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 1018 869 322 971 558 51 12 VI Total (X) 911 CTL Total (Z) 107
> VI Shell Total (/) 4 CTRL Shell Total (\) 2

Doc completed Pct 85.36% Optimization Pct 54.81%

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

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

FUNCTION GENERATOR	× Implemented	Documented	X Not WPILIB	X Menu Item	Execution Optimized	Test Worthine Name Name FunctionGenerator Add Value.vi	Function Prototype	Notes Similar to interpolated tree map	Code Review	Test Program	Error Checking
	X		X	X		FunctionGenerator Add XY.vi		Similar to interpolated tree map			
	X		X	X		FunctionGenerator_Calculate.vi		Similar to interpolated tree map			
	X		X	X		FunctionGenerator_Clear.vi		Ominiar to interpolated tree map			
	X		X	X		FunctionGenerator_Execute.vi		Similar to interpolated tree map			
	X		\overline{X}	X		FunctionGenerator New.vi		Similar to interpolated tree map			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program awan	Function Prototype	Notes	Code Review	Test Program	Error Checking
FUNCTION GENRATOR MATRIX	Χ		Χ	Χ		FunctionGeneratoMatrixr Add.vi		Similar to interpolated tree map			
	Χ		Χ	Χ		FunctionGenerator_Calculate.vi		Similar to interpolated tree map			
	Χ		Χ	Χ		FunctionGenerator_New.vi		Similar to interpolated tree map			
					pəz						

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Ample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR FILTER	X	X		Χ	1		LinearFilter_BackwardFiniteDifference.vi					
	X	X		Χ	SI		LinearFilter_Calculate.vi					
	Χ	X	Χ	Χ	Χ		LinearFilter_CutoffFrequency.vi					
	Χ	X	Χ	Χ	1		X LinearFilter_Execute.vi		Labview style helper			
	Χ	X		No	1		LinearFilter_Factorial.vi		AN INTERNAL ROUTINE			
	Χ	Χ		Χ	Χ		LinearFilter_HighPass.vi					
	Χ	Χ	Χ	Χ	Χ		LinearFilter_HighPassBW1.vi					
	X	X	X	X	X		LinearFilter HighPassBW2.vi					

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Revision 2.X	5/2/2022 - add	ed implicit model	follower and time into	erpolatable routines.		
REVISION Z.A	3/2/2022 - auu	ea imblicit moael	TOHOWEL AND UITE INC	ei bolalable Toulli les.		

odel follower and time													
		Χ	Χ	Χ	Χ			LinearFilter_LowPassBW1.vi					
	Χ	Χ	Χ	Χ	Χ			LinearFilter_LowPassBW2.vi					
	Χ	Χ		Χ	Χ			LinearFilter_MovingAverage.vi					
	Χ	X		Χ	- 1			LinearFilter_New.vi					
	Χ	Χ		Χ	SI			LinearFilter_Reset.vi					
	Χ		Χ	Χ	SI			LinearFilter_ResetToValue.vi					
	Χ	Χ		Χ	Χ			LinearFilter_SinglePoleIIR.vi					
	Χ	Χ	Χ	Χ	Χ			LinearFilter_TimeConst.vi					
MEDIAN FILTER	X X X	X X Documented	X Not WPILIB	X	S S Execution Optimized	Test Routine		VI Name MedianFilter_Calculate.vi MedianFilter_Execute.vi MedianFilter_New.vi MedianFilter_Reset.vi	Function Prototype	Notes Labview style helper	Code Review	Test Program	Error Checking
	Χ	X	Χ	Χ	SI			MedianFilter_ResetToValue.vi					
SLEW RATE 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 X X X	X X X X X X X X X X X X X X X X X X X	S S Execution Optimiz	Test Routine		VI Name SlewRateLimiter_Calculate.vi SlewRateLimiter_Close.vi SlewRateLimiter_Execute.vi SlewRateLimiter_GetRate.vi SlewRateLimiter_New.vi SlewRateLimiter_NewInitialZero.vi SlewRateLimiter_Reset.vi SlewRateLimiter_Reset.vi SlewRateLimiter_SetRate.vi	Function Prototype	Notes Labview style helper	Code Review	Test Program	Error Checking
TIMER	X X Implemented	X X Documented	X Not WPILIB	X	Execution Optimized		Χ	VI Name Timer_Close.vi Timer_Get.vi Timer_GetAndReset.vi Timer_GetInternal.vi Timer_HasPeriodPassed.vi	Function Prototype	Notes releases semaphore Internal (private) only	Code Review	Test Program	Error Checking
	X	X	X	X				Timer_HasPeriodPassedOnce.vi					
-	X	X		X				Timer_New.vi					-
	X	X		X				Timer Reset.vi					
	X	X	X					Timer ResetInternal		Internal (private) only			
	X	X	^	X			Y	Timer_Start.vi		internal (private) only			
-	\hat{x}	\hat{X}		X				Timer_Stop.vi					
-			~	No			^			Internal (private) and			
	X	Χ	Χ	IVO				Timer_StopInternal.vi		Internal (private) only			

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

FRC LabVIEW Trajectory Library – VI Implementation L	.ist											
Revision 2.X 5/2/2022 – added implicit model follower and time i	interpol mblemented	Jocumented latabl	le rout	tines.	Execution Optimized	st Rou	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X X X X X		X X X	X No X X	E	7	TimeInterpBoolean_AddSample.vi TimeInterpBoolean_CleanUp.vi TimeInterpBoolean_Clear.vi TimeInterpBoolean_GetSample.vi TimeInterpBoolean_New.vi		Update to use create matrix Update to use create matrix			H
TIME INTERPOLATABLE DOUBLE		Documented	X Not WPILIB	X Menu Item	Execution Optimized	Test Routine	VI Name TimeInterpDouble AddSample.vi	Function Prototype	Notes Update to use create matrix	Code Review	Test Program	Error Checking
	X X X		X X X	X	p _e		TimeInterpDouble_CleanUp.vi TimeInterpDouble_Clear.vi TimeInterpDouble_GetSample.vi TimeInterpDouble_New.vi		Update to use create matrix			
	Jul	Documented	Not WPILIB	Menu Item	Execution Optimize	st St	Nample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X X X X		X X X	No X X			TimeInterpPose2d_AddSample.vi TimeInterpPose2d_CleanUp.vi TimeInterpPose2d_Clear.vi TimeInterpPose2d_GetSample.vi TimeInterpPose2d_New.vi		Update to use create matrix Update to use create matrix			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimizec	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X X X X		Χ	No X X			TimeInterpRotation2d_AddSample.vi TimeInterpRotation2d_CleanUp.vi TimeInterpRotation2d_Clear.vi TimeInterpRotation2d_GetSample.vi TimeInterpRotation2d_New.vi		Update to use create matrix Update to use create matrix			
	nplemented	ocumented	Not WPILIB	Menu Item	Execution Optimized	st	Nample Program	Function Prototype	Notes	ode Review	est Program	Error Checking
DIGITAL SEQUENTIAL LOGIC		X	X	X	Ü	ř	♡ VI Name DigSeqLogic_On_Delay.vi DigSeqLogic_Off_Delay.vi DigSeqLogic_One_Shot.vi	Function Prototype	Notes	Ō	, r	Ē

XX

XX

XX

XX

XX

No

No

Χ

Χ

X

DigSegLogic SR Flip Flop.vi

Debouncer_Reset.vi

Debouncer_HasElapsed.vi

ArmFF_MinAchieveVelocity.vi

ArmFF_New_ZeroGravity.vi

ArmFF_New.vi

		_ ,,	_ ,,	, ,		2.9 - 4 - 3 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4				
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized		Notes	Code Review	Test Program	Error Checking
DEBOUNCER	Χ	X		X		Debouncer_New.vi				
	Χ	X		Χ		Debouncer_Calculate.vi				
	X	X	X	X		Debouncer Execute vi				

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

> rest Routine Menu Item Function Prototype Notes ArmFF Calculate.vi ARM FF X X XX ArmFF CalculateVelocityOnly.vi Χ ArmFF Execute.vi X LabVIEW style single call ArmFF_ExecuteVelocityOnly.vi LabVIEW style single call Χ ArmFF MaxAchieveAccel.vi X X Χ ArmFF_MaxAchieveVelocity.vi X X X XX ArmFF_MinAchieveAccel.vi Χ

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

Execution Optimized Not WPILIB Menu Item Function Prototype Notes

### ELEVIFY X X X X X X X X X X X X X X X X X X X	CONTROLLER UTIL			DIE 10	X	_			ControllerUtil_GetModulusError.vi		This was short lived in WPILIB, but still useful here.			
### FILE PFV X X X X X X X X X						pezi					journ doordi Horo.		1	
ELEFF X		nplemented	ocumented	ot WPILIB	lenu Item	xecution Optimi	est Routine	ample Program	N/ Norse	Function Proteins	Nata	ode Review	est Program	rror Checking
A	FI FV FF			_ <			_ <u> </u>	_ ∖ŏ		Function Prototype	Notes	S	<u> </u>	<u> </u>
Lab/PEW sight shape call Lab/PEW sight shape	LLLVII													
Note									ElevFF_Execute.vi		LabVIEW style single call			
Note		14		X					ElevFF_ExecuteVelocityOnly.vi		LabVIEW style single call			
Notes							+							
Notes					$\frac{1}{X}$				FlevFF MinAchieveAccel vi					
Note														
Page		X	X		X				ElevFF_New_ZeroAccel.vi					
## HOL_DRY_CTRL ## HOL		X	X		X				ElevFF_New.vi					
HOL_DRY_CTRL X		olemented	cumented	t WPILIB	nu Item	ecution Optin	st Routine	nple Prograr				de Review	st Program	or Checking
HOL_DRY_CTRL X		Imp		Not	Me	Ĕ	7es	Sai	VI Name	Function Prototype	Notes	Ö		Ern
X	HOL_DRV_CTRL			X	X									
Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/22 Added 1/26/21 Added 1/26/22 Added 1/26/21 Added 1/26/22 Added 1/26/22 Added 1/26/22 Added 1/26/21 Added 1/26/2				X	X	-								
Added 1726/21														
Added 1742/2022					\ \ \ \ \ \ \ \	1								
Note HolDroCtrl Sexcute HolDroCtrl Sexcute HolDroCtrl Sexcute HolDroCtrl New Added 1/24/2022 HolDroCtrl New Added 1/24/2022 HolDroCtrl PackFlorin Added 1/24/2022 HolDroCtrl PackFlorin Added 1/24/2022 HolDroCtrl PackFlorin Added 1/24/2022 HolDroCtrl PackFlorin Added 1/24/2022 HolDroCtrl SetTolerance HolDroCtrl SetTolera				X	X									
Notes		X	X		Χ				HolDrvCtrl_Execute.vi		Future			
X		X		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	X	SI	-				Added 1/26/21			
Added 1/28/21 Added 1/28/2		X	X	X	X	51					Added 1/24/2022			
Added 1/26/21 Added 1/26/2				$\frac{1}{X}$	$\frac{1}{X}$		+							
Pipe		X			X	SI			HolDrvCtrl_SetEnabled.vi					
PID CONTROLLER		X	X		X	SI			HolDrvCtrl_SetTolerance.vi		Added 1/26/21			
X X X X X Advanced PID X X X X X DiDController_AdvExecute.vi Labview style helper. Advanced PID X X X X X Y PIDController_AdvExecute.vi X X X X Y PIDController_AdvExecute.vi X X X X Y PIDController_AdvExecute.vi X X X X PIDController_Calculate PV.vi X X X X PIDController_DisableContinousInput.vi X X X X Y PIDController_Execute.vi X X X X PIDController_Execute.vi Labview style helper X X X X PIDController_GetContinuousError.vi OBSOLETE - Removed X X X X X X PIDController_GetPiD.vi X X X X X X X X X X				Not WPILIB	Menu Item	Execution	Test Routine	Sample Program	VI Name	Function Prototype		Code Review	Test Program	Error Checking
X X X X X PIDController_Advexceute.vi Labview style helper. Advanced PID X X X X X Y PIDController_Calculate_PV.vi Image: Calculate_PV.vi Image: Calculate_PV.vi <td< td=""><td>PID CONTROLLER</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	PID CONTROLLER				X									
Note								V						
X X X SI PIDController_AtSetpoint.vi SI PIDController_Calculate_PV.vi SI PIDController_Calculate_SP_PV.vi SI PIDController_DisableContinousInput.vi SI PIDController_EnableContinousInput.vi SI PIDController_EnableContinousInput.vi SI PIDController_EnableContinousInput.vi SI PIDController_EnableContinousError.vi SI PIDController_Execute.vi SI PIDController_Execute.vi SI PIDController_GetContinuousError.vi OBSOLETE - Removed SI PIDController_GetPlo.vi SI SI PIDController_GetPlo.vi SI SI PIDController_GetPlo.vi SI SI PIDController_GetPlo.vi SI SI PIDController_GetSetpoint.vi SI SI PIDController_GetSetpoint.vi SI SI PIDController_GetSetpoint.vi SI SI SI SI PIDController_GetSetpoint.vi SI SI SI SI SI S			_^	_ ^							PID			
X X X PIDController_Calculate_SP_PV.vi SP_V.vi X X X X SI PIDController_DisableContinousInput.vi X X X X X X X PIDController_EnableContinousInput.vi X X X X X X PIDController_Execute.vi Labview style helper X X X X X X X PIDController_GetContinuousError.vi X											=			
X X SI PIDController_DisableContinousInput.vi														
X X X SI PIDController_EnableContinousInput.vi Labview style helper X X X X X X bloom to be producted and the production of the production of the production of the production of the product of the														
X X X X PIDController_Execute.vi Labview style helper X X X X SI PIDController_GetPeriod.vi X X X SI PIDController_GetPlD.vi X X X SI PIDController_GetPlD.vi X X X SI PIDController_GetPositionError.vi X X X SI PIDController_GetSetpoint.vi														
PIDController_GetContinuousError.vi			X	X	X	31		X			Labview style helper			
X X SI PIDController_GetPeriod.vi X X X SI PIDController_GetPID.vi X X X SI PIDController_GetPositionError.vi X X X SI PIDController_GetSetpoint.vi					Ĥ									
X X SI PIDController_GetPositionError.vi X X SI PIDController_GetSetpoint.vi									PIDController_GetPeriod.vi					
X X X SI PIDController_GetSetpoint.vi					X	SI								
		X	X						PIDController_GetSetpoint.vi PIDController_GetVelocityError.vi					

n List										
	-	ble rou								
X	X		X	SI		PIDController_IsContinuousInputEnabled.vi				
X	X		X	1		PIDController_New.vi				
X	X		Χ	1		PIDController_NewPeriod.vi				
X	X	X	Χ	SI		PIDController_Pack_AdvLimits.vi				
X	X	X	Χ	SI		PIDController_Pack_AdvTuning.vi				
Χ	X	X	Χ	SI		PIDController_Pack_ErrorTolerance.vi				
X	X	X	Χ	SI		PIDController_Pack_InputLimits.vi				
X	X	X	X	SI		PIDController_Pack_Tuning.vi				
Χ	X		X	SI		PIDController_Reset.vi				
X	X		Χ	SI		PIDController_SetD.vi				
Χ	X	X	Χ	SI		PIDController_SetDerivativeFilter.vi	Advanced PID			
X	X	X	No			PIDController_SetFeedForward_OBSOLETE_DELETE.vi	Advanced PID, Obsolete –			
							DELETE			
X	X	X	No			PIDController_SetFFGain_OBSOLETE_DELETE.vi	Advanced PID, Obsolete –	1		
	1			01		DID 0 1 11 0 11 1	DELETE			
Χ	X		Χ	SI		PIDController_SetI.vi	00001575 0			
						PIDController_SetInputRange.vi	OBSOLETE – Removed			
X			X	SI		PIDController_SetIntegratorRange.vi				
X	X	X	Χ	SI		PIDController_SetOutputLimits.vi	Advanced PID			
X	X		Χ	SI		PIDController_SetP.vi				
X	X	X	Χ	SI		PIDController_SetPeriod.vi				
X	X		Χ	SI		PIDController_SetPID.vi				
X	X	X	Χ	SI		PIDController_SetPIDF.vi	Advanced PID			
X	X		X	SI		PIDController_SetSetpoint.vi				
X	X		X	SI		PIDController_SetTolerance.vi				
X	X		Χ	SI		PIDController_SetTolerancePandV.vi				
ented	ented	иг.	٤	on Optimized	utine	Program		/iew	ogram	ecking
9.	2	7	em	ć	5	L.		é	g	je Je

	S S VI Name Function Prototype	Notes	Code Review	Test Program	Error Checking
	ProfiledPIDController_AtGoal.vi				
	ProfiledPIDController_AtSetpoint.vi				
X X X	ProfiledPIDController_Calculate_Meas_Goal.vi				
X X X	ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi				
X X X	ProfiledPIDController_Calculate_Meas_StateGoal.vi				
X X X	ProfiledPIDController_Calculate_Meas.vi				
	ProfiledPIDController_DisableContInput.vi				
X X X	ProfiledPIDController_EnableContInput.vi				
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	ProfiledPIDController_Execute.vi	Single call LabVIEW style function.			
X X X	ProfiledPIDController_GetGoal.vi				
X X X	ProfiledPIDController_GetPeriod.vi				
X X X X .	ProfiledPIDController_GetPID.vi	WPILIB has separate getters.			
X X X	ProfiledPIDController_GetPositionError.vi				
X X X	ProfiledPIDController_GetSetpoint.vi				
X X X	ProfiledPIDController_GetVelocityError.vi				
X X X	ProfiledPIDController_New.vi				
X X X	ProfiledPIDController_NewPeriod.vi				
X X X	ProfiledPIDController_Reset_PosOnly.vi				
X X X	ProfiledPIDController_Reset_PosVel.vi				
	ProfiledPIDController_Reset.vi				
	ProfiledPIDController_SetConstraints.vi				
	ProfiledPIDController_SetGoal_PosOnly.vi				
	ProfiledPIDController_SetGoal.vi				
	ProfiledPIDController_SetIntegratorRange.vi				
X X X	ProfiledPIDController_SetPID.vi				
X X X					
X X X	ProfiledPIDController_SetTolerance_PosVel.vi				

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	ed implicit model follower and time		olatable ro	utines.								
	RAMSETE	X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X Wenu Item	SI X X	Test Routine	VI Name Ramsete_AtReference.vi Ramsete_Calculate_Trajectory.vi Ramsete_Calculate.vi Ramsete_Diff_DO_Eng.vi Ramsete_Diff_DO_SI.vi Ramsete_Execute_ENG.vi Ramsete_Execute_PackTuning_ENG.vi Ramsete_Execute_PackTuning.vi	Function Prototype AtReference calculate_trajectory calculate Use this one!!	Notes	Code Review	Test Program	Error Checking
		X	XX	X	1		Ramsete_Execute.vi					
	-	X		X	SI SI		Ramsete New B Z.vi Ramsete New.vi	new(b, zeta)				
		X		X	SI		Ramsete SetEnabled.vi	new SetEnabled				
		X		X	SI		Ramsete_SetTolerance.vi	SetTolerance				
		Х	X	Χ	Χ		Ramsete_SINC.vi	sinc	internal			
		Implemented	Documented Not WPILIB	Menu Item	Ехес	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
SI	MPLE MOTOR FEEDFORWARD				SI		SimpleMotorFF_Calculate_CalcAccel.vi					
		Χ		Χ			SimpleMotorFF_Calculate_NextV_Dt.vi					
		X		X	SI		SimpleMotorFF_Calculate.vi	public double calculate(double velocity, double acceleration)				
		X		X	SI X		SimpleMotorFF_CalculateVelocityOnly.vi SimpleMotorFF_MaxAchieveAccel.vi	public double calculate(double velocity) public double maxAchievableAcceleration(double maxVoltage,				
		X		X			SimpleMotorFF_MaxAchieveVel.vi	double velocity) public double maxAchievableVelocity(double maxVoltage, double	3			
		X	X	X	X		SimpleMotorFF_MinAchieveAccel.vi	acceleration) public double minAchievableAcceleration(double maxVoltage,				
							_	double velocity)				
		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 '=======												
		mplemented	Documented Vot WPILIB	Venu Item	Execution Optimizec	Test Routine	Name NI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	COORDINATE AXIS	X	7 ~	_ <	SI	-	CoordAxis D.vi					
		X		X	SI		CoordAxis_E.vi					
		X		X	SI		CoordAxis_N.vi					
		X		X	SI		CoordAxis_New.vi					
	-	X		X	SI SI		CoordAxis_S.vi CoordAxis_U.vi					
		X		X	SI		CoordAxis_U.vi					
		- •			<u>J, </u>		1======================================		1	1		

FRC LabVIEW Trajectory Library – VI Implementat												
Revision 2.X 5/2/2022 – added implicit model follower and	time in	iterpolata	able ro	utines.	þ							
	7	Implemented Documented	Not WPILIB	ı İtem	Execution Optimize	Routine ple Program				Review	Program	Checking
	9	nple	0 t N	Menu	xec	Test . Samp	VI Name	Function Protetyne	Notes	epo;	Test	īror
COORDINATE SYSTE	FM 🗀	X				$X \mid S$	CoordSystem_Convert_Pose3d.vi	Function Prototype	Notes		<u> </u>	En
0001.5111111201011		,,		X	SI		CoordSystem_Convert_Rotation3d.vi					
				X	SI		CoordSystem_Convert_Translation3d.vi					
		X		X	SI	X	CoordSystem_EDN.vi					
		X				X	CoordSystem_NED.vi					1
		X		X	SI	X	CoordSystem_New.vi					
		X		Χ	SI	X	CoordSystem_NWU.vi					L
		Implemented Documented	Not WPILIB	Menu Item	Execution Optimizec	Test Routine Sample Program				ode Review	Test Program	ror Checking
						Sa 7e	VI Name	Function Prototype	Notes	ပိ		<u> </u>
POSE		XX		X	SI		Pose2d_Equals.VI	boolean equals(other obj)				1
		X X X X		X	X SI		Pose2d_Exp.vi Pose2d_getRotation.vi	pose2d exp(twist2d twist) rotation2d getRotation()	can also use cluster unpack			
		$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		X	SI		Pose2d_getTranslation.vi	translation2d getTranslation()	can also use cluster unpack			
		X X	X	X	SI		Pose2d_getXY.vi	translation2d get translation()	can also use cluster unpack			
		XX			SI		Pose2d_getXYAngle.vi					
		XX		X	1		Pose2d_Interpolate.vi					
)	X X		X	X		Pose2d_Log.vi	twist2d log(pose2d end)				
)	X X		X	SI		Pose2d_Minus.vi	transform2d minus(pose2d other)				1
		X X		X	SI		Pose2d_New_TRRO.vi	pose2d new(translation2d, rotation2d)				
		XX		X	SI		Pose2d_New.vi	pose2d new(double x, double y, rotation2d)				
		X X X X			SI		Pose2d_Plus.vi Pose2d_RelativeTo.vi	pose2d plus(transform2d other) pose2d relativeto(pose2d other)				<u> </u>
	\vdash	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		X	SI SI		Pose2d_TransformBy.vi	pose2d transformby(transform2d other)				
		^ ^		^	31		Fosezu_Halisioniiby.vi	pose2d new()	can use cluster constant			
		Implemented Documented	Not WPILIB	Mer	Exec	Test Routine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
POSE		X			SI		Pose3d_Equals.VI					1
		X			X		Pose3d_Exp.vi					1
		X X			SI SI	-	Pose3d_getRotation.vi Pose3d_getTranslation.vi					
		X	X		SI		Pose3d_getXYZ.vi					
		X			1		Pose3d Interpolate.vi					
		X			X		Pose3d_Log.vi					
		X			SI		Pose3d Minus.vi					
		X		X	SI		Pose3d_New.vi					
		X		X	SI		Pose3d_New_Default.vi					
		X			SI		Pose3d_New_Trans3dRot3d.vi					
		X			SI		Pose3d_Plus.vi					
		X			SI		Pose3d_RelativeTo.vi					1
		X			SI		Pose3d_RotationVectorToMatrix.vi					
		X X			SI SI		Pose3d_ToPose2d.vi Pose3d_TransformBy.vi					
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	Implemented	Documented Not WPILIB	nu Item	Execution Optimize	pple Program				e Review	Test Program	
	ldw,	Vot Vot	Menu	EX EX	San	VI Name	Function Prototype	Notes	Cod	Test	
QUATERNION			X	SI		Quaternion_Equals.vi					
	X		X	SI		Quaternion_Get_All.vi					
	X			SI		Quaternion_Get_LVQuat.vi					
	X		X	SI SI		Quaternion_Get_Vect.vi Quaternion_Get_W.vi					
	X		X	SI		Quaternion Inverse.vi					
	X		X	SI		Quaternion New.vi					
	X					Quaternion New Default.vi					
	X		X	SI		Quaternion_New_LVQuat.vi					
	X		X	SI		Quaternion_Normalize.vi					
	X		X			Quaternion_Plus.vi					
	X		X	SI		Quaternion_Times.vi					
	Χ		$\perp X$	SI		Quaternion_ToRotationVector.vi				<u> </u>	
	nplemented	Documented Not WPILIB	nu Item	Execution Optimi	nple Program				de Review	st Program	
	du	Ş Ş	Menu	i Ke	San	VI Name	Function Prototype	Notes	ő	Test	
ROTATION2D		$\frac{1}{X}$	\overline{X}	SI		Rotation2d_CreateAngle.vi	rotation2d new(double value)				
	X	X	X	SI		Rotation2d_CreateAngleDegrees.vi	rotation2d fromDegrees(double degrees)	convert to radians then create			
	X	X	X	SI		Rotation2d_CreateAngleRotations.vi					
		Χ	Χ	SI		Rotation2d_CreateXY.vi	rotation2d new(double x, double y)				
		X		SI		Rotation2d_Equals.vi	boolean equals(rotation2d other)	1/00/04			
		X X X			-	Rotation2d_GetAngleCosSin.vi Rotation2d_GetCos.VI	double getCos()	New 1/26/21			+
		$\frac{\lambda}{X}$	X	SI		Rotation2d GetDegrees.VI	double getDegrees()	use cluster unpack use cluster unpack, then convert to			
	^	^		, 3,			double getbegrees()	degree distance degree			
	X	X	X	SI		Rotation2d_GetRadians.VI	double getRadians()	use cluster unpack			
	X	X	X	SI		Rotation2d_GetRotations.vi					
	X	X	X	SI		Rotation2d_GetSin.VI	double getSin()	use cluster unpack			
	· ·	X	<u>X</u>	SI		Rotation2d_GetTan.VI	double getTan()	can calculate			
	X			. 81							
	X	X	X	<u> </u>		Rotation2d_Interpolate.vi	rotation2d minus/ rotation2d -th				
	X	X	X	SI		Rotation2d Minus.vi	rotation2d minus(rotation2d other)				
	X X X	X X	X	SI SI		Rotation2d_Minus.vi Rotation2d_Plus.vi	rotation2d plus(rotation2d other)				
	X X X X	X X X	X X X	SI SI SI		Rotation2d_Minus.vi Rotation2d_Plus.vi Rotation2d_RotateBy.vi Rotation2d_Times.vi	rotation2d minus(rotation2d other) rotation2d plus(rotation2d other) rotation2d rotateby(rotation2d other) rotation2d times(double scalar)				
	X X X	X X X	X X X	SI SI		Rotation2d_Minus.vi Rotation2d_Plus.vi Rotation2d_RotateBy.vi	rotation2d plus(rotation2d other) rotation2d rotateby(rotation2d other)	can use cluster constant			

FRC LabVIEW Trajectory Library – VI Implementation List

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

| X | X | SI | | Rotation3d_GetXYZ.vi

	Χ			X	SI			Rotation3d_GetXYZ.vi					
	Χ			Χ	SI			Rotation3d_Interpolate.vi					
	X			X	SI			Rotation3d_Minus.vi					
	X			X	SI			Rotation3d_Plus.vi					
	X			X	SI			Rotation3d_RotateBy.vi					
	X			X	SI			Rotation3d_Times.vi Rotation3d_ToRotation2d.vi					
	X			\hat{x}	SI			Rotation3d_UnaryMinus.vi					
				^	31			Totationou_onarywinus.vi					
TRANSFORM2D	X X X X X X X X X X X X X X X X X X X	X X X X X	X	X X X X X X X X X X X X X X X X X X X	12 12 13 14 15 15 16 16 17 17 17 17 17 17	Test Routine		VI Name Transform2d_Create_PosePose.vi Transform2d_Create_TransRot.vi Transform2d_Equals.VI Transform2d_GetRotation.VI Transform2d_GetTranslation.VI Transform2d_GetXY.vi Transform2d_GetXYAngle.vi Transform2d_Inverse.vi Transform2d_Plus.vi Transform2d_Times.vi	Function Prototype transform2d new(pose2d, pose2d) transform2d new(translation2d, rotation2d) boolean equals(other transform2d) rotation2d getRotation() translation2d getTranslation() transform inverse() transform2d times(double scalar) transform2d new()	Notes use cluster unpack use cluster unpack new can use cluster constant	Code Review	Test Program	Error Checking
	pə;	ted (IB	n	, Optimize	ine	Program				iew	ram	Checking
TRANSFORM3D	X X X X X X X X X X X X X X X X X X X		X Not WPILIB		10 10 10 10 10 10 10 10	Test Routine	Sample	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	Function Prototype	Notes	Code Reviev	Test Program	Error Che
TRANSFORM3D	X X X X X X			X X X X X X X X X X X X X X X X X X X	SI SI SI SI SI SI	Test Rout	Sample	Transform3d_Create_Default.vi Transform3d_Create_Pose3dPose.3dvi Transform3d_Create_Trans3dRot3d.vi Transform3d_Equals.VI Transform3d_GetRotation3d.VI Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi	Function Prototype	Notes	Code Rev	Test Prog	_
TRANSFORM3D	X X X X X X X X X X X X X X X X X X X	X X Documented	Not WPILIB	X Wenu Item	S S S S S S S S S S	Test Routine Test Rout	Sample Program Sample	Transform3d_Create_Default.vi Transform3d_Create_Pose3dPose.3dvi Transform3d_Create_Trans3dRot3d.vi Transform3d_Equals.VI Transform3d_GetRotation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi VI Name Translation2d_Create_DistAng.vi Translation2d_Create.vi	Function Prototype translation2d new(double x, double y)	Notes	Code Review Code Rev	Test Prog	_
	X X X X X X X X X X X X X X X X X X X	X X Documented	Not WPILIB	X X X X X X X X X X X X X X X X X X X			Sample Program Sample	Transform3d_Create_Default.vi Transform3d_Create_Pose3dPose.3dvi Transform3d_Create_Trans3dRot3d.vi Transform3d_Equals.VI Transform3d_GetRotation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi VI Name Translation2d_Create_DistAng.vi Translation2d_Equals.vi Translation2d_Equals.vi	Function Prototype				or Checking Error
	X X X X X X X X X X X X X X X X X X X	X X Documented	Not WPILIB	X X X X X X X X X X X X X X X X X X X			Sample Program Sample	Transform3d_Create_Default.vi Transform3d_Create_Pose3dPose.3dvi Transform3d_Create_Trans3dRot3d.vi Transform3d_Equals.VI Transform3d_GetRotation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi VI Name Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Equals.vi Translation2d_GetAngle.vi	Function Prototype translation2d new(double x, double y) boolean equals(translation other)				or Checking Error
	X X X X X X X X X X X X X X X X X X X	X X Documented	Not WPILIB	X X X X X X X X X X X X X X X X X X X	SI		Sample Program Sample	Transform3d_Create_Default.vi Transform3d_Create_Pose3dPose.3dvi Transform3d_Create_Trans3dRot3d.vi Transform3d_Equals.VI Transform3d_GetRotation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi VI Name Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi	Function Prototype translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other)	Notes			or Checking Error
	X X X X X X X X X X X X X X X X X X X	X X Documented	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		Sample Program Sample	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 VI Name Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI	Function Prototype translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other) double getNorm()	Notes can use cluster unpack			or Checking Error
	X X X X X X X X X X X X X X X X X X X	X X Documented X X X X X 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		Sample Program Sample	Transform3d Create Default.vi Transform3d Create Pose3dPose.3dvi Transform3d Create Trans3dRot3d.vi Transform3d Equals.VI Transform3d GetRotation3d.VI Transform3d GetXYZ.vi Transform3d Inverse.vi Transform3d Plus.vi Transform3d Times.vi VI Name Translation2d Create DistAng.vi Translation2d Equals.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI Translation2d GetX.VI Translation2d GetX.VI Translation2d GetX.VI Translation2d GetX.VI Translation2d GetX.VI	Function Prototype translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other)	Notes			or Checking Error
	X X X X X X X X X X X X X X X X X X X	X X Documented X X X X X 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		Sample Program Sample	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 VI Name Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi Translation2d_GetNorm.VI	Function Prototype translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other) double getNorm()	Notes can use cluster unpack			or Checking Error

FRC LabVIEW Trajectory Library - VI Implementation List Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines.

| X | X | X | X | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X | | X X SI Translation2d Interpolate.vi XX Χ SI Translation2d Minus.vi translation2d minus(translation2d other) XX X SI Translation2d Plus.vi translation2d plus(translation2d other) XX X SI Translation2d_RotateBy.vi translation2d rotateBy(rotation2d other) XX X SI Translation2d Times.vi translation2d times(double scalar) XX X SI Translation2d UnaryMinus.vi translation2d unaryminus() translation2d new() can use cluster constant translation2d div(double scalar) can multiply by 1/scalar Execution VI Name Function Prototype Notes TRANSLATION3D SI Translation3d Create.vi Χ X Χ SI Translation3d_Create_Default.vi Χ Χ SI Translation3d Create DistAng.vi Χ Χ SI Translation3d Div.vi Translation3d Equals.vi X Χ SI Χ Χ SI Translation3d GetDistance.vi Χ Χ SI Translation3d GetNorm.VI Χ Translation3d GetXYZ.vi Χ Χ SI Translation3d Interpolate.vi Χ X SI Χ X SI Translation3d Minus.vi Χ X SI Translation3d Plus.vi Χ X SI Translation3d_RotateBy.vi Χ X SI Translation3d Times.vi Χ X SI Translation3d ToTranslation2d.vi X SI Translation3d_UnaryMinus.vi VI Name Function Prototype Notes TWIST2D X Χ Χ SI Twist2d Create.vi twist new(x, y, theta) Twist2d Equals.VI Χ Χ SI boolean equals(obj other) Χ X X X X SI Twist2d GetAll.VI Item VI Name Function Prototype Notes TWIST3D X Twist3d Create.vi SI X X Χ SI X Twist3d_Equals.VI Χ X X SI X Χ Twist3d_GetAll.VI '======== KINEMATICS '========

Routine Not WPILIB Menu Item Function Prototype Notes

X 5/2/2022 – added implicit model follower and time			ole rou						1			
CHASSIS SPEEDS	X	Χ		X	SI		ChassisSpeeds_FromFieldRelativeSpeeds.VI	chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle)				
			X		SI		ChassisSPeeds_GetXYOmega.vi					
	Χ	Χ		Χ	SI		ChassisSpeeds_New.vi	chassisspeeds new (double xvel, double yvel, double angvel)				
l								chassisspeeds new ()	can use cluster constant			
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					imi	5						
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	Пр	200	ζo	Menu Item	Xe	Test	VI Name	Function Prototype	Notes	ρος	est	
DIFFERENTIAL DRIVE KINEMATICS	X	X		X	1	X	DiffKinematics New.vi	diffDriveKine new(double trackWidth)	140103	\neg		
	X	Χ		Χ	X	Χ	DiffKinematics_toChassisSpeed.vi	chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds)				
	Χ	Χ		Χ	SI	X	DiffKinematics_toWheelSpeed.vi	diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds)				
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	lmp	ООС	Not	Me	Exe	7es	VI Name	Function Prototype	Notes	ŏ	7es	
DIFFERENTIAL DRIVE ODOMETRY			X				DiffOdometry_Execute.vi		DONT NEED			
	X	X		X	X		DiffOdometry_Update.vi	pose2d update(rotation2d gyro, double leftdist, double right dist)	Incorporates enhanced reset			
								diffDrOdom new(rotation gyro, pose initial)				
								diffDrOdom new(rotation gyro)				
									incorporated into "update"			
					itimized	5		pose2d getPoseMeters()	and aparts			
	emented	umented	WPILIB	u Item	sution Optimized	Routine		pose2d getPoseMeters()		e Review	Program	
	mplemented	Occumented	Jot WPILIB	Aenu Item	execution Optimized	est Routine	N Name	pose2d getPoseMeters()		ode Review	est Program	
DIFFERENTIAL DRIVE WHEEL SPEEDS	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	VI Name	pose2d getPoseMeters() Function Prototype	Notes	Code Review	Test Program	
DIFFERENTIAL DRIVE WHEEL SPEEDS			Not WPILIB		Execution	Test Routine	VI Name	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel)		Code Review	Test Program	
DIFFERENTIAL DRIVE WHEEL SPEEDS	X Implemented		Not WPILIB	X Menu Item	Execution	Test Routine	VI Name DiffWheel_Normalize.vi	pose2d getPoseMeters() Function Prototype diffDrWheelSpeeds new()		Code Review	Test Program	
DIFFERENTIAL DRIVE WHEEL SPEEDS			Not WPILIB		Execution	Test Routine	VI Name	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel)		Code Review	Test Program	
DIFFERENTIAL DRIVE WHEEL SPEEDS			Not WPILIB		Execution	Test Routine	VI Name	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel)		Code Review	Test Program	
DIFFERENTIAL DRIVE WHEEL SPEEDS			Not WPILIB		Execution	Test Routine	VI Name	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel)		v Code Review	n Test Program	
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	Implemented	Documented	ягтв	Menu Item X	Execution	Test Ro	DiffWheel_Normalize.vi	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) void normalize(double maxVel)		Code Review Code Review	Test Program	
DIFFERENTIAL DRIVE WHEEL SPEEDS	X Implemented	X Documented	МРІГІВ	X Menu Item	- Execution Optimized X Execution	st Routine Test Ro	DiffWheel_Normalize.vi VI Name MecaKinematics_New.vi	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) void normalize(double maxVel)	Notes	Code Review Code Review	st Program	
	X X X X X X X X X X	X Documented	МРІГІВ	X Wenu Item	X - Execution Optimized X Execution	st Routine Test Ro	VI Name DiffWheel_Normalize.vi VI Name MecaKinematics_New.vi MecaKinematics_SetInverseKinematics.vi	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) void normalize(double maxVel)	Notes	Code Review Code Review	st Program	
	X X Implemented	X X Documented	МРІГІВ	X Wenu Item	X	st Routine Test Ro	VI Name DiffWheel_Normalize.vi VI Name MecaKinematics_New.vi MecaKinematics_SetInverseKinematics.vi MecaKinematics_ToChassisSpeeds.vi	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) void normalize(double maxVel)	Notes	Code Review Code Review	st Program	
	X X X X X X X X X X	X X Documented	МРІГІВ	X Wenu Item	X - Execution Optimized X Execution	st Routine Test Ro	VI Name DiffWheel_Normalize.vi VI Name MecaKinematics_New.vi MecaKinematics_SetInverseKinematics.vi	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) void normalize(double maxVel)	Notes	Code Review Code Review	st Program	
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	X X X X X X X X X X	X X Documented	МРІГІВ	X Wenu Item	X X Execution Optimized X	Test Routine Test Ro	VI Name DiffWheel_Normalize.vi VI Name MecaKinematics_New.vi MecaKinematics_SetInverseKinematics.vi MecaKinematics_ToChassisSpeeds.vi MecaKinematics_ToWheelSpeeds.vi	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) void normalize(double maxVel)	Notes	ew Code Review Code Review	st Program	
	X X X X X X X X X X	x X Documented X X X	IB Not WPILIB	X X X X X X X X X X X X X X X X X X X	Optimized X X I Execution Optimized X Execution	Test Routine Test Ro	VI Name DiffWheel_Normalize.vi VI Name MecaKinematics_New.vi MecaKinematics_SetInverseKinematics.vi MecaKinematics_ToChassisSpeeds.vi MecaKinematics_ToWheelSpeeds.vi	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) void normalize(double maxVel)	Notes	leview Code Review	st Program	
	X X X X X X X X X X	x X Documented X X X	WPILIB Not WPILIB	X Wenu Item	ution Optimized X X X - Execution Optimized X Execution	Routine Test Routine Test Ro	VI Name DiffWheel_Normalize.vi VI Name MecaKinematics_New.vi MecaKinematics_SetInverseKinematics.vi MecaKinematics_ToChassisSpeeds.vi MecaKinematics_ToWheelSpeeds.vi	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) void normalize(double maxVel)	Notes	le Review Code Review	Program Test Program	
	X X X X X X X X X X	X X Documented	IB Not WPILIB	Item X X Menu Item X	Optimized X X I Execution Optimized X Execution	Test Routine Test Ro	DiffWheel_Normalize.vi VI Name MecaKinematics_New.vi MecaKinematics_SetInverseKinematics.vi MecaKinematics_ToChassisSpeeds.vi MecaKinematics_ToWheelSpeedsZeroCenter.vi	Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) void normalize(double maxVel) Function Prototype	Notes	Code Review Code Review	st Program	

noth	ing do	ne										
MECANUM DRIVE ODOMETRY	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 Not WPILIB	X X X X X X X X X X X X X X X X X X X	X Execution Optimized	Test Routine	VI Name MecaOdometry_Execute.vi MecaOdometry_GetKinematics.vi MecaOdometry_GetPose.vi MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
MECANUM DRIVE WHEEL SPEEDS	X Implemented	X Documented	Not WPILIB	X Menu Item	☑ Execution Optimized	Test Routine	NecaWheel_New.Vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double	Notes	Code Review	Test Program	Error Checking
	X	X	X		SI		MecaWheel_GetAll.vi	rearRightMetersPerSecond)				
	X	X		X	X		MecaWheel_Normalize.vi	public void normalize(double attainableMaxSpeedMetersPerSecond)				
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE KINEMATICS	Χ	Χ	Χ	Χ			SwerveKinematics_New4.VI	71	For 4 module drives			
	X	X	X	X			SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)	uses array as input			
		Χ	X	X			SwerveKinematics_ToChassisSpeeds4.VI		For 4 module drives			
	X	X	Х	X			SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI	public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters)	uses array as input			
	X	X		X			SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI	public SwerveModuleState[]				
								toSwerveModuleStates(ChassisSpeeds chassisSpeeds) public SwerveDriveKinematics(Translation2d wheelsMeters)	variable parameters (replace with			
								public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)	array and "4" calls) variable parameters (replace with array and "4" calls)			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking

5/2/2022 – added implicit model follower and			e roull	1100.								
SWERVE DRIVE ODOMET	RY	4					SwerveOdometry_Execute4.vi					
		4					SwerveOdometry_ExecuteX.vi					
		X		Χ			SwerveOdometry_GetPosition.VI	public Pose2d getPoseMeters()				
	X	X		X			SwerveOdometry_New.VI	public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle, Pose2d initialPose)				
	X	X		X			SwerveOdometry_NewZeroCenter.VI	public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle)				
	X	X		X			SwerveOdometry ResetPosition.VI	public void resetPosition(Pose2d pose, Rotation2d gyroAngle)				
	X	X	X	Χ			SwerveOdometry Update4.VI		For 4 module drives			
	X	X	X	X			SwerveOdometry UpdateWithTime4.VI		For 4 module drives			
		X					SwerveOdometry_UpdateWithTimeX.VI		uses array as input			
	X	X	X	X			SwerveOdometry UpdateX.VI		uses array as input			
									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)			
	plemented	ocumented	ot WPILIB	Menu Item Execution Optimize	Test Routine	nple Program				de Review	t Program	
	dμ	8	ζo	¥e Je	်း	San	VI Name	Function Prototype	Notes	8	်ရွ	
SWERVE DRIVE MODULE STA	.TE	$\frac{1}{\sqrt{2}}$		X SI	<u> </u>		SwerveModuleState CompareTo.vi	public int compareTo(SwerveModuleState o)	140103			
SWERVE DRIVE MODULE STA	.15							public int compare ro(swervelviodulestate o)				
							SwerveModuleState_Get.vi	with the Common National Chate (devicted and the common distributions of the common di				
	X			X SI			SwerveModuleState_New.vi	public SwerveModuleState(double speedMetersPerSecond, Rotation2d angle)				
	X	X		X SI	1		SwerveModuleState_Optimize.vi	public SwerveModuleState optimize(SwerveModuleState desired,				
							1	Rotation2d angle)				
==	Implemented	Documented	Not WPILIB	Menu Item Execution Optimized	Test Routine	Imple Program				de Review	est Program	:
CUBIC HERMITE SPL	INE X	X		X X X	Test		VI Name CubicHermiteSpline_getControlVectorFromArrays.vi CubicHermiteSpline_makeHermiteBasis.vi CubicHermiteSpline_New.vi		Notes not needed, use cluster unpack		7	
POSE WITH CURVATU	Implemented X X X	No commented X	Not WPILIB	X	Test Routine	Sample Program	CubicHermiteSpline_getControlVectorFromArrays.vi CubicHermiteSpline_makeHermiteBasis.vi	protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) Function Prototype public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter)	Notes	Code Review Co	Test Program	
	Implemented X X X	No commented X	Not WPILIB	Menu Item X X X Execution Optimized	Test Routine	Sample Program	CubicHermiteSpline_getControlVectorFromArrays.vi CubicHermiteSpline_makeHermiteBasis.vi CubicHermiteSpline_New.vi	protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) Function Prototype public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter) public PoseWithCurvature()	not needed, use cluster unpack	de Review	Test Program	

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public double curvatureRadPerMeter...

not needed, use cluster unpack

abVIEW Trajectory Library – VI Implementatior n 2.X 5/2/2022 – added implicit model follower and tim	n List ne intei	rpolata	able rou	utines.								
QUINTIC HERMITE SPLINI	E X X	X		X Wenu Item	Execution Optimize	Test Routine	VI Name QuinticHermiteSpline_getControlVectorFromArrays.vi QuinticHermiteSpline_makeHermiteBasis.vi QuinticHermiteSpline_New.vi	Function Prototype private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) protected SimpleMatrix getCoefficients()	Notes	Code Review	Test Program	
	nted	nted		E	n Optimized	Routine		protected Simple Matrix getCoemcients()	not needed, use cluster unpack	view	gram	Cking
	pleme	cumente	ot WPILIB	Menu Item	ecution	st				ode Revi	st Pro	, C
		ŏ	Not		_ŭ_	9 4	VI Name	Function Prototype	Notes	<u>Š</u>		, L
SPLINE (Abstract class	s) X	X		Χ			Spline_getPoint.vi	public PoseWithCurvature getPoint(double t)				
								Spline(int degree) public static class ControlVector				-
		_						public ControlVector(double[] x, double[] y)	implemented as data structure			
SPLINE HELPEI				X Menu	S Execution		VI Name SplineHelp_GetCubicCtrlVector.vi	Function Prototype private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point)	Notes	Code	Test	
	X			X		X	SplineHelp_GetCubicCtrlVectorsFromWayPts.vi	public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints(Pose2d start, Translation2d[] interiorWaypoints, Pose2d end)				
	X		X				SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi SplineHelp_GetCubicSpline_Calc1.vi		internal			-
	X		$\frac{1}{X}$				SplineHelp_GetCubicSpline_Calc2.vi		internal			
	X	X	X	No			SplineHelp_GetCubicSpline_Calc3.vi		internal			
	X			X		X	SplineHelp_getCubicSplinesFromControlVectors.vi	public static CubicHermiteSpline[] getCubicSplinesFromControlVectors(Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end)				
	X	X		X	SI		SplineHelp_GetQuinticCtrlVector.vi	private static Spline ControlVector getQuinticControlVector(double scalar, Pose2d point)			l	
							SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi	<pre>public static List<spline.controlvector> getQuinticControlVectorsFromWaypoints(List<pose2d> waypoints)</pose2d></spline.controlvector></pre>	REMOVED 2762			
	X			X			SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi SplineHelp_getQuinticSplinesFromControlVectors.vi	public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors(Spline.ControlVector[] controlVectors)	REMOVED 2762			
	X			X			SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi	'	New 2762			
	X			X			SplineHelp_GetQuinticSplinesFromWayPts.vi	private static void themes Algerithms/devible II and a vible II be devible.	New 2762			
	X	X		No			SplineHelp_ThomasAlgorithm.vi	private static void thomasAlgorithm(double[] a, double[] b, double[c, double[] d, double[] solutionVector)	Internal			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	VI Name			Code Review	Test Program	;
	duj	ρο	Not	Me	Exe	7es	VI Name	Function Prototype	Notes	Č	7es	l
VIEW Trajectory Library Routines visy	_	7		_	7	. ,	,		·	•		Page
												Page

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines SPLINE PARAMETERIZER X X SplineParam Spline T0 T1.vi public static List<PoseWithCurvature> parameterize(Spline spline, double t0, double t1) $X \mid X$ SplineParam Spline.vi public static List<PoseWithCurvature> parameterize(Spline spline) X X X No SplineParam StackGet.vi internal
 X
 X
 X
 No

 X
 X
 X
 No
 SplineParam StackPop.vi internal SplineParam StackPush.vi internal '----TRAJECTORY '======== Wenu Item Notes Function Prototype VI Name TRAJECTORY X Trajectory_Concatenate.vi X X FUTURE Χ Χ Χ Trajectory_equals.vi boolean equals(other obj) XX SI Trajectory_GetStates.vi public List<State> getStates() Χ not needed, use unpack Trajectory_GetTotalTime.vi Χ Χ X SI public double getTotalTimeSeconds() not needed, use unpack SI Trajectory_lerp_double.vi private static double lerp(double startValue, double endValue, X X No internal private static Pose2d lerp(Pose2d startValue, Pose2d endValue, XX No SI Trajectory lerp Pose.vi internal double t) XX Χ SI Trajectory_New_Empty.vi public Trajectory(final List<State> states) Χ Χ Χ SI Trajectory_New.vi X public Trajectory relativeTo(Pose2d pose) Χ Χ Trajectory_RelativeTo.vi Χ Χ Χ Trajectory_Sample.vi public State sample(double timeSeconds) Trajectory_SampleReverse.vi Χ Χ Χ Χ Sample in reverse order. Negate sample. XX X Trajectory TransformBy.vi public Trajectory transformBy(Transform2d transform) public Pose2d getInitialPose() can use cluster unpack, array index Routine WPILIB Menu Item VI Name Function Prototype Notes TRAJECTORY_STATE X Χ Χ SI TrajectoryState Equals.vi boolean equals(other obj) Χ Χ Χ Χ SI TrajectoryState GetAll.vi XX X SI TrajectoryState GetPose.vi $X \mid X$ X TrajectoryState Interpolate.vi State interpolate(State endValue, double i) Χ X Χ SI TrajectoryState New.vi public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter) public State() Execution Optin Menu Item VI Name Function Prototype Notes TRAJECTORY CONFIG X SI FrajectoryConfig Create.vi public TrajectoryConfig(double maxVelocityMetersPerSecond, X X double maxAccelerationMetersPerSecondSq) Χ Χ Χ SI TrajectoryConfig_setCentripetalAccel.vi X FrajectoryConfig_setKinematicsDiffDrive.vi public TrajectoryConfig setKinematics(DifferentialDriveKinematics Χ X SI

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines TrajectoryConfig setKinematicsMecanumfDrive.vi public TrajectoryConfig setKinematics(MecanumDriveKinematics X kinematics) $X \mid X$ Χ SI TrajectoryConfig setKinematicsSwerveDrive.vi public TrajectoryConfig setKinematics(SwerveDriveKinematics ki<u>nematics)</u> XX X SI TrajectoryConfig setReversed.vi public TrajectoryConfig setReversed(boolean reversed) 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) duplicate. public double getStartVelocity() can use cluster unpack public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond) public double getEndVelocity() can use cluster unpack public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond) public double getMaxVelocity() can use cluster unpack public double getMaxAcceleration() can use cluster unpack public List<TrajectoryConstraint> getConstraints() Implemented differently, can't duplicate. can use cluster unpack public boolean isReversed() NOTE ADD OTHER "SET" ROUTINES FOR OTHER CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC. WPILIB Menu Item VI Name Function Prototype Notes TRAJECTORY GENERATE X rajectoryGenerate Make Cubic CtrlVect.vi public static Trajectory generateTrajectory(Spline.ControlVector uses cubic splines initial, List<Translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<Translation2d> interiorWaypoints, Pose2d end, TrajectoryGenerate Make Cubic.vi Χ Χ X uses cubic splines TrajectoryConfig config)
Helper to bring these all together... Χ TrajectoryGenerate_Make_Generic.vi Use this one!!! $\overline{X} \mid X \mid$ Χ TrajectoryGenerate_Make_Quintic_CtrlVect.vi public static Trajectory generateTrajectory(ControlVectorList Χ uses quintic splines X X controlVectors, TrajectoryConfig config) XX X X TrajectoryGenerate Make Quintic Weighted.vi New 2762 X TrajectoryGenerate_Make_Quintic.vi public static Trajectory generateTrajectory(List<Pose2d> Χ Χ uses quintic splines waypoints, TrajectoryConfig config) Χ TrajectoryGenerate splinePointsFromSplines.vi public static List<PoseWithCurvature> X X splinePointsFromSplines(Spline[] splines) Item VI Name Function Prototype Notes TRAJECTORY GENERATE (Control Vector) public ControlVectorList(int initialCapacity) may not need, just data public ControlVectorList() may not need, just data public ControlVectorList(Collection<? extends may not need, just data Spline.ControlVector> collection) Menu Item Function Prototype Notes VI Name TRAJECTORY PARAMETERIZE X X X No TrajectoryParam_calcStuffFwd.vi

sion 2.X 5/2/2022 – added implicit model follower and time												
			X				TrajectoryParam_calcStuffRev.vi	multiple static validf Alti- 11 9 0	This parties are also to 1			-
	X			No			TrajectoryParam_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. This routines needs to be changed			-
		X	X	No			TrajectoryParam_enforceVelocity.vi		when new constraints are added.			
	X	X		X			TrajectoryParam_timeParam.vi	public static Trajectory timeParameterizeTrajectory(List <posewithcurvature> points. List<trajectoryconstraint> constraints, double startVelocityMetersPerSecond, double endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq, boolean reversed)</trajectoryconstraint></posewithcurvature>				
					imized	ш						
	plemented	Documented	Not WPILIB	nu Item	Execution Opti	rest Routine Sample Progra				Code Review	st Program	
	duJ	ρο	Not	Menu	Exe	Sar	VI Name	Function Prototype	Notes	\sim	Tes	
AJECTORY PARAMETERIZE CONSTRAINED STATE		X		X			ConstrainedState_New.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)				
	X	X	X				ConstrainedState_SetMaxAccel.vi					-
		X	X				ConstrainedState_SetMinAccel.vi ConstrainedState SetVelAccel.vi					+
			X				ConstrainedState SetVelocity.vi					
				7.			Constrained diate_dot volocity.vi	ConstrainedState()				
TRAJECTORY UTIL		X Documented	Not WPILIB	X Menu Item		Sample Prog	VI Name TrajectoryUtil_fromPathWeaverJSON.vi	Function Prototype public static Trajectory fromPathweaverJson(Path path)	Notes	Code Re	Test Pro	
	X	X	X	X	X		TrajectoryUtil_MakeWeightedWayPoint_ENG.vi TrajectoryUtil_MakeWeightedWayPoint.vi					-
	X			X	X		TrajectoryUtil_toPathWeaverJSON.vi	public static void toPathweaverJson(Trajectory trajectory, Path path)				
								public static Trajectory deserializeTrajectory(String json)				
								public static String serializeTrajectory(Trajectory trajectory)				
	nplemented	Documented	Vot WPILIB	Menu Item	Execution Optimized	rest Routine Sample Program	V/I Name	For etian Dratative	Nata			
TRAPEZOID PROFILE	_ <u>2</u>	_ Q	<	X	<u> </u>	8 78	VI Name TrapProfConstraint New.vi	Function Prototype	Notes			
THAT LEGID I NOTICE	X	X		X			TrapProfile Calculate.vi					
	X	X	X	No X			TrapProfile_Direct.vi TrapProfile_Execute.vi		Private, remove from menu			
		X	Χ	Χ	SI		TrapProfile_Execute_AtGoal.vi					
	X	X		X X			TrapProfile_IsFinished.vi TrapProfile_New_DefInitial.vi					
	X	X		X			TrapProfile New.vi					
	X	X		No			TrapProfile_ShouldFlipAcceleration.vi		Private, remove from menu			
	Χ	Χ		Х			TrapProfile_TimeLeftUntil.vi					
	X	X		X			TrapProfile_TotalTime.vi					
							I translituadi Mada I arrala re					
	X	X		X X			TrapProfState_Equals.vi TrapProfState New.vi					

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TRAJECTORY CONSTRAINT

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TORY CONSTRAINT									
====	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name Function Prototype	Notes
CENTRIPETAL ACCELERATION CONSTRAINT		X		X				CentripetalAccelConstraint_getMaxVelocity.vi public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X			(CentripetalAccelConstraint_getMinMaxAccel.vi public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI		(CentripetalAccelConstraint_New.vi public CentripetalAccelerationConstraint(double maxCentripetalAccelerationMetersPerSecondSq)	Can use cluster pack for now
DIFF DRIVE KINEMATIC CONSTRAINT	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine		VI Name Function Prototype DiffDriveKinematicsConstraint_getMaxVelocity.vi public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double	Notes
	X	X		X				poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) DiffDriveKinematicsConstraint_getMinMaxAccel.vi public MinMax	
				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI		Ī	DiffDriveKinematicsConstraint_New.vi public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond)	
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name Function Prototype	Notes
DIFF DRIVE VOLTAGE CONSTRAINT	X	X		X				DiffDriveVoltageConstraint_getMaxVelocity.vi public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X			1	DiffDriveVoltageConstraint_getMinMaxAccel.vi public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI		[DiffDriveVoltageConstraint_New.vi public DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)	
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name Function Prototype	Notes
JERK CONSTRAINT	/		X					JerkConstraint_getMaxVelocity.vi Routine exists, it is just a shell	FUTURE
	/		X		SI			JerkConstraint_getMinMaxAccel.vi Routine exists, it is just a shell JerkConstraint_New.vi Routine exists, it is just a shell	FUTURE FUTURE
	/				J1			I Noulli e exists, it is just a strell	I O I OIL

MECANUM DRIVE KINEMATICS CONSTRAINT		X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine	 VI Name MecaDriveKinematicsConstraint_getMaxVelocity.vi	Function Prototype	Notes
	X	X		X			MecaDriveKinematicsConstraint_getMinMaxAccel.vi		
	X	Χ		X	SI		MecaDriveKinematicsConstraint_New.vi		
SWERVE DRIVE KINEMATICS CONSTRAINT	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine	 VI Name SwerveDriveKinematicsConstraint_getMaxVelocity.vi SwerveDriveKinematicsConstraint_getMinMaxAccel.vi	Function Prototype public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	Notes

SwerveDriveKinematicsConstraint New.vi

TRAJECTORY CONSTRAINT

Interface class - nothing done (not needed)

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

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UTILITY

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

JAVA / C++ WPILIB EQUIVALENT

	. Implemented	. Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
UTIL	X	Χ	Χ	Χ	SI			Util_ApproxEqual.vi		
	X	X	X	X				Util_Array_PoseWCurv_to_XY.vi		
	X	Χ	X	Χ	SI			Util_CalcDist.vi		
	X	Χ	X	Χ	SI			Util_GetLibraryVersion.vi		
	X	Χ	X	Χ	SI			Util_GetLibUsage.vi		
	X	Χ	X	Χ				Util_GetTime.vi		Once tested completely, this should be optimized!
	Χ	Χ	Χ	No	N/A			Util_LibraryGlobals.vi		Global Variables – no block diag.
	Χ	Χ	Χ	Χ				Util_Trajectory_Absolute_To_Relative.vi		
	X	Χ	X	X				Util Trajectory ReadFile.vi		

Newpublic SwerveDriveKinematicsConstraint(final SwerveDriveKinematics kinematics, double maxSpeedMetersPerSecond)

Can use cluster pack for now

ie interp	olatar	ie rou	tines.		
X	Χ	Χ	Χ	Util_Trajectory_to_XY.vi	
X	Χ	Χ	No	Util_Trajectory_WriteFile_Config.vi	internal
X	Χ	Χ	No	Util_Trajectory_WriteFile_OneState.vi	internal
X	X	Χ	X	Util_Trajectory_WriteFile_PathFinder.vi	
X	Χ	Χ	No	Util_Trajectory_WriteFile_PathFinderConfig.vi	internal
X	X	Χ	X	Util_Trajectory_WriteFile_Pathweaver.vi	
X	Χ	Χ	No	Util_Trajectory_WriteFile_States.vi	internal
X	X	Χ	No	Util_Trajectory_WriteFile_WayPoints.vi	internal
X	Χ	Χ	Χ	Util_Trajectory_WriteFile.vi	
X	Χ	Χ	Χ	Util_TrajectoryState_Meters_To_Inches.vi	
X	X	Χ	X	Util_TrajState_to_DiffDrive_WheelPos.vi	
X	Χ	Χ	Χ	Util_DispWaypoint_Eng_To_SI.vi	
X	X	Χ	X	Util_DispWaypoint_To_CubicInput.vi	
X	Χ	Χ	Χ	Util_DispWaypoint_To_QuinticInput.vi	
X	Χ	Χ	Χ	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	VI Name	Function Prototype	Notes
CONV	Χ	Χ	Χ	Χ	SI			Conv_AngleDegrees_Heading.vi		
	Χ	Χ	Χ	Χ	SI			Conv_AngleRadians_Heading.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Centimeters_Meters.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Deg_Radians.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Deg_Rotations.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Feet_Meters.vi		
	Χ	Χ	Χ	Χ	SI			Conv_GyroDegrees_Heading.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Heading_AngleRadians.vi		
-	X	X	X	Χ	SI			Conv_Inches_Meters.vi		
	X	X	X	Χ	SI			Conv_Kilograms_Pounds.vi		
	X	X	X	X	SI			Conv_Meters_Feet.vi		
	X	X	X	X	SI			Conv_Meters_Inches.vi		
	X	X	X	X	SI			Conv_Pose2d_SI_Eng.vi		
-	X	X	X	X	SI			Conv_Pounds_Kilograms.vi		
	X	X	X	X	SI			Conv_Radians_Deg.vi		
	X	X	X	X	SI			Conv_Radians_Rotations.vi		
	X	X	X	X	SI			Conv_Rotations_Deg.vi		
	X	X	X	X	SI			Conv_Rotations_Radians.vi		
	Χ	X	X	X	SI			Conv_Yards_Meters.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimizea	Test Routine	Sample Program	VI Name	Function Prototype	Notes
UNITS	X	Χ		X	SI			Units_DegreesToRadians.vi		
	X	Χ		X	SI			Units_DegreesToRotations.vi		
	X	Χ		X	SI			Units_FeetToMeters.vi		
	Χ	Χ		Χ	SI			Units_InchesToMeters.vi		
	X	Χ		X	SI			Units_MetersToFeet.vi		
	X	Χ		X	SI			Units_MetersToInches.vi		
	Χ	Χ		Χ	SI			Units_MillisecondsToSeconds.vi		
	X	Χ		X	SI			Units_RadiansPerSecondToRotationsPerMinute.vi		

ie iii	ter por	alabi	e roui	unes.		
	X /	X		Χ	SI	Units_RadiansToDegrees.vi
	X /	X		Χ	SI	Units_RadiansToRotations.vi
	X)	X		Χ	SI	Units_RotationsPerMinuteToRadiansPerSecond.vi
	X 7	X		Χ	SI	Units_RotationsToDegrees.vi
	X \	X		Χ	SI	Units_RotationsToRadians.vi
	X 7	X		Χ	SI	Units_SecondsToMilliseconds.vi

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PATHFINDER UTIL

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

JAVA / C++ WPILIB EQUIVALENT

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program ≤	Name	Function Prototype	Notes
PATHFINDERUTIL	Χ	X	X	X			Pat	thfinderUtil_Continuous_Heading_Difference.vi		
	Χ	Χ	Χ	Χ			Pat	thfinderUtil_OptimizeTrajectoryStates.vi		
	Χ	Χ	Χ	Χ			Pat	thfinderUtil_ToTrajectory.vi		
	Χ	X	X	X				thfinderUtil ToTrajectoryStates.vi		

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STATE SPACE MODEL

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Sample Program emple Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DC MOTOR		X		X	SI		DCMotor_GetAndymark9015.vi					
	Χ	Χ		Χ	SI		DCMotor_GetAndymarkRs775_125.vi					
	Χ	X		Χ	SI		DCMotor_GetBag.vi					
	Χ	Χ		Χ	SI		DCMotor_GetBanebotsRs550.vi					
	Χ	Χ		Χ	SI		DCMotor_GetBanebotsRs775.vi					
	Χ	X		Χ	SI		DCMotor_GetCIM.vi					
	Χ	Χ		Χ	SI		DCMotor_GetCurrent.vi					
	Χ	X		Χ	SI		DCMotor_GetFalcon500.vi					
	Χ	X		Χ	SI		DCMotor_GetMiniCIM.vi					
	Χ	X		Χ	SI		DCMotor_GetNEO.vi					
	Χ	X		Χ	SI		DCMotor_GetNEO550.vi					
	Χ	X		X	SI		DCMotor_GetRomiBuiltIn.vi					
	Χ	X		X	SI		DCMotor_GetVex775Pro.vi					
	X	X		Χ	SI		DCMotor_New.vi					
	Χ	X		Χ	SI		DCMotor_PickMotor.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM ID	X	X		X	_	T .	LinearSystemId_CreateDCMotorSystem.vi	71				_
	, ,											
	X	X		X			LinearSystemId_CreateDriveTrainVelocitySy	/stem.vi	Update to use create matrix			

XX

LinearSystemId_CreateFlywheelSystem.vi

Update to use create matrix

tillic i	nicip	Olatai	no rou	itii iC3.			
	X	X		X		LinearSystemId_CreateSingleJointedArmSystem.vi	Update to use create matrix
	X	X		X		LinearSystemId_IdentifyDriveTrainSystem.vi	Update to use create matrix
	Χ	Χ		Χ		LinearSystemId_IdentifyPositionSystem.vi	Update to use create matrix
	X	X		X		LinearSystemId_IdentifyVelocitySystem.vi	Update to use create matrix

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

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	plemente	VPI I Ite	utic		Ä		Ċ
	Implemente Documente	Not WPILIB Menu Item	Execution Op Test Routine	VI Name Function Prototype Notes	Code	Test	Error
DIFFERENTIAL DRIVE POSE ESTIMATOR		≥ ≥ X	<u> </u>	VI Name Function Prototype Notes DiffDrivePoseEst AddVisionMeasurement.vi	<u></u>	<u> </u>	Щ
DITTERENTIAL DRIVE FOSE ESTIMATOR	X X	X		DiffDrivePoseEst_FillStateVector.vi			
	XX	X		DiffDrivePoseEst_GetEstimatedPosition.vi			
	XX	Х		DiffDrivePoseEst_Kalman_F_Callback.vi			
	XX	X		DiffDrivePoseEst_Kalman_H_Callback.vi			
	X X	X		DiffDrivePoseEst_New.vi			
-	XX	X		DiffDrivePoseEst_ResetPosition.vi			
	X X X X X	X		DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi DiffDrivePoseEst_Update.vi			
	XXX	X		DiffDrivePoseEst_UpdateWithTime.vi			
	XX	X		DiffDrivePoseEst VisionCorrect Callback.vi			
	XX	X		DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi			
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EXTENDED KALMAN FILTER	X X	X	Exec Test	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi	Code R		
EXTENDED KALMAN FILTER	X X X	X	Exec	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Correct.vi Just a shell, not functional!	Code R		
EXTENDED KALMAN FILTER	X X X X X X X	X X X	Exec	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Correct.vi Just a shell, not functional! ExtendedKalmanFilter_GetP_Single.vi	Code R		
EXTENDED KALMAN FILTER	X X X	X	Exec	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Correct.vi Just a shell, not functional! ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi	Code R		
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	Exec	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Correct.vi Just a shell, not functional! ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi	Code R		
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	Exec	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Correct.vi Just a shell, not functional! ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi	Code R		
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	Exec	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Correct.vi Just a shell, not functional! ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi	Code R		
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	Exec	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Correct.vi Ust a shell, not functional! ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Reset.vi	Code R		
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	Exec	VI Name ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_SetP.vi	Code R		
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	Exec	VI Name ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Gorrect_vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Nvi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi	Code R		
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	Exec	VI Name ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_SetP.vi	Code R		
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	Exec	VI Name ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Gorrect_vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Nvi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi	Code R		
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	Exec	VI Name ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Gorrect_vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Nvi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi	Code R		
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	Exec	VI Name ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Gorrect_vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Nvi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi ExtendedKalmanFilter_SetZet.vi	Code R		Error
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	ptimized Exec	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Correct.vi UstendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Ni ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Reset.vi ExtendedKalmanFilter_SetP.vi ExtendedKalmanFilter_SetP.vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi	Sw Code R		Error
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	Optimized Exec	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Gorrect_Vi Just a shell, not functional! ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Reset.vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi	View		ecking
EXTENDED KALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	ution Optimized Routine Test	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Gorrect_Vi Just a shell, not functional! ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Reset.vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi	Review	Program	. Checking
EXTENDED KALMAN FILTER	Semented Semented	X	ution Optimized Routine Test	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_Gorrect_Vi Just a shell, not functional! ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Reset.vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi	Review	Program	. Checking
	Maplemented Maple Maple	Not WPILIB X X X X X X X X X X X X X	Execution Optimized Test Routine	VI Name ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_GetP_Single_vi ExtendedKalmanFilter_GetP_Vi ExtendedKalmanFilter_GetP_Vi ExtendedKalmanFilter_GetP_Vi ExtendedKalmanFilter_GetP_Vi ExtendedKalmanFilter_GetVHat_Single_vi ExtendedKalmanFilter_GetVHat_Vi ExtendedKalmanFilter_New_vi ExtendedKalmanFilter_New_vi ExtendedKalmanFilter_Predict_vi ExtendedKalmanFilter_Predict_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetVHat_Single_vi ExtendedKalmanFilter_SetXHat_Single_vi ExtendedKalmanFilter_SetXHat_Vi Function Prototype Notes	View		ecking
EXTENDED KALMAN FILTER	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	Execution Optimized X Test Routine Test	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Ni ExtendedKalmanFilter_GetP_Ni ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_Vi ExtendedKalmanFilter_Peredict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_SetP_Ni ExtendedKalmanFilter_SetP_Ni ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Vi	Review	Program	· Checking
	X	Not WPILIB X X X X X X X X X X X X X	Execution Optimized X Test Routine Test	VI Name ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Ni ExtendedKalmanFilter_GetP_Ni ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat_Vi ExtendedKalmanFilter_Predict_vi ExtendedKalmanFilter_Predict_vi ExtendedKalmanFilter_Predict_vi ExtendedKalmanFilter_Predict_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_vi ExtendedKalmanFilter_SetXHat_vi ExtendedKalmanFilter_SetXHat_vi ExtendedKalmanFilter_SetXHat_vi ExtendedKalmanFilter_SetXHat_Vi ExtendedKalmanFilter_SetXHat_Vi ExtendedKalmanFilter_SetXHat_Vi ExtendedKalmanFilter_SetXHat_Vi	Review	Program	. Checking
	X	Not WPILIB X X X X X X X X X X X X X	Execution Optimized X Test Routine Test	VI Name ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Ni ExtendedKalmanFilter_GetVai_Single.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict vi ExtendedKalmanFilter_Predict vi ExtendedKalmanFilter_SetP_Ni ExtendedKalmanFilter_SetP_Ni ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_SetXHat_Single.vi ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_Correct.vi KalmanFilter_Correct.vi KalmanFilter_GetK Ka	Review	Program	. Checking
	X	Not WPILIB X X X X X X X X X X X X X	Execution Optimized X Test Routine Test	VI Name	Review	Program	. Checking
	X	Not WPILIB X X X X X X X X X X X X X	Execution Optimized X Test Routine Test	VI Name Function Prototype Notes ExtendedKalmanFilter_Correct_OnlyUY.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP_N ExtendedKalmanFilter_GetV.w ExtendedKalmanFilter_GetV.w ExtendedKalmanFilter_GetV.w ExtendedKalmanFilter_Pedict.vi ExtendedKalmanFilter_Pedict.vi ExtendedKalmanFilter_Pedict.vi ExtendedKalmanFilter_Pedict.vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetP_vi ExtendedKalmanFilter_SetVHat_vi ExtendedKalmanFilter_SetVHat_vi ExtendedKalmanFilter_SetVHat_vi ExtendedKalmanFilter_SetXHat_vi ExtendedKalmanFilter_SetXHat_vi ExtendedKalmanFilter_SetXHat_vi ExtendedKalmanFilter_SetXHat_vi	Review	Program	. Checking

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Revision 2 X	5/2/2022 - added imr	licit model follower and time intern	iolatable routines

.X 5/2/2022 – added implicit model follower and time	interp	oolata	ble rou	ıtines.				-				
·	Χ	Χ		Χ		Χ	KalmanFilter_Predict.vi					
	Χ			X			KalmanFilter_Reset.vi					
	Χ	Χ		X			KalmanFilter_SetXHat					
	Χ	X		X		X	KalmanFilter_SetXHat_Single					
KALMAN FILTER LATENCY COMPENSATOR	X Implemented	X	Not WPILIB	X X Menu Item	Execution Optimized	Test Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
		X		X			KalmanFilterLatencyComp_FindClosestMeasurement.vi					
		X		X			KalmanFilterLatencyComp_New.vi					
	X			X			KalmanFilterLatencyComp_Observer_New.vi					
	X	X		X			KalmanFilterLatencyComp_Reset.vi					
SWERVE DRIVE POSE ESTIMATOR	X	X X Documented		X X Menu Item	Execution Opti	Test Routine	SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi	Function Prototype	Notes	Code Review	Test Program	Error Checkin
	X			X			SwerveDrivePoseEst Kalman F Callback.vi					
	X			X			SwerveDrivePoseEst_Kalman_H_Callback.vi					
	X			X			SwerveDrivePoseEst New.vi					
	X			X			SwerveDrivePoseEst ResetPosition.vi					
	X			X			SwerveDrivePoseEst SetVisionMeasurementStdDevs.vi					
	Χ			Χ			SwerveDrivePoseEst_Update.vi					
		Χ		Χ			SwerveDrivePoseEst UpdateWithTime.vi					
	Χ	Χ		Χ			SwerveDrivePoseEst_VisionCorrect_Callback.vi					
	Χ	X		X			SwerveDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER				X			UnscentedKalmanFilter_Correct_FuncGroup.vi					
_	X			X			UnscentedKalmanFilter_Correct_OnlyUY.vi					
	X			X			UnscentedKalmanFilter_Correct_OnlyUYR.vi					
	X			X			UnscentedKalmanFilter_Correct.vi					
	X			X			UnscentedKalmanFilter_GetP_Single.vi UnscentedKalmanFilter_GetP.vi					
-	X			X			UnscentedKalmanFilter_GetZHat_Single.vi					
-	X			X			UnscentedKalmanFilter_GetXHat.vi					
-	X			X			UnscentedKalmanFilter_New_Default.vi					
+	X			X			UnscentedKalmanFilter_New_FuncGroup.vi					
-		X		X			UnscentedKalmanFilter_New.vi					
		X		X			UnscentedKalmanFilter Predict.vi					
L			1					l				

X	X	Χ		UnscentedKalmanFilter_Reset.vi
X	X	Χ		UnscentedKalmanFilter_SetP.vi
X	X	Χ		UnscentedKalmanFilter_SetXHat_Single.vi
X	X	Χ		UnscentedKalmanFilter_SetXHat.vi
X	X	Χ		UnscentedKalmanFilter_Transform.vi

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STATE SPACE CONTROL										
CONTROL AFFINE PLANT INVERSION FEEDFORWARD	Implemented Documented	Not WPILIB	Menu Item	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE ACCELERATION LIMITER	X Implemented Documented	Not WPILIB	X Menu Item	Execution Optimized X Test Routine	S VI Name DiffDrvAccelLimit Calculate.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	Implemented X S	<u> </u>	Menu Item X	Test Routine X		Function Prototype	Notes	Code Review	Test Program	Error Checking
	X X X X X		X X X X X	X X X X X	ImplModelFollow_GetU_Single.vi ImplModelFollow_New.vi ImplModelFollow_New_Plant.vi					
LINEAR PLANT INVERSION FEEDFORWARD			X Menu Item	Test Routine	ยื่อ อีน ยื่อ VI Name LinearPIntInvFF_Calculate_NextR.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X		X X X X X X X X		LinearPIntInvFF_Calculate.vi LinearPIntInvFF_GetR_Single.vi LinearPIntInvFF_GetR.vi LinearPIntInvFF_GetUff_Single.vi LinearPIntInvFF_GetUff.vi LinearPIntInvFF_New_Plant.vi LinearPIntInvFF_New.vi LinearPIntInvFF_Reset_Initial.vi LinearPIntInvFF_Reset_Zero.vi					

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LINEAR QUADRATIC REGULATOR		X		X	(LinearQuadraticRegulator_Calculate_NextR.vi				
	X	Χ		X					LinearQuadraticRegulator_Calculate.vi				
	Χ	Χ		X	(IOT ORIGINAL			
	Χ	Χ		X			Χ		LinearQuadraticRegulator_GetK.vi				
	Χ	Χ		X					LinearQuadraticRegulator_GetR_Single.vi				
	Χ	Χ		X					LinearQuadraticRegulator_GetR.vi				
	Χ	Χ		X					LinearQuadraticRegulator_GetU_Single.vi				
	Χ	Χ		X					LinearQuadraticRegulator_GetU.vi				
	/	Χ		X	(Χ		LinearQuadraticRegulator_LatencyCompensate.vi	Routine exists, but it only has			
										nterger raise matrix to power.			
	Χ	Χ		X					LinearQuadraticRegulator_New_ELMS.vi				
	Χ	X		X	(LinearQuadraticRegulator_New_N.vi				
									LinearQuadraticRegulator_New_Raw.vi				
	Χ	Χ		X	(Χ		LinearQuadraticRegulator_New_SystemELMS.vi				
	X	Χ		X					LinearQuadraticRegulator_New.vi				
	X	Χ		X					LinearQuadraticRegulator_Reset.vi				
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	直	8	≥	Me	Š	й	Ţe.	Sa	VI Name Function Prototype N	lotes	ပိ	Test	Error
LINEAR SYSTEM	X	X				1			LinearSystem_CalculateX.vi				
	Χ	X		X	(1			LinearSystem_CalculateY.vi				
		X			(SI			LinearSystem_GetA.vi				
	X										+		
	X			λ	<i>(</i>								
	Χ	Χ			(SI			LinearSystem GetAElement.vi				
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	X X X X	X X X X		X X X	(((SI SI SI SI			LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi				
	X X X X	X X X X		X X X	(((SI SI SI SI			LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi				
	X X X X X X	X X X X X X		X X X X	((((SI SI SI SI SI SI			LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi				
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	X X X X X X	X X X X X X		X X X X	((((SI SI SI SI SI SI			LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi				
	X X X X X X	X X X X X X		X X X X	((((SI SI SI SI SI SI			LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi				
	X X X X X X	X X X X X X		X X X X	((((SI SI SI SI SI SI			LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi				
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	X X X X X X X	X X X X X X X		X X X X X		SI SI SI SI SI SI	ne		LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi		, iew	те	sking
	X X X X X X X	X X X X X X X	89	X X X X X		Optimized Optimized	utine	Program	LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi		eview	ogram	hecking
	X X X X X X X	X X X X X X X	89	X X X X X		Optimized Optimized	Routine	Program	LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi		. Review	Program	Checking
	X X X X X X X	X X X X X X X	89	X X X X X		Optimized Optimized	st Routine	Program	LinearSystem_GetB.vi LinearSystem_GetBelement.vi LinearSystem_GetC.vi LinearSystem_GetC.vi LinearSystem_GetC.vi LinearSystem_GetD.vi LinearSystem_GetD.vi LinearSystem_GetDelement.vi LinearSystem_New.vi		ode Review	st Program	ģ
	X X X X X X	X X X X X X		X X X X X		SI SI SI SI SI SI	Test Routine	Sample Program	LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi LinearSystem_New.vi VI Name Function Prototype	lotes	Code Review	Test Program	Error Checking
LINEAR SYSTEM LOOP	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	89	X X X X X		Optimized Optimized	Test Routine	Sample Program	LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi LinearSystem_New.vi VI Name Function Prototype	lotes	Code Review	Test Program	ģ
LINEAR SYSTEM LOOP	X X X X X X X X X X X X X X X X X X X	X Documented X	Not WPILIB	X X X X X X X		Optimized Optimized	Test Routine	Sample Program	LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetCelement.vi LinearSystem_GetD.vi LinearSystem_GetDelement.vi LinearSystem_New.vi VI Name Function Prototype N LinearSystemLoop_ClampInput.vi	lotes	Code Review	Test Program	ģ
LINEAR SYSTEM LOOP	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	Not WPILIB	X X X X X		Optimized Optimized	Test Routine	Sample Program	LinearSystem_GetB.vi LinearSystem_GetBlement.vi LinearSystem_GetC.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi LinearSystem_New.vi VI Name Function Prototype InearSystemLoop_ClampInput.vi LinearSystemLoop_Correct.vi	lotes	Code Review	Test Program	ğ
LINEAR SYSTEM LOOP	X X X X X X X X X X X X X X 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		Optimized Optimized	Test Routine	Sample Program	LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetC.loi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi LinearSystem_GetDElement.vi LinearSystem_New.vi VI Name Function Prototype N LinearSystemLoop_ClampInput.vi LinearSystemLoop_Correct.vi LinearSystemLoop_GetClampFunction.vi	lotes	Code Review	Test Program	ğ
LINEAR SYSTEM LOOP	X X X X X X X X X X X X X X 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		Optimized Optimized	Test Routine	Sample Program	LinearSystem_GetB.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetC.vi LinearSystem_GetD.vi LinearSystem_GetD.vi LinearSystem_New.vi VI Name VI Name Function Prototype N LinearSystemLoop_ClampInput.vi LinearSystemLoop_Correct.vi LinearSystemLoop_GetClampFunction.vi LinearSystemLoop_GetClampFunction.vi LinearSystemLoop_GetController.vi	lotes	Code Review	Test Program	ģ
LINEAR SYSTEM LOOP	X X X X X X X X X X X X X X 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		Optimized Optimized	Test Routine	Sample Program	LinearSystem_GetAElement.vi LinearSystem_GetBLvi LinearSystem_GetBelment.vi LinearSystem_GetC.vi LinearSystem_GetC.vi LinearSystem_GetD.vi LinearSystem_GetDelment.vi LinearSystem_New.vi VI Name Function Prototype N LinearSystemLoop_ClampInput.vi LinearSystemLoop_Correct.vi LinearSystemLoop_GetCompFunction.vi LinearSystemLoop_GetController.vi LinearSystemLoop_GetError_Single.vi	lotes	Code Review	Test Program	ģ
LINEAR SYSTEM LOOP	X X X X X X X X X X X X X X 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		Optimized Optimized	Test Routine	Sample Program	LinearSystem_GetAElement.vi LinearSystem_GetBElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetD.vi LinearSystem_GetDelement.vi LinearSystem_New.vi VI Name Function Prototype N LinearSystemLoop_ClampInput.vi LinearSystemLoop_GetCelempEunction.vi LinearSystemLoop_GetController.vi LinearSystemLoop_GetError_Single.vi LinearSystemLoop_GetError.vi LinearSystemLoop_GetError.vi LinearSystemLoop_GetError.vi LinearSystemLoop_GetError.vi LinearSystemLoop_GetError_Single.vi LinearSystemLoop_GetError.vi	lotes	Code Review	Test Program	ĕ
LINEAR SYSTEM LOOP	X X X X X X X X X X X X X X 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		Optimized Optimized	Test Routine	Sample Program	LinearSystem_GetBelment.vi LinearSystem_GetBelment.vi LinearSystem_GetBelment.vi LinearSystem_GetC.vi LinearSystem_GetCelment.vi LinearSystem_GetDelment.vi LinearSystem_GetDelment.vi LinearSystem_GetDelment.vi LinearSystem_New.vi VI Name VI Name Function Prototype N LinearSystemLoop_ClampInput.vi LinearSystemLoop_Correct.vi LinearSystemLoop_GetClampFunction.vi LinearSystemLoop_GetClampFunction.vi LinearSystemLoop_GetCorror_Single.vi LinearSystemLoop_GetError_Vi LinearSystemLoop_GetError_vi LinearSystemLoop_GetError_vi LinearSystemLoop_GetError_vi LinearSystemLoop_GetFror_vi	lotes	Code Review	Test Program	ģ
LINEAR SYSTEM LOOP	X X X X X X X X X X X X X X 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		Optimized Optimized	Test Routine	Sample Program	LinearSystem_GetAElement.vi LinearSystem_GetBElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetD.vi LinearSystem_GetDelement.vi LinearSystem_New.vi VI Name Function Prototype N LinearSystemLoop_ClampInput.vi LinearSystemLoop_GetCelempEunction.vi LinearSystemLoop_GetController.vi LinearSystemLoop_GetError_Single.vi LinearSystemLoop_GetError.vi LinearSystemLoop_GetError.vi LinearSystemLoop_GetError.vi LinearSystemLoop_GetError.vi LinearSystemLoop_GetError_Single.vi LinearSystemLoop_GetError.vi	lotes	Code Review	Test Program	ģ

X X X	X		X X X			LinearSystemLoop_New.vi LinearSystemLoop_Predict.vi LinearSystemLoop_Reset.vi LinearSystemLoop_SetClampFunction.vi LinearSystemLoop_SetNextR_Some.vi LinearSystemLoop_SetNextR.vi LinearSystemLoop_SetXHat_Single.vi LinearSystemLoop_SetXHat.vi				
mplemented	ocumented	Vot WPILIB	Venu Item	Execution Optimized	lest Routine Sample Program			de Review	st Program	or Checking

LTV DIFFERENTIAL DRIVE CONTROLLER

_ 4	Q	2 3	S	Ψ	۳	ίχ	VI Name	Function Prototype	Notes	Ö	7	Ш
X			(LTVDiffDriveCtrl_Calculate.vi					
X		,	(LTVDiffDriveCtrl_New.vi					
X			(LTVDiffDriveCtrl_Calculate_TrajState.vi					
X		,	(LTVDiffDriveCtrl_Calculate_SetTolerance.vi					
X			(LTVDiffDriveCtrl_Calculate_AtReference.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optim	Test Routine	Sample Program		Function Prototype	Notes	Code Review	Test Program	Error Checking
LTV UNICYCLE CONTROLLER	X			X		X		LTVUnicycleCtrl_AtReference.vi					
	X		Х	X		Х		LTVUnicycleCtrl_Calculate_Orig.vi		This one computes a new LQR each time.			
	X		Χ	X		Х		LTVUnicycleCtrl_Calculate_TrajState_Orig.vi		This one computes a new LQR each time.			
	Χ			Χ		X		LTVUnicycleCtrl_Calculate_TrajState.vi					
	X			Χ		X		LTVUnicycleCtrl_Calculate.vi					
	Χ			Χ		X		LTVUnicycleCtrl_New.vi					
	X			Χ		X		LTVUnicycleCtrl_SetEnabled.vi					
	X			Χ		Χ		LTVUnicycleCtrl_SetTolerance.vi					

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

> VI Name Function Prototype Notes CallbackHelp_MatrixMinus.vi
> CallbackHelp_MatrixMult_CoerceSizeB.vi

<u> </u>	<i>jj</i>
Revision 2.X 5/2/2022 – added in	mplicit model follower and time interpolatable routines.

X	X	X	Χ	CallbackHelp_MatrixMult.vi		
Χ	X	X	Χ	CallbackHelp_MatrixPlus.vi		

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Sample Program NI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
STATE SPACE UTIL	Χ	X	X	No			StateSpaceUtil_Check_Stabalizable.vi		Internal routine			
	Χ	Χ		Χ			StateSpaceUtil_ClampInputMaxMagnitude.vi		Routine exists, it is just a shell			
	Χ	X		Χ			StateSpaceUtil_IsDetectable.vi					
	Χ	X		Χ			StateSpaceUtil_IsStabalizable.vi			1		
	Χ	X		X		X	StateSpaceUtil_MakeCostMatrix.vi			1		
	Χ	X		Χ		X	StateSpaceUtil_MakeCovarianceMatrix.vi					
	Χ	X		X			StateSpaceUtil_MakeWhiteNoiseVector.vi			1		
	Χ	X		X			StateSpaceUtil_NomalizeInputVector.vi					
	Χ	X		X			StateSpaceUtil_PoseTo3dVector.vi			1		
	Χ	X		Χ			StateSpaceUtil_PoseTo4dVector.vi					
	Χ	X		Χ			StateSpaceUtil_PoseToVector.vi					

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

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DC MOTOR SIM	X	Χ		Χ			DCMotorSim_getAngularPositionRad.vi					
	Χ	Χ		Χ			DCMotorSim_getAngularPositionRotations.vi					
	Χ	X		Χ			DCMotorSim_getAngularVelocityRadPerSec.vi					

ime interp	polat	able routine	S.		
X	X		·	DCMotorSim_getAngularVelocityRPM.vi	
X	X			DCMotorSim_GetCurrentDrawAmps.vi	
X	X	X		DCMotorSim_New_MOI.vi	
X	X			DCMotorSim_New_Plant.vi	
X	X	X		DCMotorSim_SetInputVoltage.vi	
X	X		·	DCMotorSim_Update.vi	
,					

DIFFERENTIAL DRIVE TRAIN SIN	Implemented Documented	 Menu Item	Execution Optimized	Test Routine	S VI Name Function Prototype Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE TRAIN SIN		X			DiffDriveTrainSim_ClampInput.vi	\vdash		
	XX	X			DiffDriveTrainSim_CreateKitbotSim_EstMass.vi			
	XX	X			DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi			
	XX	X			DiffDriveTrainSim_CreateKitbotSim.vi	\vdash		
	XX	X			DiffDriveTrainSim_GetCurrentDrawAmps.vi	\vdash		
	X X X X	X			DiffDriveTrainSim_GetCurrentGearing.vi			
		X			DiffDriveTrainSim_GetDynamics.vi	 	,——	
		X			DiffDriveTrainSim_GetHeading.vi DiffDriveTrainSim GetLeftCurrentDrawAmps.vi	 		
	X X X X	X			DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi DiffDriveTrainSim_GetLeftPositionMeters.vi		,——	
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	X			DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi			
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	X			DiffDriveTrainSim_GetDetrelocityMetersPersecond.vi			
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	X			DiffDriveTrainSim_GetOutput_Single.vi			
	$\begin{array}{ c c c c c } \hline X & X \\ \hline \end{array}$	X			DiffDriveTrainSim_GetPose.vi DiffDriveTrainSim_GetRightCurrentDrawAmps.vi			
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	X			DiffDriveTrainSim_GetRightPositionMeters.vi			
	X X	X			DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi			
	X X	X			DiffDriveTrainSim_GetState_Single.vi			
	X X	X			DiffDriveTrainSim GetState.vi			
	XX	X			DiffDriveTrainSim KitBotWheelSize.vi			
	XX	X			DiffDriveTrainSim New Mass MOI.vi			
	XX	X			DiffDriveTrainSim New.vi			
	XX	X			DiffDriveTrainSim_SetCurrentGearing.vi			
	XX	X			DiffDriveTrainSim SetInputs.vi			
	XX	X			DiffDriveTrainSim_SetPose.vi			
	XX	Χ			DiffDriveTrainSim_SetState.vi			
	XX	X			DiffDriveTrainSim_ToughBoxMiniGearRatio.vi			
	XX	X			DiffDriveTrainSim_ToughBoxMiniMotor.vi			
	XX	X			DiffDriveTrainSim_Update.vi			

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	K VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
ELEVATOR SIM	Χ	Χ		Χ			ElevatorSim_GetCurrentDraw.vi					
	Χ	Χ		Χ			ElevatorSim_GetPositionMeters.vi					
	Χ	Χ		Χ			ElevatorSim_GetVelocityMetersPerSecond.vi					
	Χ	X		X			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	X	No			ElevatorSim_RKF45_Func.vi					
	Χ	Χ		Χ			ElevatorSim_SetInputVoltage.vi					
	X	X		X			ElevatorSim SetState.vi					

I I TO LOD VIII	Lvv i i ajootoi y	Libiary	vi impiomonta	tion Liot
Revision 2.X	5/2/2022 - add	led implicit r	model follower and	time interpol

orary – VI Implementation	List												
nplicit model follower and time		olatal	ole rou										
	Χ	Χ	X	X				ElevatorSim_Update.vi		Needed because this doesn't			
				V				ElevatorSim_UpdateX.vi		extend.			
	X	X		X				ElevatorSim_WouldHitLowerLimit.vi			+		
	\overline{X}	\hat{x}		X				ElevatorSim WouldHitUpperLimit.vi					
L													
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	mple Program				Code Review	Test Program	or Checking
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FLYWHEEL SIM		X		Χ				FlyWheelSim_GetAngularVelocityRadPerSec.vi					
	Χ	Χ		Χ				FlyWheelSim_GetAngularVelocityRPM.vi					
	Χ	Χ		Χ				FlyWheelSim_GetCurrentDrawAmps					
								FlyWheelSim_New_LinSys		Future			
								FlyWheelSim_New_LinSys_MOI_NoNoise		Future			
								FlyWheelSim_New_LinSys_NoNoise		Future			
	Χ	Χ		X				FlyWheelSim_New_MOI.vi					
	X	X		X				FlyWheelSim_SetInput.vi					
	X	X		X				FlyWheelSim_SetState.vi					
	X	X		Χ				FlyWheelSim_Update.vi					
LINEAR SYSTEM SIM	X Implemented	X Documentea	Not WPILIB	X Menu Item	Execution Op	Test Routine		VI Name LinearSystemSim_ClampInput.vi	Function Prototype	Notes	Code Revie	Test Program	Error Checking
LINEAR OTOTEM OIM								LinearSystemSim_GetCurrentDrawAmps.vi		DONT IMPLEMENT			
	Х	X		X				LinearSystemSim_GetOutput_Single.vi		DOM: INIT ELIMENT			
	Χ	Χ		Χ				LinearSystemSim_GetOutput.vi					
	Χ	Χ		Χ				LinearSystemSim_New					
								LinearSystemSim_New_NoNoise.vi					
	Χ	Χ		Χ				LinearSystemSim_SetInput_Array.vi		Doesn't use clamp?			
	Χ	Χ		Χ				LinearSystemSim_SetInput_Single.vi					
	Χ	Χ		Χ				LinearSystemSim_SetInput.vi					
	Χ	Χ		Χ				LinearSystemSim_Setstate.vi					
	Χ	Χ		X				LinearSystemSim_Update.vi					
	X	X		No				LinearSystemSim_UpdateX.vi					
	Χ	<u> </u>	X	No				LinearSystemSim_UpdateY.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
SINGLE JOINT ARM SIM			_<_	<u>≥</u>	- W			SngJntArmSim_EsitmateMOI.vi	i unction i fototype	INOTES		7	<u> </u>
SINGLE JUINT ARIVI SIM	X	X		X				SngJntArmSim_EsitnateMOI.vi SngJntArmSim_GetAngleRads.vi					
	X	X		X				SngJntArmSim_GetCurrentDraw.vi					
	X	X		X				SngJntArmSim_GetVelocityRadsPerSec.vi					
	X	X		X				SngJntArmSim_HasHitLowerLimit.vi					
	X	X		X				SngJntArmSim_HasHitUpperLimit.vi					
	X	X		X				SngJntArmSim_New.vi					
	Χ	Χ		No				SngJntArmSim_Rkf45_Func.vi					
	Χ	Χ		Χ				SngJntArmSim_SetInputVoltage.vi					
	Χ	Χ		Χ				SngJntArmSim_SetState.vi					
	Χ	Χ		Χ				SngJntArmSim_Update.vi					
•													

IIC	nneip	Ulalal	ne routines.					
	X	Χ	X		SngJntArmSim_UpdateX.vi			
	Χ	Χ	X		SngJntArmSim_WouldHitLowerLimit.vi			
	X	Χ	X		SngJntArmSim_WouldHitUpperLimit.vi			

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

> X Menu Item
> IS Execution Optim Function Prototype VI Name Notes MAT BUILDER X X MatBuilder_Create.vi XX MatBuilder_Fill.vi

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optir	Test Routine	S VI Name Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX		X		- <u>X</u>	SI		Matrix_AssignBlock.vi	110103			
MATRIX	X	X		X	SI		Matrix Block.vi				
		<u> </u>					Matrix_ChangeBoundsUnchecked.vi				
	Y	X		X	SI		Matrix Create.vi				
		\ \ \			Oi		Matrix Det.vi				
	X	X		X	SI		Matrix_Diag.vi				
					Oi		Matrix Div Scalar.vi	labview has function			
							Matrix ElementPower.vi	idbylow flab fariotion			
	X	X		X	SI		Matrix ElementSum.vi				
							Matrix ElementTimes.vi				
							Matrix_Equals.vi				
	X	X		X	1		Matrix_Exp.vi				
	X	X		X	SI		Matrix ExtractColumnVector.vi				
	X	X		X	SI		Matrix_ExtractFrom.vi				
					· ·		Matrix ExtractMatrix.vi				
	X	X		Χ	SI		Matrix ExtractRowVector.vi				
	X	X		X	SI		Matrix_Fill.vi				
							Matrix Get.vi	labview has function			
	X	X		Χ	1		Matrix Ident.vi	WPILIB calls this EYE			
					-		Matrix Inv.vi				
	X	X		Χ	SI		Matrix IsEqual.vi				
							Matrix IsIdentical.vi				
	X	X		Χ	1		Matrix LLTDecompose.vi				
							Matrix Max.vi				
							Matrix MaxAbs.vi				
							Matrix Mean.vi				
							Matrix_MinInternal.vi				
							Matrix Minus Matrix.vi				
							Matrix Minus Scalar.vi				
	X	Χ		Χ	1		Matrix_NormF.vi				
							Matrix NormIndP1.vi				
							Matrix_Plus_Matrix.vi				
							Matrix Plus Scalar.vi				
	X	X		Χ	1		Matrix_Pow.vi	THIS NEEDS WORK!!!!			
	X	X		Χ	SI		Matrix SetColumn.vi				
	X	X		Χ	SI		Matrix_SetRow.vi THERE ARE LOTS OF OTHER MATRIX FUNCTIONS SHOULD BE INCLUDED HERE FOR ISOLATION.	STHAT			
							Matrix Solve.vi				

Revision 2.X 5/2/2022 – added implicit mo	odel follower and time	interr	nolatah	le rout	ines						
Nevision 2.X 3/2/2022 – added implicit mo		шетр	Dialas	ie routi	11103.			Matrix_Times_Matrix.vi			
					-+			Matrix_Times_Scalar.vi			
								Matrix_Trace.vi			
		X	X		X	SI		Matrix_Transpose.vi			
		Χ		Χ	X	-		Matrix_WithinTolerance.vi			
	SIMPLE MATRIX	/ Implemented	X Documented	Not WPILIB	X	Stimized State Cutton Optimized Test Routine	ram	VI Name Function Prototype Notes SimpleMatrix_ExtractMatrix.vi NOTE Matrix also has an ExtractMatrix with different calling parameters YUK.	v Code Review	n Test Program	ng Error Checking
		Implemented	Documented	Not WPILIB		Execution Op Test Routine	Sample Progr	VI Name Function Prototype Notes	Code Review	Test Program	Error Checking
	MATRIX HELPER	Χ	Χ	X	X	SI		MatrixHelper_CooerceSize.vi			
		Χ	Χ	X	X	SI		MatrixHelper_MultCooerceBSize.vi			
		Χ	X	X	_X	SI		MatrixHelper_Zero.vi			
		Implemented	Documented	Not WPILIB		Execution Optimiz Test Routine	Sample Program	VI Name Function Prototype Notes	Code Review	Test Program	Error Checking
	VECTOR BUILDER	X	X		$X \mid$	SI		VecBuilder_1x1Fill.vi			
		Χ	X		X	SI		VecBuilder_2x1Fill.vi			
		Χ	Χ	,	_X	SI		VecBuilder_3x1Fill.vi			
		X	X		X	SI		VecBuilder_4x1Fill.vi			
	-	X	X		X X	SI		VecBuilder_5x1Fill.vi			
	-	X	X	\rightarrow	X	SI SI		VecBuilder_6x1Fill.vi VecBuilder_7x1Fill.vi			
	-	X	X	\rightarrow	X	SI		VecBuilder_8x1Fill.vi			
				-+				VecBuilder_9x1Fill.vi			
								VecBuilder_10x1Fill.vi			
		Χ	Χ	X	X	SI		VecBuilder_ArrayBy1Fill.vi			
'====== MATH '========											
	ANGLE STATISTICS[X Implemented	X Documented	X Not WPILIB	Menu Item	X Execution Optimized Test Routine	Sample Program	VI Name Function Prototype Notes AngleStats_AngleAdd_CallbackHelp.vi	Code Review	Test Program	Error Checking

FRC LabVIEW Trajectory Library – VI Implementation List

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

| X | X | X | X | AngleStats_AngleAdd.vi

	X	Χ		X	1	X		AngleStats_AngleAdd.vi				
	Χ		X	Χ	Χ			AngleStats_AngleMean_CallbackHelp.vi				
	Χ	Χ		X	1	X		AngleStats_AngleMean.vi				
	Χ		X	Χ	X			AngleStats_AngleResidual_CallbackHelp.vi				
	X	Χ		Χ	1	X		AngleStats_AngleResidual.vi				
					~							
					zec							
					ii.		m					5
	Ø	Ø			Opt	Φ	gre			\$	E	king King
	nte	nte	- 19	Ē		ıtin	Pro			χį	gra	ec/
	ше	ne	ď	lte	iţi	301	e			Re	. Program	Checking
	Implemente	Documente	Not WPILIB	Menu Item	Execution	Test Routine	Sample			qe	st I	Error
			δ	Me		7е	Sa		Notes	Š	Test	En
MATH UTILITY		Χ		Χ	SI			MathUtil_AngleModulus.vi				
	X	X		Χ	SI			MathUtil_ApplyDeadband.vi				
	Χ	Χ		Χ	SI			MathUtil_Clamp_Int.vi				
	Χ	Χ		Χ				MathUtil_Clamp.vi				
	Χ	Χ		X	SI			MathUtil_InputModulus.vi				
	X	Χ		X	Si			MathUtil_Interpolate.vi				
					75							
					zec							
					imi		ш					70
	Ø	Ø			Opt	a)	gre			8	E	ding.
	nte	nte	97	Ē		ıtin	Progr			χį	gra	ec/
	ше	иe	ď	lte	iţi	રજ	e e			Re	. Program	\mathcal{E}
	Implementea	Documente	Not WPILIB	Menu Item	Execution	Test Routine	Sample			ge	st F	Error Checking
	Ē	8	8	Ø	й	Ţe.	Sa		Notes	Ö	Test	Eri
MERWE SCALED SIGMA POINTS		Χ		X	1			MerweScSigPts_ComputeWeights.vi				
	Χ	X		X	SI			MerweScSigPts_GetNumSigmas.vi				
	Χ	X		X	SI SI			MerweScSigPts_GetWc_Single.vi				
	Χ	X		Χ	SI			MerweScSigPts_GetWc.vi				
	Χ	Χ		Χ	SI			MerweScSigPts_GetWm_Single.vi				
	Χ	X		Χ	SI			MerweScSigPts_GetWm.vi				
	Χ	X		Χ				MerweScSigPts_New_Default.vi				
	Χ	Χ		X	1			MerweScSigPts_New.vi				
	Χ	Χ		X	1			MerweScSigPts_SigmaPoints.vi				
					_							
					mized							
					ini;		ШE					50
	Ø	Ø			Opti	Φ	gre			\$	Ē	king
	mplemented	Documented	Not WPILIB	Ē		Routine	Progr			ivie	Program	Checking
	ие	ие	ď	lte	ıţio	રુ	ble I			Re	2	\mathcal{E}
	o/e	ກິວ	<i>≠</i>	Menu Item	Execution	st I	E			qe	st I	Error
	<u>E</u>		8		Ϋ́	Test	Sa		Notes	ပိ	7 9	Eu
NUMERICAL INTEGRATION	Χ	X		X	1				NOT USED. Should this be used			
									or abandoned???			
		X		X				NumIntegrate_Rk4_Dbl_X_U.vi				
	X	X		X				NumIntegrate_Rk4_Dbl_X.vi				
	X	X		X				NumIntegrate_Rk4_Mat_X_U.vi				
	X	X		X	CI			NumIntegrate_Rk4_Mat_X.vi NumIntegrate Rkdp Func A.vi				
	X	X		No No								
	X	X		NO	SI	1		NumIntegrate_Rkdp_Func_B1.vi NumIntegrate_Rkdp_Func_B1B2.vi				
	X	X		No	SI	1	1	NumIntegrate_Rkdp_Func_B182.vi			+	
	X	X		No				Numintegrate_Rkdp_Func_Bz.vi Numintegrate_Rkdp_Impl.vi				
	X	X		X					New replacement for RKF45			
	X	X		No	SI			NumIntegrate_Rkf45_Func_A.vi	recw replacement for INIC45			
	X	\hat{X}		No				NumIntegrate_Rkf45_Func_B1.vi				
	X	\hat{x}			SI			NumIntegrate_Rkf45_Func_B1B2.vi				
	X	\overline{X}		No	SI	1		NumIntegrate_Rkf45_Func_B2.vi				
				. 10		1		,				

FRC LabVIEW Trajector	y Library – VI Implementation I	List										
Revision 2.X 5/2/2022 – ad	ded implicit model follower and time	interpol	latable	routin	ies.			NumIntegrate_RKf45_Func_Bs.vi	Removed. Replaced with newer			
									functions.			
								NumIntegrate_RKf45_Func_Ch.vi	Removed. Replaced with newer functions.			İ
								NumIntegrate_RKf45_Func_Ct.vi	Removed. Replaced with newer			
		X	X	_	No	1		NumIntegrate_Rkf45_Impl.vi	functions.			
			X		X			NumIntegrate_Rkf45_Mat_X_U.vi	Note that this Feinberg method has been changed and a Dormand Price method has been			
								NumIntegrate_RKf45_New.vi	implemented TODO Removed. Never used.			
		X	X	X	X	SI		NumIntegrate_Trap_Dbl.vi	nomovou. Novor dodd.			
		X	X	X	X	1		NumIntegrate_Trap_Mat.vi				
	L											
		Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	rest Noutifie Sample Program	VI Name Function Prototype	Notes	Code Review	Test Program	Error Checking
	RUNGE KUTTA TIME VARYING	X	X	_	No			RungeKuttaTimeVarying_RK4_Mat_T_Y.vi	110100			7
		Implemented				Execution Optimized	Sample Program	VI Name Function Prototype	Notes	Code Review	Test Program	Error Checking
	NUMERICAL JACOBIAN		X		X X			NumJacobian_U.vi NumJacobian_X.vi				
				_	^			Nullidacobiali_X.VI				
	RICCATI	X X X X	X X X X	X X	X X Wenu It	Execution	Sample Program	VI Name Function Prototype Riccati_Check_Detectable.vi Riccati_Check_Stabilizable.vi Riccati_DARE_Iterate.vi Riccati_DARE_StructDoubling.vi Riccati_DARE_N.vi Riccati_DARE_N.vi Riccati_DARE.vi	Notes Routine exists, it is just a shell Not really done !!!	Code Review	Test Program	Error Checking
			X		X		`	Riccati_Input_Check.vi				
'====== VISION '========												
	COMPUTER VISION UTILITIES	X	X X Documented	Not N	X Menu Item	Execution Optimized	Sample Program	VI Name Function Prototype CompVisionUtil_CalculateDistanceToTarget.vi CompVisionUtil_EstimateCameraToTarget.vi	Notes	Code Review	Test Program	Error Checking
		_ X	<u> </u>		Λ			Compvision∪tii_EstimateCamera ro rarget.vi				

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

 $Z \mid X \mid X \mid X \mid N/A$

 Z
 X
 X
 X
 N/A

 Z
 X
 X
 X
 N/A

Z X X X N/A

Z X X X N/A

Z X X X N/A

Z X X X N/A

X X N/A

X X N/A

Ζ

Χ	X	X		CompVisionUtil_EstimateFieldToCamera.vi			
Χ	Χ	Χ		CompVisionUtil_EstimateFieldToRobot.vi			
Χ	Χ	X		CompVisionUtil_EstimateFieldToRobot_Alt.vi			

'======== TYPE DEFINITIONS '========= Menu Item Execution VI Name Function Prototype Notes ARM FF.CTL TypeDef Z X X X N/A Z X X X N/A BANG BANG.CTL BICon-Matrix FUNC TYPE.CTL NOT USED. Should this be X X N/A deleted or abandoned??? Z X X X N/A CALLBACK FUNC TYPE.CTL Z X X X N/A CHASSIS SPEEDS.CTL Z X X X N/A CONTRAINED STATE.CTL Z X X N/A COORDINATE AXIS.CTL X X N/A COORDINATE SYSTEM.CTL Z X X X N/A DCMOTOR TYPES ENUM.CTL DCMOTOR.CTL $Z \mid X \mid X \mid X \mid N/A$ DCMOTOR SIM.CTL $Z \mid X \mid X \mid X \mid N/A$ DEBOUNCER TYPE ENUM.Ctl $Z \mid X \mid X \mid X \mid N/A$ DEBOUNCER.CTL $Z \mid X \mid X \mid X \mid N/A$ DIFF DRIVE ACCEL LIMIT.CTL $Z \mid X \mid X \mid X \mid N/A$ DIFF DRIVE KINEMATICS.CTL $Z \mid X \mid X \mid X \mid N/A$ DIFF DRIVE Kitbot WheelSize ENUM.ctl Z X X X N/A DiFF DRIVE Pose EST.ctl Z X X X N/A DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl Z X X X N/A DIFF DRIVE ToughBoxMini MotorChoice ENUM.ctl Z X X X N/A Z X X X N/A DIFF DRIVE TRAIN SIM STATE ENUM.CTL $Z \mid X \mid X \mid X \mid N/A$ DIFF DRIVE TRAIN SIM.ctl DISPLAY WAYPOINT.ctl Was UTIL WAYPOINT.VI $Z \mid X \mid X \mid X \mid NA$ DISPLAY WEIGHTED WAYPOINT.ctl New V1.5. was $Z \mid X \mid X$ X NA UTIL WEIGHTED WAYPOINIT.VI Z X X X N/A ELEV FF.CTL Z X X X N/A ELEVATOR SIM.CTL Z X X X N/A EXTENDED KALMAN CORRECT FUNC GROUP.CTL Z X X N/A EXTENDED KALMAN FILTER.CTL Z X X X N/A FLYWHEEL SIM.ctl Z X X X N/A FUNCTION GENERATOR.ctl Z X X X N/A FUNCTION GENERATOR MATRIX.ctl Z X X X N/A HOLONOMIC DRV CTRL.CTL New 1/26/21 Z X X X N/A TIME INTERPOLATABLE BOOLEAN.CTL Z X X X N/A TIME INTERPOLATABLE DOUBLE.CTL TIME INTERPOLATABLE POSE2D.CTL Z X X X N/A Z X X X N/A TIME INTERPOLATABLE ROTATION2D.CTL Z X X X N/A KALMAN FILTER LATENCY COMP FUNC GROUP.CTL KALMAN FILTER LATENCY COMP.CTL $Z \mid X \mid X \mid X \mid N/A$

> KALMAN_FILTER.ctl LINEAR FILTER.CTL

LINEAR PLANT INV_FF.ctl

LINEAR_SYSTEM_LOOP.ctl

LTV DIFF DRIVE CTRL.ctl

LINEAR_SYSTEM_SIM.ctl

LINEAR SYSTEM.ctl

LINEAR QUADRATIC REGULATOR.ctl

LTV_DIFF_DRIVE_CTRL_STATE_ENUM.ctl

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me interp	olatab	ole rou	tines.			
Z		X	Χ	N/A	LTV_UNICYCLE_CONTROLLER.CTL	
Z		X	Χ	N/A	LTV_UNICYCLE_CONTROLLER_INPUT_ENUM.ctl	
Z		X	Χ	N/A	LTV UNICYCLE CONTROLLER STATE ENUM.ctl	
Z	Χ	Χ	Χ	N/A	MECA DRIVE KINEMATICS.CTL	
Z	Χ	X	Χ	N/A	MECA DRIVE ODOMETRY.CTL	
Z	Χ	Х	Χ	N/A	MECA WHEEL SPEEDS.CTL	
Z	Χ	Х	X	N/A	MEDIAN FILTER.CTL	
Z	X	X	X	N/A	MERWE SCALED SIGMA PTS.ctl	
Z	X	X	X	N/A	OBSERVER SNAP LIST ITEM.CTL	
Z	X	X	X	N/A	OBSERVER SNAPSHOT.CTL	
Z	X	X	X	N/A	PARAM STACK ITEM.CTL	
		\hat{X}	X	N/A	PARAM STACK.CTL	
Z	X	X	X	N/A N/A	PID ADV LIMITS.CTL	
Z						
Z	X	X	X	N/A	PID_ADV_TUNING.CTL	
Z	X	X	X	N/A	PID_CONTROLLER.CTL	
Z	Χ	X	X	N/A	PID_ERROR_TOLERANCE.CTL	
Z	Χ	X	Χ	N/A	PID_INPUT_LIMITS.CTL	
Z	Χ	X	X	N/A	PID_TUNING.CTL	
Z	Χ	Χ	X	N/A	POSE2D.CTL	
Z		Χ	X	N/A	POSE3D.CTL	
Z	Χ	Χ	X	N/A	POSEwCURVATURE.CTL	
Z	Χ	Χ	X	N/A	PROFILED_PID_CONTROLLER.CTL	
Z		X	X	N/A	QUATERNION.CTL	
Z	Χ	Χ	X	N/A	RAMSETE_EXE_TUNING.CTL	
Z	Χ	X	X	N/A	RAMSETE.CTL RAMSETE.CTL	
Z	Χ	X	X	N/A	ROTATION2D.CTL	
Ζ		Χ	Χ	N/A	ROTATION3D.CTL	
Z	Χ	Х	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	
	X	X	\overline{X}	N/A	SWERVE DRIVE ODOMETRY.CTL	
Z	X	X	X	N/A N/A	SWERVE DRIVE POSE EST.CTL	
Z	X	X	X	N/A	TIMER.CTL	
Z	X	X	X	N/A	TRAJ_CONFIG.CTL	
Z	X	X	X	N/A	TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL	
Z	X	X	X	N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_KINEMATICS.CTL	
Z	Χ	X	Χ	N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_VOLTAGE.CTL	
1		Χ		N/A	TRAJ_CONSTRAINT_JERK.CTL	Routine exists, it is just a shell
Z	Χ	X	Χ	N/A	TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL	
Z	Χ	X	X	N/A	TRAJ_CONSTRAINT_MINMAX.CTL	
Z	Χ	X	X	N/A	TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	
Z	Χ	Χ	X	N/A	TRAJ_STATE.CTL	
Z	Χ	X	X	N/A	TRAJECTORY_SPLINE_TYPE_ENUM.CTL	
Z	Χ	X	Χ	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	X	N/A	TRANSLATION3D.CTL	
Z	Χ	Χ	X	N/A	TRAPEZOID_PROFILE_CONSTRAINT.CTL	
Ζ	Χ	X	Χ	N/A	TRAPEZOID PROFILE STATE.CTL	
Z	Χ	Χ	Χ	N/A	TRAPEZOID PROFILE.CTL	
Z	Χ	X	X	N/A	TWIST2D.CTL	
Z		X	X	N/A	TWIST3D.CTL	
Z	Χ	X	X	N/A	UNSCENTED KALMAN CORRECT FUNC GROUP.CTL	
Z	X	X	X	N/A	UNSCENTED KALMAN FILTER.ctl	
Z	X	X	X	N/A	UNSCENTED KALMAN NEW FUNC GROUP.CTL	
Z	X	X	X	N/A	UTIL PATHFINDER CONFIG.CTL	
N/A	^	N/A	^	N/A	WAYPOINTS.CTL	Delete – obsolete
	X		Χ		WEIGHTED WAYPOINT.CTL	New V1.5
Z	٨	X	^	NA N/A	_	
N/A Z	X	N/A X	Χ	N/A N/A	X_Y_HEADINGS.CTL X Y PAIR.CTL	Delete – obsolete
	^	_ ^	^	IVA	N_1_1 AIN.OTE	

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