI Name Function Prototype	Notes	Sode	Test	irro 1
KALMAN FILTER	X	X		X	X		KalmanFilter_Correct.vi				- 4
		X		X			KalmanFilter_GetK				
		X		X X			KalmanFilter_GetK_Single.vi KalmanFilter GetXHat				
		X		X	X		KalmanFilter_GetXHaT_Single				
		Χ		X	X		KalmanFilter_New.vi				
		X		X X	X		KalmanFilter_Predict.vi KalmanFilter Reset.vi				
		X		X			KalmanFilter_SetXHat				
	Χ	X		X	X		KalmanFilter_SetXHat_Single				
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	2	7		Menu Execu	Test			Notes	<u>Š</u>	Test	Err
KALMAN FILTER LATENCY COMPENSATOR		X		X X			KalmanFilterLatencyComp_AddObserverState.vi				
		X		^			KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi				
	X	X		X			KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi				
	X	Х		Х			KalmanFilterLatencyComp_FindClosestMeasurement.vi				
	X	X		Χ			KalmanFilterLatencyComp_New.vi				
	X			X X			KalmanFilterLatencyComp_Observer_New.vi				
	Χ	Χ		X			KalmanFilterLatencyComp_Reset.vi				
				<i>pe</i>							
				imiz		ш					2
	pə	þə	9	Opt	Je J	ogre			é.	am	king
	nent	ent	WPILIB	ltem tion	Routine	e Pr			Revi	Progra	thec
	претеп	Documen	ž	Menu I Execut	st R	mple			de f	st P.	.or C
		8_	Not	<u>Ř</u> <u>Ř</u>	Test			Notes	8	Test	Err
MECANUM DRIVE POSE ESTIMATOR	X	Y	-	X			MecaDrivePoseEst_AddVisionMeasurement_StdDev.vi MecaDrivePoseEst_AddVisionMeasurement.vi				
	^	^		^			INICCADITYCE OSCIDIL AUGUSTONINICASUI CITICILL.VI				

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D	= 1010000				
Revision 2.X	5/2/2022 – 3	added impli	icit model fo	wer and time interpolatable routines.	

mile mileip	Olatab	ie routiries.		
X	Χ	X		MecaDrivePoseEst_GetEstimatedPosition.vi
X	Χ	No		MecaDrivePoseEst_Kalman_F_Callback.vi
X	Χ	No		MecaDrivePoseEst_Kalman_H_Callback.vi
X	Χ	X		MecaDrivePoseEst_New.vi
X	X	X		MecaDrivePoseEst_ResetPosition.vi
X	Χ	X		MecaDrivePoseEst_SetVisionMeasurementStdDevs.vi
X	Χ	X		MecaDrivePoseEst_Update.vi
X	Χ	X		MecaDrivePoseEst_UpdateWithTime.vi
X	Χ	No		MecaDrivePoseEst_VisionCorrect_Callback.vi
X	Χ	No		MecaDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi

	Implemented	Documented	Not WPILIB Menu Item	Execution Optimized	Test Routine	Sample Program		Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR							veDrivePoseEst_AddVisionMeasurement_StdDev.vi			
		Χ	X				veDrivePoseEst_AddVisionMeasurement.vi			
		X	X				veDrivePoseEst_GetEstimatedPosition.vi			
-	X	X	X				veDrivePoseEst_Kalman_F_Callback.vi			
	X	X	X				veDrivePoseEst_Kalman_H_Callback.vi			
		X	X				rveDrivePoseEst_New.vi			
-		X	X				veDrivePoseEst_ResetPosition.vi			
		X	X				veDrivePoseEst_SetVisionMeasurementStdDevs.vi			
	X	X	X				rveDrivePoseEst_Update.vi			
	X	X	X				rveDrivePoseEst_UpdateWithTime.vi			
		X	X				rveDrivePoseEst_VisionCorrect_Callback.vi			
	Χ	X	X			Swer	veDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi			
				nized		8				
	nplemented	ocumented	ot WPILIB Ienu Item	xecution Optimized	est Routine	ample Program	Expedies Destators	ode Review	est Program	rror Checking
UNISCENTED KALMAN EILTED	<pre>/ Implemented</pre>		Not WPILIB Menu Item	Execution Optimized	Test Routine	Sample N IS		Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X	X	X		Test Routine	N IV Samble	entedKalmanFilter Correct FuncGroup.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X	X	X		Test Routine	Unsc Unsc	pentedKalmanFilter_Correct_FuncGroup.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X X X	X X X	X		Test Routine	VI Na Unsc	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X X X X	X X X	X X X		Test Routine	VI Na Unsc Unsc Unsc	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X X X X	X X X X X	X X X X		Test Routine	Unsc Unsc Unsc Unsc Unsc Unsc	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct.vi tentedKalmanFilter_GetP_Single.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X X X X X	X X X X X	X X X X		Test Routine	Unsc Unsc Unsc Unsc Unsc Unsc Unsc	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X X X X X X	X X X X X X	X X X X X		Test Routine	Unsc Unsc Unsc Unsc Unsc Unsc Unsc Unsc	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP.vi tentedKalmanFilter_GetXHat_Single.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X X X X X X X	X X X X X X X	X		Test Routine	Unsc Unsc Unsc Unsc Unsc Unsc Unsc Unsc	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP.vi tentedKalmanFilter_GetXHat_Single.vi tentedKalmanFilter_GetXHat_Single.vi tentedKalmanFilter_GetXHat_Single.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X X X X X X X X	X	X		Test Routine	Unsc Unsc Unsc Unsc Unsc Unsc Unsc Unsc	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP.vi tentedKalmanFilter_GetXHat_Single.vi tentedKalmanFilter_GetXHat_Single.vi tentedKalmanFilter_GetXHat_Ni tentedKalmanFilter_New_Default.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	X		Test Routine	VI Na Unsc Unsc Unsc Unsc Unsc Unsc Unsc Unsc	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP.vi tentedKalmanFilter_GetXHat_Single.vi tentedKalmanFilter_GetXHat_Single.vi tentedKalmanFilter_GetXHat.vi tentedKalmanFilter_New_Default.vi tentedKalmanFilter_New_FuncGroup.vi	Code Review	Test Program	Error Checking
UNSCENTED 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 X X X X X X	X		Test Routine	VI Na Unsc Unsc Unsc Unsc Unsc Unsc Unsc Unsc	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP.vi tentedKalmanFilter_GetXHat_Single.vi tentedKalmanFilter_GetXHat.vi tentedKalmanFilter_New_Default.vi tentedKalmanFilter_New_FuncGroup.vi tentedKalmanFilter_New.vi	Code Review	Test Program	Error Checking
UNSCENTED 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 X X X X X X	X		Test Routine	VI Na Unsc Unsc Unsc Unsc Unsc Unsc Unsc Unsc	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP.vi tentedKalmanFilter_GetXHat_Single.vi tentedKalmanFilter_GetXHat_vi tentedKalmanFilter_New_Default.vi tentedKalmanFilter_New_FuncGroup.vi tentedKalmanFilter_New.vi tentedKalmanFilter_New.vi tentedKalmanFilter_Predict.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	X		Test Routine	Unsc Unsc Unsc Unsc Unsc Unsc Unsc Unsc	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP.vi tentedKalmanFilter_GetXHat_Single.vi tentedKalmanFilter_GetXHat.vi tentedKalmanFilter_New_Default.vi tentedKalmanFilter_New_Default.vi tentedKalmanFilter_New_FuncGroup.vi tentedKalmanFilter_New.vi tentedKalmanFilter_Predict.vi tentedKalmanFilter_Predict.vi tentedKalmanFilter_Predict.vi	Code Review	Test Program	Error Checking
UNSCENTED 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 X X X X X X	X		Test Routine	VI Na Unsc Unsc Unsc Unsc Unsc Unsc Unsc Unsc	rentedKalmanFilter_Correct_FuncGroup.vi rentedKalmanFilter_Correct_OnlyUY.vi rentedKalmanFilter_Correct_OnlyUYR.vi rentedKalmanFilter_Correct.vi rentedKalmanFilter_GetP_Single.vi rentedKalmanFilter_GetP_Single.vi rentedKalmanFilter_GetP.vi rentedKalmanFilter_GetXHat_Single.vi rentedKalmanFilter_GetXHat.vi rentedKalmanFilter_New_Default.vi rentedKalmanFilter_New_Default.vi rentedKalmanFilter_New.vi rentedKalmanFilter_New.vi rentedKalmanFilter_Predict.vi rentedKalmanFilter_Reset.vi rentedKalmanFilter_Reset.vi rentedKalmanFilter_SetP.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	X		Test Routine	Unscience of the control of the cont	tentedKalmanFilter_Correct_FuncGroup.vi tentedKalmanFilter_Correct_OnlyUY.vi tentedKalmanFilter_Correct_OnlyUYR.vi tentedKalmanFilter_Correct.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP_Single.vi tentedKalmanFilter_GetP.vi tentedKalmanFilter_GetXHat_Single.vi tentedKalmanFilter_GetXHat.vi tentedKalmanFilter_New_Default.vi tentedKalmanFilter_New_Default.vi tentedKalmanFilter_New_FuncGroup.vi tentedKalmanFilter_New.vi tentedKalmanFilter_Predict.vi tentedKalmanFilter_Predict.vi tentedKalmanFilter_Predict.vi	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	X		Test Routine	VI Na Unsc Unsc Unsc Unsc Unsc Unsc Unsc Unsc	rentedKalmanFilter_Correct_FuncGroup.vi rentedKalmanFilter_Correct_OnlyUY.vi rentedKalmanFilter_Correct_OnlyUYR.vi rentedKalmanFilter_Correct_Vi rentedKalmanFilter_GetP_Single.vi rentedKalmanFilter_GetP_Single.vi rentedKalmanFilter_GetXHat_Single.vi rentedKalmanFilter_GetXHat_vi rentedKalmanFilter_New_Default.vi rentedKalmanFilter_New_FuncGroup.vi rentedKalmanFilter_New.vi rentedKalmanFilter_New.vi rentedKalmanFilter_Predict.vi rentedKalmanFilter_Reset.vi rentedKalmanFilter_SetY.vi rentedKalmanFilter_SetY.vi rentedKalmanFilter_SetY.vi rentedKalmanFilter_SetXHat_Single.vi	Code Review	Test Program	Error Checking

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

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. Function Prototype Notes CONTROL AFFINE PLANT INVERSION FEEDFORWARD Function Prototype Notes DIFFERENTIAL DRIVE ACCELERATION LIMITER X DiffDrvAccelLimit_Calculate.vi X DiffDrvAccelLimit New.vi Function Prototype Notes IMPLICIT MODEL FOLLOWER X Χ ImplModelFollow_Calculate.vi X ImplModelFollow GetU.vi Χ X ImplModelFollow_GetU_Single.vi Χ X ImplModelFollow New.vi X Χ ImplModelFollow_New_Plant.vi Χ X Χ Χ ImplModelFollow_Reset.vi Function Prototype Notes LINEAR PLANT INVERSION FEEDFORWARD X Χ X LinearPIntInvFF Calculate NextR.vi X LinearPIntInvFF Calculate.vi Χ Χ LinearPIntInvFF GetR Single.vi Χ Χ Χ LinearPIntInvFF_GetR.vi X X Χ LinearPIntInvFF_GetUff_Single.vi X X X LinearPIntInvFF GetUff.vi XX Χ LinearPIntInvFF_New_Plant.vi XX X LinearPIntInvFF New.vi XX Χ LinearPIntInvFF Reset Initial.vi LinearPIntInvFF Reset Zero.vi XX Χ Function Prototype Notes LINEAR QUADRATIC REGULATOR X LinearQuadraticRegulator_Calculate_NextR.vi X X X LinearQuadraticRegulator_Calculate.vi X Χ X NOT ORIGINAL Χ Χ LinearQuadraticRegulator_GetK_Single.vi Χ Χ LinearQuadraticRegulator_GetK.vi

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 5/2/2022 – added implicit model follower and time interpretations of the interpretation of the control
ne <u>interp</u>	olatabl	e routines.			
X	X	X		LinearQuadraticRegulator_GetR_Single.vi	
X	X	X		LinearQuadraticRegulator_GetR.vi	
X	X	X		LinearQuadraticRegulator_GetU_Single.vi	
X	X	X		LinearQuadraticRegulator_GetU.vi	
/	X	X	Χ	LinearQuadraticRegulator_LatencyCompensate.vi	Routine exists, but it only has
					interger raise matrix to power.
X	X	X		LinearQuadraticRegulator_New_ELMS.vi	
X	X	X		LinearQuadraticRegulator_New_N.vi	
				LinearQuadraticRegulator_New_Raw.vi	
X	X	X	Χ	LinearQuadraticRegulator_New_SystemELMS.vi	
X	X	X		LinearQuadraticRegulator_New.vi	
X	X	X		LinearQuadraticRegulator_Reset.vi	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM	Χ	Χ		X	- 1		LinearSystem_CalculateX.vi					
	Χ	X		X	- 1		LinearSystem_CalculateY.vi					
	Χ	X		X	SI		LinearSystem_GetA.vi					
	X	X		X	SI		LinearSystem_GetAElement.vi					
	Χ	X		X	SI		LinearSystem_GetB.vi					
	Χ	X		X	SI		LinearSystem_GetBElement.vi					
	Χ	X		X	SI		LinearSystem_GetC.vi					
	X	X		X	SI		LinearSystem_GetCElement.vi					
	Χ	X		X	SI		LinearSystem_GetD.vi					
	Χ	X		X	SI		LinearSystem_GetDElement.vi					
	Χ	Χ		Χ	SI		LinearSystem_New.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample And Manager No. 1 Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM LOOP	X	Χ		Χ			LinearSystemLoop_ClampInput.vi					
	X	Χ		Χ			LinearSystemLoop_Correct.vi					
							LinearSystemLoop_GetClampFunction.vi					
	Χ	Χ		Χ			LinearSystemLoop_GetController.vi					
	Χ	Χ		Χ			LinearSystemLoop_GetError_Single.vi					
	Χ	Χ		Χ			LinearSystemLoop_GetError.vi					
	Χ	Χ		Χ			LinearSystemLoop_GetFeedForward.vi					
	Χ	Χ		Χ			LinearSystemLoop_GetNextR_Single.vi					
	Χ	X		Χ			LinearSystemLoop_GetNextR.vi					
	Χ	Χ		Χ			LinearSystemLoop_GetObserver.vi					
	Χ	Χ		Χ			LinearSystemLoop_GetU_Row.vi					
	Χ	Χ		Χ			LinearSystemLoop_GetU.vi					
	Χ	X		Χ			LinearSystemLoop_GetXHat_Single.vi					
	Χ	X		Χ			LinearSystemLoop_GetXHat.vi					
							LinearSystemLoop_New_BBB					
							LinearSystemLoop_New_LinearSystem_ClampFunc					
	X	X		Χ			LinearSystemLoop_New_LinearSystem_ClampVal.vi					
	X	X		Χ			LinearSystemLoop_New.vi					
	X	X		X			LinearSystemLoop_Predict.vi					
	Χ	X		Χ			LinearSystemLoop_Reset.vi					
							LinearSystemLoop_SetClampFunction.vi					
							LinearSystemLoop_SetNextR_Some.vi					
	Χ	X		Χ			LinearSystemLoop_SetNextR.vi					
							LinearSystemLoop_SetXHat_Single.vi					

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. LinearSystemLoop SetXHat.vi Function Prototype Notes LTV DIFFERENTIAL DRIVE CONTROLLER LTVDiffDriveCtrl Calculate.vi Χ Χ X X LTVDiffDriveCtrl New.vi X Χ LTVDiffDriveCtrl_Calculate_TrajState.vi LTVDiffDriveCtrl_Calculate_SetTolerance.vi Χ X LTVDiffDriveCtrl Calculate AtReference.vi Χ Function Prototype Notes LTV UNICYCLE CONTROLLER X Χ X LTVUnicycleCtrl_AtReference.vi X LTVUnicycleCtrl Calculate Orig.vi This one computes a new LQR each time. X LTVUnicycleCtrl Calculate TrajState Orig.vi This one computes a new LQR Χ X X each time. Χ LTVUnicycleCtrl_Calculate_TrajState.vi X X Χ Χ Χ LTVUnicycleCtrl_Calculate.vi LTVUnicycleCtrl_New.vi Χ X X LTVUnicycleCtrl SetEnabled.vi X Χ Χ LTVUnicycleCtrl SetTolerance.vi X X '======== STATE SPACE UTILITIES '======== Function Prototype Notes X CALLBACK HELPER X X X CallbackHelp MatrixMinus.vi XX CallbackHelp MatrixMult CoerceSizeB.vi X X X CallbackHelp_MatrixMult.vi X X X X CallbackHelp MatrixPlus.vi ltem Function Prototype Notes DISCRETIZATION X Discretization_DiscretizeA.vi X Χ X XX X X Discretization DiscretizeAB.vi Discretization DiscretizeABTaylor.vi XX X Χ XX Discretization DiscretizeAQ.vi Χ X X X Discretization DiscretizeAQTaylor.vi Χ X Discretization_DiscretizeR.vi XX Χ

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. Function Prototype STATE SPACE UTIL X X StateSpaceUtil_Check_Stabalizable.vi X No Internal routine Χ StateSpaceUtil ClampInputMaxMagnitude.vi Χ X Routine exists, it is just a shell XX Χ StateSpaceUtil IsDetectable.vi XX Χ StateSpaceUtil IsStabalizable.vi StateSpaceUtil MakeCostMatrix.vi XX Χ XX StateSpaceUtil MakeCovarianceMatrix.vi X XX StateSpaceUtil_MakeWhiteNoiseVector.vi X StateSpaceUtil NomalizeInputVector.vi Χ X Χ Χ Χ StateSpaceUtil PoseTo3dVector.vi Χ Χ Χ Χ StateSpaceUtil PoseTo4dVector.vi StateSpaceUtil PoseToVector.vi X X X '======== SIMULATION '======= Function Prototype Notes BATTERY SIM X X BatterySim CalculateDefaultBatteryLoadedVoltage.vi X SI X SI BatterySim CalculateLoadedVoltage.vi $X \mid X$ Function Prototype DC MOTOR SIM X DCMotorSim_getAngularPositionRad.vi X X DCMotorSim_getAngularPositionRotations.vi Χ Χ X Χ Χ Χ DCMotorSim_getAngularVelocityRadPerSec.vi X Χ Χ DCMotorSim_getAngularVelocityRPM.vi X X DCMotorSim GetCurrentDrawAmps.vi Χ X Χ DCMotorSim New MOI.vi Χ X X DCMotorSim New Plant.vi Χ Χ DCMotorSim_SetInputVoltage.vi Χ X X Χ DCMotorSim Update.vi Function Prototype Notes DiffDriveTrainSim_ClampInput.vi DIFFERENTIAL DRIVE TRAIN SIM X X X XX Χ DiffDriveTrainSim CreateKitbotSim EstMass.vi

DiffDriveTrainSim CreateKitbotSim EstMassMOI.vi

DiffDriveTrainSim CreateKitbotSim.vi

DiffDriveTrainSim GetCurrentDrawAmps.vi

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THO EUDVIEW Trajectory Library Vi implementation	LIJU						
Revision 2.X 5/2/2022 – added implicit model follower and time	interp	olatabl	le rout	ines.			
	Χ	Χ		X		DiffDriveTrainSim_GetCurrentGearing.vi	

ie iiiteip	Diatable Tou	uncs.				
X	Χ	X		DiffDriveTrainSim_GetCurrentGearing.vi		
X	Χ	X		DiffDriveTrainSim_GetDynamics.vi		
X	Χ	X		DiffDriveTrainSim_GetHeading.vi		
X	Χ	X		DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi		
X	X	X		DiffDriveTrainSim_GetLeftPositionMeters.vi		
X	X	X		DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi		
X	Χ	X		DiffDriveTrainSim_GetOutput_Single.vi		
X	Χ	X		DiffDriveTrainSim_GetPose.vi		
X	X	X		DiffDriveTrainSim_GetRightCurrentDrawAmps.vi		
X	Χ	X		DiffDriveTrainSim_GetRightPositionMeters.vi		
X	X	X		DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi		
X	X	X		DiffDriveTrainSim_GetState_Single.vi		
X	X	X		DiffDriveTrainSim_GetState.vi		
X	X	X		DiffDriveTrainSim_KitBotWheelSize.vi		
X	Χ	X		DiffDriveTrainSim_New_Mass_MOI.vi		
X	X	X		DiffDriveTrainSim_New.vi		
X	X	X		DiffDriveTrainSim_SetCurrentGearing.vi		
X	X	X		DiffDriveTrainSim_SetInputs.vi		
X	X	X		DiffDriveTrainSim_SetPose.vi		
X	Χ	X		DiffDriveTrainSim_SetState.vi		
X	X	X		DiffDriveTrainSim_ToughBoxMiniGearRatio.vi		
X	Χ	X		DiffDriveTrainSim_ToughBoxMiniMotor.vi		
X	Χ	X		DiffDriveTrainSim_Update.vi		

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

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

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. FlyWheelSim Update.vi Function Prototype VI Name Notes LINEAR SYSTEM SIM X LinearSystemSim_ClampInput.vi LinearSystemSim GetCurrentDrawAmps.vi DONT IMPLEMENT.. Χ Χ LinearSystemSim_GetOutput_Single.vi X XX Χ LinearSystemSim GetOutput.vi LinearSystemSim New XX Χ LinearSystemSim New NoNoise.vi LinearSystemSim SetInput Array.vi $X \mid X$ X Doesn't use clamp? XX LinearSystemSim_SetInput_Single.vi X Χ Χ LinearSystemSim_SetInput.vi X Χ Χ LinearSystemSim_Setstate.vi X Χ Χ Χ LinearSystemSim Update.vi LinearSystemSim UpdateX.vi X Χ No X X X No LinearSystemSim UpdateY.vi Menu Item Function Prototype Notes SINGLE JOINT ARM SIM X SngJntArmSim_EsitmateMOI.vi Χ Χ SngJntArmSim GetAngleRads.vi X Χ X SngJntArmSim_GetCurrentDraw.vi Χ Χ X X Χ SngJntArmSim_GetVelocityRadsPerSec.vi X X Χ SngJntArmSim_HasHitLowerLimit.vi XX Χ SngJntArmSim HasHitUpperLimit.vi XX X SngJntArmSim New.vi SngJntArmSim_Rkf45_Func.vi XX No XX X SngJntArmSim_SetInputVoltage.vi XX Χ SngJntArmSim_SetState.vi Χ X Χ SngJntArmSim_Update.vi Χ X X SngJntArmSim_UpdateX.vi Χ SngJntArmSim_WouldHitLowerLimit.vi Χ Χ Χ X X SngJntArmSim WouldHitUpperLimit.vi '========= MATRIX UTILITIES '======== VI Name Function Prototype Notes MAT BUILDER X X Χ SI MatBuilder Create.vi XX X SI MatBuilder Fill.vi

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. VI Name Function Prototype Notes MATRIX Χ X Χ SI Matrix AssignBlock.vi X SI Matrix Block.vi Matrix_ChangeBoundsUnchecked.vi XX X SI Matrix Create.vi Matrix Det.vi X X X SI Matrix Diag.vi labview has function Matrix Div Scalar.vi Matrix_ElementPower.vi XX X SI Matrix ElementSum.vi Matrix ElementTimes.vi Matrix Equals.vi XX XI Matrix Exp.vi XX X SI Matrix_ExtractColumnVector.vi XX X SI Matrix ExtractFrom.vi Matrix ExtractMatrix.vi X X X SI Matrix ExtractRowVector.vi Matrix Fill.vi XX X SI Matrix_Get.vi labview has function XX X Matrix Ident.vi WPILIB calls this EYE Matrix Inv.vi Χ X SI Matrix IsEqual.vi X Matrix IsIdentical.vi XX XI Matrix_LLTDecompose.vi Matrix_Max.vi Matrix MaxAbs.vi Matrix Mean.vi Matrix MinInternal.vi Matrix Minus Matrix.vi Matrix Minus Scalar.vi XX Matrix NormF.vi XI Matrix NormIndP1.vi Matrix Plus Matrix.vi Matrix Plus Scalar.vi XX XI THIS NEEDS WORK!!!! Matrix Pow.vi X X X SI Matrix_SetColumn.vi XX X SI THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT Matrix_SetRow.vi SHOULD BE INCLUDED HERE FOR ISOLATION. Matrix Solve.vi Matrix Times Matrix.vi Matrix Times Scalar.vi Matrix Trace.vi XX X SI Matrix_Transpose.vi X XX Matrix WithinTolerance.vi VI Name Function Prototype SIMPLE MATRIX X NOTE Matrix also has an SimpleMatrix ExtractMatrix.vi ExtractMatrix with different calling parameters.... YUK.

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 5/2/2022 – added implicit model follower and time interpretations of the control of the

odel follower and time i	nterpo	latabl	e routi	ines.								
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX HELPER	X	X	X	X	SI		MatrixHelper_CooerceSize.vi					
	Χ	Χ	Χ	Χ	SI		MatrixHelper_MultCooerceBSize.vi					
	Χ	Χ	Χ	Χ	SI		MatrixHelper_Zero.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program Ambie Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
VECTOR BUILDER	Χ	Χ		X	SI		VecBuilder_1x1Fill.vi					
	Χ	Χ		X	SI		VecBuilder_2x1Fill.vi					
	Χ	Χ		X	SI		VecBuilder_3x1Fill.vi					
	Χ	Χ		X	SI		VecBuilder_4x1Fill.vi					
	Χ	Χ		X	SI		VecBuilder_5x1Fill.vi					
	Χ	Χ		X	SI		VecBuilder_6x1Fill.vi					
	Χ	Χ		X	SI		VecBuilder_7x1Fill.vi					
	Χ	Χ		X	SI		VecBuilder_8x1Fill.vi					
							VecBuilder_9x1Fill.vi					
							VecBuilder_10x1Fill.vi					
	Χ	Χ	X	X	SI		VecBuilder_ArrayBy1Fill.vi					

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MATH '========

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

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						mize		ξ					
	þ	g	m			Optii	e	. Program			W.	шe	Checking
	Implementea	ente	Not WPILIE	į "	5		Routine	Pro Pro			evie	Program	hec
	lem	Documen	Ŋ	Menu Item	2	Execution	t Re	S VI Name			že R	τ. P	
	lmp	Doc	Not	Ne.	5	Exe	Test	S VI Name	Function Prototype	Notes	Cod	Test	Error
MERWE SCALED SIGMA POINTS		X		X		1		MerweScSigPts_ComputeWeights.vi					
	X					SI		MerweScSigPts_GetNumSigmas.vi				-	
	X			X	(·	SI SI		MerweScSigPts_GetWc_Single.vi MerweScSigPts_GetWc.vi					
	X	X		$\frac{\hat{x}}{x}$		SI		MerweScSigPts_GetWm_Single.vi					
	X	X		X		SI		MerweScSigPts_GetWm.vi					
	X			X		1		MerweScSigPts_New_Default.vi			<u> </u>		
	X	X				1		MerweScSigPts_New.vi MerweScSigPts_SigmaPoints.vi					
	X	X		^	(1		MerwescsigPts_sigmaPoints.vi					
						zed							
						imi.		Program					B
	pa	eq	В) _		Ö	ие	ogr.			e.	am	Checking
	mplemented	Documente	Not WPILIE	Menu Item		ion	Test Routine	P. C.			gev.	Test Program	γρεc
	len	unc	Š	. 7	2	cut	it B	S VI Name			Je F	# P	9
	Imp	ρŏ	Not	N N	2	Execution	<u>7</u> es	S VI Name	Function Prototype	Notes	Ö	7es	Error
NUMERICAL INTEGRATION	1 X	X		X		1		NumIntegrate_Func_Ax_Bu_K.vi		NOT USED. Should this be used			
	X	X		X	,					or abandoned???			-
	X			$\frac{1}{x}$	(NumIntegrate_Rk4_Dbl_X.vi					
	X	X		X	(NumIntegrate_Rk4_Mat_X_U.vi					
	X			X				NumIntegrate_Rk4_Mat_X.vi			<u> </u>		
	X			No	0	SI SI		NumIntegrate_Rkdp_Func_A.vi NumIntegrate_Rkdp_Func_B1.vi					-
	X					SI		NumIntegrate_Rkdp_Func_B1.vi NumIntegrate_Rkdp_Func_B1B2.vi					
	X			No		SI		NumIntegrate_Rkdp_Func_B2.vi			i		
	X			No	0	1		Numintegrate_Rkdp_Impl.vi					
	X			X		CI		NumIntegrate_RKDP_Mat_X_U.vi		New replacement for RKF45			
	X			No	0	SI		NumIntegrate_Rkf45_Func_A.vi NumIntegrate_Rkf45_Func_B1.vi					
	X					SI		NumIntegrate Rkf45 Func B1B2.vi					
	X					SI		NumIntegrate_Rkf45_Func_B2.vi					
								NumIntegrate_RKf45_Func_Bs.vi		Removed. Replaced with newer	İ		
								NumIntegrate_RKf45_Func_Ch.vi		functions. Removed. Replaced with newer			
										functions.			
								NumIntegrate_RKf45_Func_Ct.vi		Removed. Replaced with newer	ĺ		1
	X	X		No	0	1		NumIntegrate_Rkf45_Impl.vi		functions.			
	X	X		X				NumIntegrate_Rkf45_Mat_X_U.vi		Note that this Feinberg method has			
										been changed and a Ďormand Price method has been	İ		
										implemented TODO	İ		
								NumIntegrate_RKf45_New.vi		Removed. Never used.			
		X	$+$ \times	(X				NumIntegrate_Trap_Dbl.vi					
	X	_ X	- ^	X		1		NumIntegrate_Trap_Mat.vi					
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	pa	þ	m	1		ndo Obti	Je	Program			ΘW	am	Checking
	ent	ente	3/17/6	i ii	5	ion	outii	Ž.			Revie	ubo.	hec
	Implementea	Document	Vot WPILIB	Menu Item	2	Execution	Test Routine	∍Jdu			te F	Test Program	Š
	Птр	000	Not	Z Z	2	Exe	Tes	S VI Name	Function Prototype	Notes	Code	Tes	Error
RUNGE KUTTA TIME VARYING		X		No				RungeKuttaTimeVarying_RK4_Mat_T_Y.vi					
											i ————		1

Revision 2.X 5/2/2022 – ac	Ided implicit model follower and time	interpo	latable r	outines.				-				
	NUMERICAL JACOBIAN	X X Implemented	X	X Menu Item		Test Routine	S VI Name NumJacobian_U.vi NumJacobian_X.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	RICCAT	X X X	X X 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	Riccati_Check_Detectable.vi Riccati_Check_Stabilizable.vi Riccati_DARE_Iterate.vi Riccati_DARE_StructDoubling.vi Riccati_DARE_N.vi Riccati_DARE.vi Riccati_DARE.vi Riccati_Input_Check.vi	Function Prototype	Notes Routine exists, it is just a shell Not really done !!!	Code Review	Test Program	Error Checking
'====== VISION												
'=====	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		Test Routine	VI Name CompVisionUtil_CalculateDistanceToTarget.vi CompVisionUtil_EstimateCameraToTarget.vi CompVisionUtil_EstimateFieldToCamera.vi CompVisionUtil_EstimateFieldToRobot.vi CompVisionUtil_EstimateFieldToRobot_Alt.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
'====== TYPE DEFINITIONS												
'======================================	TypeDef	Z Z Z Z Z Z	X	X	N/A N/A N/A N/A	Test Routine	VI Name ARM_FF.CTL BANG_BANG.CTL BICOn-Matrix_FUNC_TYPE.CTL CALLBACK_FUNC_TYPE.CTL CHASSIS_SPEEDS.CTL CONTRAINED_STATE.CTL COORDINATE_AXIS.CTL COORDINATE_SYSTEM.CTL DCMOTOR_TYPES_ENUM.CTL	Function Prototype	Notes NOT USED. Should this be deleted or abandoned???	Code Review	Test Program	Error Checking

Z	ne interpo	olatabl	le rout	tines.			
7	Z	Χ	X	X	N/A	DCMOTOR.CTL DCMOTOR.CTL	
	Z	Χ	X	X		DCMOTOR SIM.CTL	
7	Z						
Z							
7							
Z							
Z							
Z							
Z							
Z							
Z							
Z							
Z	Z	X		X			
	Z		X		NA		
Z	Z	X	X	X	NA	DISPLAY_WEIGHTED_WAYPOINT.ctl	
Z							UTIL_WEIGHTED_WAYPOINIT.VI
Z							
Z	Ζ	X	X	X	N/A	ELEV_FF.CTL	
Z	Z	X	X	X	N/A		
Z	Z	X	X	X	N/A	EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL	
Z	Z		X	X	N/A		
Z		Χ					
Z			-				
Z							
Z							New 1/26/21
2							146W 1720/21
Y							
Z			-				
X							
Z							
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Z							
Z							
Z							
Z	Z	Χ	X	X			
Z	Z	Χ	X	X	N/A	LINEAR_QUADRATIC_REGULATOR.ctl	
Z	Z	X	X	X	N/A	LINEAR SYSTEM LOOP.ctl	
Z	Z	Χ	X	X	N/A	LINEAR SYSTEM SIM.ctl	
Z	Z	X	X	X	N/A	LINEAR SYSTEM.cti	
Z	Z		X				
Z	-				N/A		
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Z X X N/A MERWE_SCALED_SIGMA_PTS.ctl Z X X X N/A OBSERVER_SNAP_LIST_ITEM.CTL Z X X X N/A OBSERVER_SNAPSHOT.CTL Z X X N/A PARAM_STACK_ITEM.CTL X Z X X N/A PARAM_STACK_CTL X Z X X N/A PID_ADV_LIMITS.CTL X Z X X N/A PID_ADV_LIMITS.CTL X Z X X N/A PID_CONTROLLER.CTL X Z X X N/A PID_ECONTROLLER.CTL X Z X X N/A PID_ECONTROLLER.CTL X Z X X N/A PID_ID_ERROR_TOLERANCE.CTL X Z X X N/A PID_ID_UNING.CTL X Z X X N/A POSE2D.CTL X Z X X							
Z							
Z							
Z X X N/A PARAM_STACK_ITEM.CTL Z X X X N/A PARAM_STACK_CTL Z X X X N/A PID_ADV_LIMITS.CTL Z X X N/A PID_ADV_TUNING.CTL PID_CONTROLLER.CTL Z X X N/A PID_ERROR_TOLERANCE.CTL PID_ERROR_TOLERANCE.CTL Z X X N/A PID_INPUT_LIMITS.CTL PID_INPUT_LIMITS.CTL Z X X N/A POSE2D.CTL PID_INTROLER.CTL Z X X N/A POSE3D.CTL POSE3D.CTL Z X X N/A PROFILED_PID_CONTROLLER.CTL POSE3D.CTL Z X X <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>							
Z X X N/A PARAM_STACK.CTL Z X X N/A PID_ADV_LIMITS.CTL Z X X N/A PID_ADV_TUNING.CTL Z X X N/A PID_CONTROLLER.CTL Z X X N/A PID_ERROR_TOLERANCE.CTL Z X X N/A PID_INPUT_LIMITS.CTL Z X X N/A PID_TUNING.CTL Z X X N/A POSE3D.CTL Z X X N/A POSE3D.CTL Z X X N/A POSEWCURVATURE.CTL Z X X N/A PROFILED_PID_CONTROLLER.CTL Z X X N/A QUATERNION.CTL Z X X N/A RAMSETE_EXE_TUNING.CTL Z X X N/A RAMSETE_CTL Z X X N/A ROTATION2D.CTL						<u> </u>	
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interpo	nlatahl	e routi	nes			
Z	X	X	X	N/A	SIMPLE MOTOR FF.CTL	
Z	X	X	X	N/A	SINGLE JOINT ARM SIM.CTL	
Z	X	X	X	N/A	SLEW RATE LIMITER.CTL	
Z	X	X	X	N/A	SPLINE CTRL VECTOR.CTL	
Z	X	X	X	N/A	SPLINE.CTL	
Z	X	X	X	N/A	SWERVE DRIVE KINEMATICS.CTL	
Z	X	X	X	N/A	SWERVE DRIVE MODULE STATE.CTL	
Z	X	X	X	N/A	SWERVE DRIVE ODOMETRY.CTL	
Z	X	X	X	N/A	SWERVE DRIVE Pose EST.CTL	
Ζ	Χ	Χ	Χ	N/A	TIMER.CTL	
Z	Χ	Χ	X	N/A	TRAJ CONFIG.CTL	
Z	Χ	Χ	X	N/A	TRAJ CONSTRAINT CENTRIPETAL ACCEL.CTL	
Z	Χ	Χ	Χ	N/A	TRAJ CONSTRAINT DIIF DRIVE KINEMATICS.CTL	
Z	Χ	Χ	Χ	N/A	TRAJ CONSTRAINT DIIF DRIVE VOLTAGE.CTL	
١		Χ		N/A	TRAJ CONSTRAINT JERK.CTL	Routine exists, it is just a shell
Z	Χ	Χ	Χ	N/A	TRAJ CONSTRAINT MECA DRIVE KINEMATICS.CTL	
Z	Χ	Χ	Χ	N/A	TRAJ CONSTRAINT MINMAX.CTL	
Z	Χ	Χ	X	N/A	TRAJ CONSTRAINT SWERVE DRIVE KINEMATICS.CTL	
Z	Χ	Χ	Χ	N/A	TRAJ_STATE.CTL	
Z	Χ	Χ	X	N/A	TRAJECTORY_SPLINE_TYPE_ENUM.CTL	
Z	Χ	Χ	X	N/A	TRAJECTORY.CTL	
Z	Χ	Χ	X	N/A	TRANSFORM2D.CTL	
Z		Χ	X	N/A	TRANSFORM3D.CTL	
Z	Χ	Χ	Χ	N/A	TRANSLATION2D.CTL	
Z		Χ	Χ	N/A	TRANSLATION3D.CTL	
Z	Χ	Χ	Χ	N/A	TRAPEZOID_PROFILE_CONSTRAINT.CTL	
Z	Χ	Χ	X	N/A	TRAPEZOID_PROFILE_STATE.CTL	
Z	Χ	Χ	X	N/A	TRAPEZOID_PROFILE.CTL	
Z	Χ	Χ	X	N/A	TWIST2D.CTL	
Z		X	X	N/A	TWIST3D.CTL	
Z	Χ	Χ	Χ	N/A	UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL	
Z	Χ	Χ	X	N/A	UNSCENTED_KALMAN_FILTER.ctl	
Z	Χ	Χ	Χ	N/A	UNSCENTED_KALMAN_NEW_FUNC_GROUP.CTL	
Z	Χ	Χ	Χ	N/A	UTIL_PATHFINDER_CONFIG.CTL	
N/A		N/A		N/A	WAYPOINTS.CTL	Delete – obsolete
Z	Χ	Χ	Χ	NA	WEIGHTED_WAYPOINT.CTL	New V1.5
N/A		N/A		N/A	X_Y_HEADINGS.CTL	Delete – obsolete
Z	Χ	Χ	Χ	N/A	X_Y_PAIR.CTL	

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