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

VI / CTL Totals
VI Total (X)
CTL Totals (Z)
VI Shell Total (I)
CTRL Shell Total (I)

Doc completed Pct 99.91% Optimization Pct 56.03%

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

'======== BASE

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

entation udpate.													
LINEAR FILTER		X		X	1			LinearFilter_BackwardFiniteDifference.vi					
	Χ	Χ		X	SI	'		LinearFilter_Calculate.vi					
	Χ	Χ	Χ	X	X			LinearFilter_CutoffFrequency.vi					
	Χ	Χ	Χ				X	LinearFilter_Execute.vi		Labview style helper			
	Χ	Χ		No				LinearFilter_Factorial.vi		AN INTERNAL ROUTINE			
	Χ	Χ			1			LinearFilter_FiniteDifference.vi					
	Χ	X		X	X			LinearFilter_HighPass.vi					
	Χ	Χ	Χ	X	X			LinearFilter_HighPassBW1.vi					
	Χ	Χ	Χ	X	X			LinearFilter_HighPassBW2.vi					
	Χ	Χ	X	X	X			LinearFilter_LowPassBW1.vi					
	Χ	Χ	Χ		X			LinearFilter_LowPassBW2.vi					
	Χ	Χ		X				LinearFilter_MovingAverage.vi					
	X	X		X	1			LinearFilter_New.vi					
	X	X		X	SI			LinearFilter_Reset.vi					
	X	Χ	Χ					LinearFilter_ResetToValue.vi					
_	X	X		X	X			LinearFilter_SinglePoleIIR.vi					
	Χ	Χ	Χ	Χ	X			LinearFilter_TimeConst.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Samule Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
MEDIAN FILTER	X	X		X	X			MedianFilter Calculate.vi					
	Χ	Χ	Χ	X	1		λ	MedianFilter_Execute.vi		Labview style helper			
	Χ	X		X	SI			MedianFilter New.vi		, i			
	Χ	Χ		X	SI			MedianFilter_Reset.vi					
	Χ	X	X	X	SI			MedianFilter ResetToValue.vi					
SLEW RATE FILTER	X X Implemented	X X Documentea	X X Not WPILIB		い Execution Op	'	Sec.	VI Name SlewRateLimiter_Calculate.vi SlewRateLimiter_Close.vi SlewRateLimiter_Evecute.vi	Function Prototype	Notes Labview style helper	Code Review	Test Program	Error Checking
	X	X	X	X	SI			SlewRateLimiter GetRate.vi		Labricw Style Helper			
	X	X		X	1	_		SlewRateLimiter_New.vi					
	X	X		X	1			SlewRateLimiter_NewInitialZero.vi					
	X	X		X	1			SlewRateLimiter_Reset.vi					
	X	X		X	I SI			SlewRateLimiter_SetRate.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	ample Program			Code Review	Test Program	Error Checking
		Ğ	ž	Ž	ΨΨ	<u></u>	, °		Function Prototype	Notes	ŏ		Ē
TIMER	X	X	Χ	X				Timer_Close.vi		releases semaphore			
	X	X		X			X	Timer_Get.vi					
	X	X	X	X			\perp	Timer_GetAndReset.vi		lata was al fassina ()			
_	X	X	X	No				Timer_GetInternal.vi		Internal (private) only			
	X	X		X				Timer_HasPeriodPassed.vi					
	X	X	X	X				Timer_HasPeriodPassedOnce.vi					
	X	X		X				Timer_New.vi					
	X	X		X			λ	Timer_Reset.vi		letere el freier ()			
	X	X	X	No				Timer_ResetInternal		Internal (private) only			
	X	X		X				Timer_Start.vi					
	X	X		X No			X	Timer_Stop.vi					
	~	Y	Χ	I No			- 1	Timer_StopInternal.vi	1	Internal (private) only	1	1	

TIME INTERPOLATABLE BOOLEA	X X Implemented	Documented	Not WPILIB	щ	Optimize	45	ram					_
TIME INTERPOLATABLE BOOLEA	X		Not V	Menu Item	Execution	Test Routine	Sample Programme	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	Χ	Χ	X	1		TimeInterpBoolean_AddSample.vi	71	Update to use create matrix		`	
		X	X	No X	SI		TimeInterpBoolean_CleanUp.vi TimeInterpBoolean_Clear.vi		Update to use create matrix			
	X	X	X	X	1		TimeInterpBoolean_Cteal.vi TimeInterpBoolean_GetSample.vi					
	X	Χ	X	X	SI		TimeInterpBoolean_New.vi					
	Χ	Χ	X	Χ	SI		TimeInterpBoolean_SetMaxTime.vi					
TIME INTERPOLATABLE DOUBLE	X X Implemented	X X Documented	X X Not WPILIB	No	☑	Test Routine	VI Name TimeInterpDouble_AddSample.vi TimeInterpDouble_CleanUp.vi TimeInterpDouble_Clear.vi	Function Prototype	Notes Update to use create matrix Update to use create matrix	Code Review	Test Program	Error Checking
	X	X	X	X	1		TimeInterpDouble_Clear.vi TimeInterpDouble GetSample.vi					
	X	X		X	SI SI		TimeInterpDouble_New.vi TimeInterpDouble_SetMaxTime.vi					
TIME INTERPOLATABLE POSE2D	X	X	X X X X X X	No X X X	1	Test Routine	VI Name TimeInterpPose2d_AddSample.vi TimeInterpPose2d_CleanUp.vi TimeInterpPose2d_Clear.vi TimeInterpPose2d_GetSample.vi TimeInterpPose2d_New.vi TimeInterpPose2d_SetMaxTime.vi	Function Prototype	Notes Update to use create matrix Update to use create matrix	Code Review	Test Program	Error Checking
TIME INTERPOLATABLE ROTATION2D	X 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 L Execution Optimized	Test Routine	VI Name TimeInterpRotation2d_AddSample.vi TimeInterpRotation2d_CleanUp.vi TimeInterpRotation2d_Clear.vi TimeInterpRotation2d_GetSample.vi TimeInterpRotation2d_GetSample.vi TimeInterpRotation2d_New.vi	Function Prototype	Notes Update to use create matrix Update to use create matrix	Code Review	Test Program	Error Checking
DIGITAL SEQUENTIAL LOGIC	X Implemented X X	X Documented X	X Not WPILIB	X Menu Item	Execution Optimized 99	Test Routine	TimeInterpRotation2d_SetMaxTime.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking

X	X	X	X	DigSeqLogic_Off_Delay.vi			
X	Χ	X	X	DigSeqLogic_One_Shot.vi			
X	Χ	X	Χ	DigSeqLogic_SR_Flip_Flop.vi			

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DEBOUNCER	X	Χ		X			Debouncer_New.vi					
	X	Χ		Χ			Debouncer_Calculate.vi					
	X	Χ	Χ	X			Debouncer_Execute.vi					
	X	Χ		No			Debouncer_Reset.vi					
	Χ	X		No			Debouncer_HasElapsed.vi					
							·					

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

> Function Prototype Notes ARM FF X X ArmFF Calculate.vi Χ ArmFF_CalculateVelocityOnly.vi
> ArmFF_Execute.vi XX X LabVIEW style single call X ArmFF_ExecuteVelocityOnly.vi
> ArmFF_MaxAchieveAccel.vi LabVIEW style single call X Χ X ArmFF_MaxAchieveVelocity.vi ArmFF MinAchieveAccel.vi X X X X ArmFF_MinAchieveVelocity.vi ArmFF_New_ZeroGravity.vi ArmFF New.vi

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

Execution Optimized Menu Item Function Prototype Notes

CONTROLLER UTIL											
L	X	<	X	SI		ControllerUtil_GetModulusError.vi		This was short lived in WPILIB, but still useful here.			
	Implemented	Documented Not WPII IB	Menu Item	Execution Optimized	Test Routine	Sample Program NI Name			Code Review	rogram	Error Checking
	Je.	3 \$	חמ	noe	St Fi	du			ge	st F	o, o
			Me	EX	Ğ	S VI Name	Function Prototype	Notes	Š	<u>7</u> e8	Err
ELEV FF			X			ElevFF_Calculate.vi					
	X Z	(X		'	ElevFF_CalculateVelocityOnly.vi					
		λ				ElevFF_Execute.vi		LabVIEW style single call			
		λ			<u> </u>	ElevFF_ExecuteVelocityOnly.vi		LabVIEW style single call			
		(X		 '	ElevFF_MaxAchieveAccel.vi					
		(X		!	ElevFF_MaxAchieveVelocity.vi					
		(X			ElevFF_MinAchieveAccel.vi					
<u> </u>		(X			ElevFF_MinAchieveVelocity.vi ElevFF New ZeroAccel.vi					
		< <	$\frac{\lambda}{X}$		+	ElevFF New.vi					
L	^ /	`				Elever_inew.vi					
	Implemented	Not MPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	Function Proteture	Nata	Code Review	est Program	Error Checking
		<u>3 ≥</u>	≥ X	_ ш			Function Prototype	Notes Added 1/24/2022	S	F	<u> </u>
			$\frac{\lambda}{X}$		+	HolDrvCtrl_AdvCalculate_Trajectory.vi HolDrvCtrl_AdvCalculate.vi		Added 1/24/2022 Added 1/24/2022			
		\ \ \ \	X		+	HolDrvCtrl AtReference.vi		Added 1/24/2022 Added 1/26/21			
		<u>`</u>	X	1		HolDrvCtrl_Calculate_Trajectory.vi		Added 1/26/21 Added 1/26/21			
		<u>`</u>	$\frac{\lambda}{X}$	1		HolDrvCtrl Calculate_rrajectory.vr		Added 1/26/21			
		<u>`</u>		,	+	HolDrvCtrl_Execute_Trajectory.vi		Added 1/20/21 Added 1/24/2022			
	X	$\langle \rangle$	$\frac{\lambda}{X}$	+	+	HolDrvCtrl Execute_rrajectory.vi		Future			
		<u>` </u>	$\frac{\lambda}{X}$	SI		HolDrvCtrl New.vi		Added 1/26/21			
		` X			+	HolDrvCtrl PackExecuteSP.vi		710000 1720721			
	X	<i>x</i>	X	+		HolDrvCtrl PackPID.vi		Added 1/24/2022			
	\sim 1 \sim							Added 1/24/2022			
		<i>()</i>	· X			HOIDIVCIII PACKPIOIPID.VI				'	
	X		X			HolDrvCtrl_PackProfPID.vi HolDrvCtrl SetEnabled.vi					
	X	(X	SI				Added 1/26/21 Added 1/26/21			
	X X X X	Not WPII IB	Menu Item X X X	Execution Optimized 99 99	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes	Code Review	Test Program	Error Checking
PID CONTROLLER	X X X X X X X X X X X X X X X X X X X	X Not while is	X Wenu Item	Execution Optimized 99 9	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID	Code Review	Test Program	Error Checking
PID CONTROLLER	X Maplemented X X X X X X X X X	X Not while is	X X Wenu Item	Execution Optimized 99 9	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced	Code Review	Test Program	Error Checking
PID CONTROLLER	X X X X X X X 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	Execution Optimized 99 9	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi ### VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi X PIDController_AdvExecute.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID	Code Review	Test Program	Error Checking
PID CONTROLLER	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	Secution Optimized 99	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced	Code Review	Test Program	Error Checking
PID CONTROLLER	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	Secution Optimized 99	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced	Code Review	Test Program	Error Checking
PID CONTROLLER	X	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	Secution Optimized 9 9	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced	Code Review	Test Program	Error Checking
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PID CONTROLLER	X		X X X X X X X X X X X X X X X X X X X	S S S S S S S S S S S S S S S S S S S	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID	Code Review	Test Program	Error Checking
PID CONTROLLER	X	C C C C C C C C C C C C C C C C C C C	X X X X X X X X X X X X X X X X X X X	S S S S S S S S S S S S S S S S S S S	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi X PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi X PIDController_EnableContinousInput.vi X PIDController_Execute.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID Labview style helper. Advanced	Code Review	Test Program	Error Checking
PID CONTROLLER	X X X X X 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 S S S S S S S S S S S S S S S S S	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi X PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi X PIDController_EnableContinousInput.vi PIDController_Execute.vi PIDController_Execute.vi PIDController_GetContinuousError.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID	Code Review	Test Program	Error Checking
PID CONTROLLER	X		X X X X X X X X X X X X X X X X X X X	S S S S S S S S S S S S S S S S S S S	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi X PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi X PIDController_EnableContinousInput.vi PIDController_Execute.vi PIDController_GetContinuousError.vi PIDController_GetPeriod.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID Labview style helper. Advanced	Code Review	Test Program	Error Checking
PID CONTROLLER	X		X X X X X X X X X X X X X X X X X X X	S S S S S S S S S S S S S S S S S S S	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi X PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi X PIDController_Execute.vi PIDController_GetContinuousError.vi PIDController_GetPID.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID Labview style helper. Advanced	Code Review	Test Program	Error Checking
PID CONTROLLER	X		X X X X X X X X X X X X X X X X X X X	S S S S S S S S S S S S S S S S S S S	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi X PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi X PIDController_EnableContinousInput.vi PIDController_Execute.vi PIDController_GetContinuousError.vi PIDController_GetPID.vi PIDController_GetPID.vi PIDController_GetPositionError.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID Labview style helper. Advanced	Code Review	Test Program	Error Checking
PID CONTROLLER	X		X X X X X X X X X X X X X X X X X X X	S S S S S S S S S S	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi X PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi X PIDController_Execute.vi PIDController_GetContinuousError.vi PIDController_GetPID.vi PIDController_GetPID.vi PIDController_GetPositionError.vi PIDController_GetPositionError.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID Labview style helper. Advanced	Code Review	Test Program	Error Checking
PID CONTROLLER	X		X X X X X X X X X X X X X X X X X X X	S S S S S S S S S S	Test Routine	HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi X PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi X PIDController_EnableContinousInput.vi PIDController_Execute.vi PIDController_GetContinuousError.vi PIDController_GetPID.vi PIDController_GetPID.vi PIDController_GetPositionError.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID Labview style helper. Advanced	Code Review	Test Program	Error Checking

Χ		X	1		PIDController_NewPeriod.vi		
Χ	Χ	Χ	SI		PIDController_Pack_AdvLimits.vi		
Χ	Χ	Χ	SI		PIDController_Pack_AdvTuning.vi		
X	Χ	Χ	SI		PIDController_Pack_ErrorTolerance.vi		
Χ	Χ	Χ	SI		PIDController_Pack_InputLimits.vi		
Χ	Χ	Χ	SI		PIDController_Pack_Tuning.vi		
Χ		Χ	SI		PIDController_Reset.vi		
Χ		Χ			PIDController_SetD.vi		
Χ	Χ	Χ	SI			Advanced PID	
X	X	No			PIDController_SetFeedForward_OBSOLETE_DELETE.vi	Advanced PID, Obsolete – DELETE	
X	X	No	_		PIDController SetEFGain OBSOLETE DELETE vi	Advanced PID, Obsolete – DELETE	
	^	/10			TIBOONII OII OII OII OII OBOOLETE_BEEETE.VI	Advanced Fib., Obsolute BEELIE	
Χ		Χ	SI		PIDController_Setl.vi		
					PIDController_SetInputRange.vi	OBSOLETE – Removed	
X		Χ	SI		PIDController_SetIntegratorRange.vi		
Χ	Χ	Χ	SI		PIDController_SetOutputLimits.vi	Advanced PID	
Χ		Χ	SI		PIDController_SetP.vi		
Χ	Χ	Χ	SI		PIDController_SetPeriod.vi		
Χ		Χ	SI		PIDController_SetPID.vi		
Χ	Χ	Χ	SI		PIDController_SetPIDF.vi	Advanced PID	
Χ		Χ	SI		PIDController_SetSetpoint.vi		
Χ		Χ	SI		PIDController_SetTolerance.vi		
X		X	SI		PIDController SetTolerancePandV.vi		
	X X X X X X X X X X X X X X X X X X X	X	X	X	X	X X X SI PIDController_Pack_AdvLimits.vi X X X SI PIDController_Pack_AdvTuning.vi X X X SI PIDController_Pack_ErrorTolerance.vi X X X SI PIDController_Pack_InputLimits.vi X X X SI PIDController_Pack_Tuning.vi X X X SI PIDController_Reset.vi X X SI PIDController_SetDerivativeFilter.vi X X X SI PIDController_SetFedForward_OBSOLETE_DELETE.vi X X X SI PIDController_SetInputRange.vi X X X SI PIDController_SetOutputLimits.vi X X X SI PIDController_SetOutputLimits.vi	X

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PROFILED PID CONTROLLER	Χ	Χ		Χ	SI			ProfiledPIDController_AtGoal.vi					
	X	Χ		Χ	SI			ProfiledPIDController_AtSetpoint.vi					
	Χ	Χ		Χ				ProfiledPIDController_Calculate_Meas_Goal.vi					
	Χ	Χ		Χ				ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi					
	Χ	Χ		Χ				ProfiledPIDController_Calculate_Meas_StateGoal.vi					
	Χ	Χ		Χ				ProfiledPIDController_Calculate_Meas.vi					
	Χ	Χ		Χ	SI			ProfiledPIDController_DisableContInput.vi					
	Χ	Χ		Χ	SI			ProfiledPIDController_EnableContInput.vi					
	X	X	X	X	1			ProfiledPIDController_Execute.vi		Single call LabVIEW style function.			
	X	Χ		Χ	SI			ProfiledPIDController_GetGoal.vi					
	Χ	Χ		Χ	SI			ProfiledPIDController_GetPeriod.vi					
	Χ	Χ	Χ	Χ	SI			ProfiledPIDController_GetPID.vi		WPILIB has separate getters.			
	Χ	Χ		Χ	SI			ProfiledPIDController_GetPositionError.vi					
	Χ	Χ		Χ	SI			ProfiledPIDController_GetSetpoint.vi					
	Χ	X		Χ	SI			ProfiledPIDController_GetVelocityError.vi					
	Χ	Χ		Χ	1			ProfiledPIDController_New.vi					
	Χ	Χ		Χ	1			ProfiledPIDController_NewPeriod.vi					
	X	X		Χ	SI			ProfiledPIDController_Reset_PosOnly.vi					
	X	X		X	SI			ProfiledPIDController_Reset_PosVel.vi					
	X	X		X	SI			ProfiledPIDController_Reset.vi					
	X	X		X	SI			ProfiledPIDController_SetConstraints.vi					
	X	X		X	SI			ProfiledPIDController_SetGoal_PosOnly.vi					
	X	X		X	SI			ProfiledPIDController_SetGoal.vi					
	X	X		X	SI SI			ProfiledPIDController_SetIntegratorRange.vi ProfiledPIDController SetPID.vi					
	X	X		X	SI			ProfiledPIDController_SetPID.vi ProfiledPIDController_SetTolerance_PosOnly.vi					
	X	X		X	SI			ProfiledPIDController SetTolerance PosVel.vi					
	^	^		^	SI			FTOILIEUFIDOOHIIOIIEI_SELTOIEIAHOE_F05VEI.VI					

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FRC LabVIEW Trajectory Library – VI Implementation	on List		
Revision 2.X 5/24/2022 – After documentation udpate.			
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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
RAMSETE	Χ	Χ		Χ	SI			Ramsete_AtReference.vi	AtReference				
	Χ	Χ		Χ	Χ			Ramsete_Calculate_Trajectory.vi	calculate_trajectory				
	Χ	Χ		Χ	Χ			Ramsete_Calculate.vi	calculate				
	Χ	Χ	X	Χ	X			Ramsete_Diff_DO_Eng.vi					
	Χ	Χ	Χ	Χ	Χ			Ramsete_Diff_DO_SI.vi					
	Χ	Χ	Χ	X	1			Ramsete_Execute_ENG.vi	Use this one!!				
	Χ	Χ	Χ	X	SI			Ramsete_Execute_PackTuning_ENG.vi					
	X	Χ	X	X	SI			Ramsete_Execute_PackTuning.vi					
	X	Χ	Χ	Χ	1			Ramsete_Execute.vi					
	Χ	Χ		X	SI			Ramsete_New_B_Z.vi	new(b, zeta)				
	Χ	Χ		X	SI			Ramsete_New.vi	new				
	Χ	Χ		X	SI			Ramsete_SetEnabled.vi	SetEnabled				
	Χ	Χ		Χ	SI			Ramsete_SetTolerance.vi	SetTolerance				
	Χ	X		X	Χ			Ramsete_SINC.vi	sinc	internal			

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

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

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			_ ≥					VI Name	Function Prototype	Notes	Ö	<u>F</u>	Ü
COORDINATE SYSTEM	X	X		X	SI	X		CoordSystem_Convert_Pose3d.vi					
	X	X		X	SI			CoordSystem_Convert_Rotation3d.vi					
	X	Χ		X	SI			CoordSystem_Convert_Translation3d.vi					
	X	Χ		X	SI	X		CoordSystem_EDN.vi					
	X	Χ		X		X		CoordSystem_NED.vi					
	X	X		X	SI	X		CoordSystem_New.vi					
	X	X		X	SI	X		CoordSystem_NWU.vi					
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	Implemente		_ ≥	Ž	<u> û</u>		്റ്	VI Name	Function Prototype	Notes	<u>Ŭ</u>		<u>i</u>
POSE2D	X	Χ		X	SI			Pose2d_Equals.VI	boolean equals(other obj)				
	X	Χ		X	X			Pose2d_Exp.vi	pose2d exp(twist2d twist)				
	X	X		X	SI			Pose2d getRotation.vi	rotation2d getRotation()	can also use cluster unpack			
	X	X		X	SI			Pose2d_getTranslation.vi	translation2d getTranslation()	can also use cluster unpack			
	X	X	X		SI			Pose2d_getXY.vi	translationzu gerrranslation()	can also use cluster unpack			
	X	X	X		SI			Pose2d_getXYAngle.vi					
	X	X		X				Pose2d_Interpolate.vi					
	Χ	X		X	X			Pose2d_Log.vi	twist2d log(pose2d end)				
	X	X		X	SI			Pose2d_Minus.vi	transform2d minus(pose2d other)				
	X	Χ		X	SI			Pose2d_New_TRRO.vi	pose2d new(translation2d, rotation2d)				
	X	Χ		X	SI			Pose2d_New.vi	pose2d new(double x, double y, rotation2d)				
	X	X		X	SI			Pose2d_Plus.vi	pose2d plus(transform2d other)				
	X	X		X				Pose2d RelativeTo.vi	pose2d relativeto(pose2d other)				
	X			X	SI			Pose2d_TransformBy.vi	pose2d transformby(transform2d other)				
					Oi			1 63624_114113161111By.vi	pose2d new()	can use cluster constant			
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POSE3D	X	Χ		X	SI			Pose3d_Equals.VI					
	X	X		X				Pose3d_Exp.vi					
	X	X	+	$\frac{X}{X}$	SI		+	Pose3d getRotation.vi					
	X	X	+	$\frac{1}{X}$		+	+	Pose3d_getTranslation.vi					
			\ \										
	X		X	X	SI	-	-	Pose3d_getXYZ.vi		-			
	X	X	-	X	1			Pose3d_Interpolate.vi					
	X	X		X	X			Pose3d_Log.vi					
	X	Χ		X				Pose3d_Minus.vi					
	X	Χ		X				Pose3d New.vi					
	Χ	X		X				Pose3d New Default.vi					
	X	X		X				Pose3d New Trans3dRot3d.vi					
	X	X		$\frac{\lambda}{X}$			+	Pose3d_Plus.vi					
			1				+	Pose3d RelativeTo.vi	+				
	X	X	-	X	SI		+						
	X	X		No		-		Pose3d_RotationVectorToMatrix.vi					
	X	X		X		1		Pose3d_ToPose2d.vi					
	X	X		X	SI			Pose3d_TransformBy.vi					
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ROTATION2D X X X S Rotation2d CreateAngle vi rotation2d more groups Rotation2d country Rotation2d country Rotation2d CreateAngle Rotations vi rotation2d more groups Rotation2d country Rotation2d CreateAngle Rotations vi Rotation2d CreateAngle Rotations vi Rotation2d CreateAngle Rotation3d Rotation3d CreateAngle Rotation3d Rotation3d CreateAngle Rotation3d Rotation3d CreateAngle Rotation3d CreateAngle Rotation3d Rotation3d CreateAngle Rotation3d Rotati														
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X	ROTATION2D				Χ	SI								
X									Rotation2d_CreateAngleDegrees.vi	rotation2d fromDegrees(double degrees)	convert to radians then create			
X			X						Rotation2d_CreateAngleRotations.vi					
X	•													
X				V						boolean equals(rotation2d other)	Na 4/00/04			
ROTATION3D ROTATION3D R	·			Χ					Rotation2d_GetAngleCosSin.vi	double getCos()				
Rotation2d GetRadians VI double getRadians() use cluster unpack											·			
X		^	^		^	O,			Notation2d_Octbegrees.vi	double getbegrees()				
X		X	Χ		Χ	SI			Rotation2d_GetRadians.VI	double getRadians()	use cluster unpack			
ROTATION3D X X X X X X X X X		X			Χ									
ROTATION3D X X X S Rotation2d Interpolate vi														
X										double getTan()	can calculate			
X														
ROTATION3D X X X S S Rotation3d Create AxisAngle.vi X X X X S Rotation3d Create RollPitchYaw.vi X X X X X S Rotation3d GetIvals.incide Country (a) X X X X X X X X X		X	X			SI								
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ROTATION3D X X X S Rotation3d Create Quaternion vi X X X S Rotation3d Create Calubration Create Cal		^	^		^	31			Notation2d_onaryiviinds.vi		can use cluster constant			
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X X X SI Rotation3d_Create_Default.vi X X X SI Rotation3d_Create_Quaternion.vi X X X SI Rotation3d_Create_RollPitchYaw.vi X X X SI Rotation3d_Equals.vi X X X SI Rotation3d_GetAxisAngle.vi X X X SI Rotation3d_GetQuaternion.vi X X X SI Rotation3d_GetQuaternion.vi	ROTATIONSD		X	<		(S)		<i>V</i>)		Tunotion i Tototype	Notes		7	F
X X SI Rotation3d_Create_Quaternion.vi X X X SI Rotation3d_Create_RollPitchYaw.vi X X X SI Rotation3d_Equals.vi X X X SI Rotation3d_GetAxisAngle.vi X X X SI Rotation3d_GetQuaternion.vi X X X SI Rotation3d_GetQuaternion.vi X X X SI Rotation3d_GetXYZ.vi	NO IATIONOD					SI								
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X X X SI Rotation3d GetXYZ.vi														
X X SI Rotation3d_Interpolate.vi		X	Χ			SI			Rotation3d_GetXYZ.vi					
		X	X		X	SI			Rotation3d_Interpolate.vi					

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	X	Χ		X				Rotation3d_Minus.vi					
	X	X		Χ	SI			Rotation3d Plus.vi					
	X	Χ		X	SI			Rotation3d_RotateBy.vi					
	Χ	Χ		X	SI			Rotation3d Times.vi					
	X	X		X				Rotation3d ToRotation2d.vi					
					01								
	Χ	Χ		X	SI			Rotation3d_UnaryMinus.vi					
TRANSFORM2D	X X X Implemented	X X X Documented	Not WPILIB	X X X Menu Item	SI SI	Test Routine	Sample Program	VI Name Transform2d_Create_PosePose.vi Transform2d_Create_TransRot.vi Transform2d_Equals.VI Transform2d_GetRotation.VI Transform2d_GetTranslation.VI	Function Prototype transform2d new(pose2d, pose2d) transform2d new(translation2d, rotation2d) boolean equals(other transform2d) rotation2d getRotation() translation2d getTranslation()	Notes use cluster unpack use cluster unpack	Code Review	Test Program	Error Checking
	X	Χ	X	Χ	SI			Transform2d_GetXY.vi					
	Χ	Χ	X	X	SI			Transform2d_GetXYAngle.vi					
	X	X	- ` `	X		_		Transform2d Inverse.vi	transform inverse()	new			
				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	31	-			nansionii niverse()	IICW			
	Χ	Χ		Χ	Si			Transform2d_Plus.vi					
	X	Χ		X	SI	L	L	Transform2d_Times.vi	transform2d times(double scalar)				
								_	transform2d new()	can use cluster constant			
TRANSFORM3D	X X X Implemented	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	SI SI SI SI	Test Routine	Sample Program	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 Review	Test Pr	Error Checking
	Χ			X				Transform3d Times.vi					
TRANSLATION2D	X X X	X X Documented	Not WPILIB	X X Wenu Item	SI SI	Test Routine	Sample Program	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	Code Review	Test Program	Error Checking
					01	_				ann i ea alicetan e e e e e			
	X	Χ		Χ	SI			Translation2d_GetNorm.VI	double getNorm()	can use cluster unpack			
	Χ	Χ		Χ	SI			Translation2d_GetX.VI	double getX()	can use cluster unpack			
	X	Χ	Χ	X	SI			Translation2d_GetXY.VI					
	X	Χ		X	SI			Translation2d_GetY.VI	double getY()	can use cluster unpack			
	X	X		X	SI	1		Translation2d_Interpolate.vi	acasic gott (/	can doo oldotoi diipaok			
				<u> </u>	31		-						
	Χ	Χ		X	SI			Translation2d_Minus.vi	translation2d minus(translation2d other)				
	Χ	Χ		X	SI			Translation2d_Plus.vi	translation2d plus(translation2d other)				
	X	X		X	SI			Translation2d_RotateBy.vi	translation2d rotateBy(rotation2d other)				
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	X	X		X	SI			Translation2d_Times.vi	translation2d times(double scalar)				
	X	Χ		X	SI			Translation2d_UnaryMinus.vi	translation2d unaryminus()				
									translation2d new()	can use cluster constant			
									translation2d div(double scalar)	can multiply by 1/scalar			
TRANSLATION3D	X X X X X X	X X X X X	Not WPILIB	X	SI SI SI SI	Test Routine		VI Name Translation3d_Create.vi Translation3d_Create_Default.vi Translation3d_Create_DistAng.vi Translation3d_Div.vi Translation3d_Equals.vi Translation3d_GetDistance.vi Translation3d_GetNorm.VI Translation3d_GetXYZ.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	Χ	Χ		X	SI			Translation3d_Interpolate.vi					
	X			X	SI			Translation3d Minus.vi					
	X			X	SI			Translation3d Plus.vi					
	X	X		$\frac{X}{X}$	SI			Translation3d_RotateBy.vi			+		
	X			X	SI			Translation3d Times.vi				+	
		X		X	SI			Translation3d ToTranslation2d.vi					
	X	X		X	SI			Translation3d_UnaryMinus.vi					
TWIST2I	X X Implemented	X X Documented	X Not WPILIB	X X Menu Item	ଦ୍ର ତ Execution Optimiz	Test Routine		VI Name Twist2d_Create.vi Twist2d_Equals.VI Twist2d_GetAll.VI	Function Prototype twist new(x, y, theta) boolean equals(obj other)	Notes	Code Re	Test Progran	Error Checking
		X		<u> </u>	31			TWISt2d_GetAll.VI					
TWIST3I	X X Implemented	Χ	X Not WPILIB	X X Menu Item	SI	X X Test Routine		VI Name Twist3d_Create.vi Twist3d_Equals.VI Twist3d_GetAll.VI	Function Prototype	Notes	Code Review	Test Program	Error Checking
					otimized		ram					-	би
CHASSIS SPEEDS	< Implemented	X Documented	Not WPILIB	X Menu Item	 ଦ୍ର Execution Optin	Test Routine		VI Name ChassisSpeeds_FromFieldRelativeSpeeds.VI	Function Prototype chassisspeeds from Field Relative Speeds (double x, double y,	Notes	Code Review	Test Program	Error Checking
CHASSIS SPEEDS	^	^		*	اد			onassisopeeus_rionirielukelaliveopeeus.vi	chassisspeeds from Field Relative Speeds (double x, double y, double angvel, rotation 2d robotangle)				
	X	X	X	X	SI			ChassisSPeeds_GetXYOmega.vi	double aligner, rotationza robotaligie)				
	X		<u> </u>	$+ \frac{x}{x}$	SI			ChassisSpeeds_New.vi	chassisspeeds new (double xvel, double yvel, double angvel)				
					<u> </u>			- 1	chassisspeeds new ()	can use cluster constant			
								I	1 /	Contractor Contractor			

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

nothing done

FRC LabVIEW Trajectory Library - VI Implementation List Revision 2.X 5/24/2022 – After documentation udpate. Function Prototype Notes DIFFERENTIAL DRIVE KINEMATICS X X DiffKinematics New.vi diffDriveKine new(double trackWidth) Χ DiffKinematics toChassisSpeed.vi chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) XX X SI X DiffKinematics_toWheelSpeed.vi diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds) Function Prototype VI Name Notes **DIFFERENTIAL DRIVE ODOMETRY** DiffOdometry_Execute.vi DONT NEED X Χ DiffOdometry_Update.vi pose2d update(rotation2d gyro, double leftdist, double right dist) Incorporates enhanced reset diffDrOdom new(rotation gyro, pose initial) diffDrOdom new(rotation gyro) void resetPosition(pose2d, rotation2d) incorporated into "update" pose2d getPoseMeters() VI Name Function Prototype Notes DIFFERENTIAL DRIVE WHEEL SPEEDS diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) XX DiffWheel Normalize.vi void normalize(double maxVel) Χ Function Prototype Notes MECANUM DRIVE KINEMATICS X MecaKinematics New.vi Χ Χ X MecaKinematics SetInverseKinematics.vi X X X X X Χ MecaKinematics_ToChassisSpeeds.vi Χ MecaKinematics_ToWheelSpeeds.vi Χ MecaKinematics ToWheelSpeedsZeroCenter.vi Function Prototype Notes MECANUM DRIVE MOTOR VOLTAGE

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	Implemented	nte	Not WPILIB	ltem) N	Routine	Progi				evie	gra	Checking
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MECANUM DRIVE ODOMETRY		Do			<u>W</u> _	_ <u> </u>	Sa	VI Name	Function Prototype	Notes	ပိ	<u> </u>	Щ
MECANUM DRIVE ODOMETRY		Χ	X	X	X			MecaOdometry_Execute.vi MecaOdometry_GetKinematics.vi					
	X	\hat{X}	^	X	+^	+		MecaOdometry_GetPose.vi					
	X	X		X				MecaOdometry_New.vi					
	X	Χ		X				MecaOdometry_NewDefaultPose.vi					
	Χ	Χ		X				MecaOdometry_Reset.VI					
	Χ	Χ		X				MecaOdometry_Update.vi					
	X	Χ		X				MecaOdometry_UpdateWithTime.vi					
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	tea	ted	18	2	Õ	ine	õ				/je/	ran	Ċki
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MECANUM DRIVE WHEEL SPEEDS	X	Χ		X	SI			MecaWheel_New.Vi	public MecanumDriveWheelSpeeds(double				
									frontLeftMetersPerSecond, double frontRightMetersPerSecond,				
									double rearLeftMetersPerSecond, double rearRightMetersPerSecond)				
	X	Χ	X	X	SI			MecaWheel GetAll.vi	rear Rightweters rei Second)				
	X	X		X	X			MecaWheel_Normalize.vi	public void normalize(double				
									attainableMaxSpeedMetersPerSecond)				
					mized		Ē						
	olemented	cumented	t WPILIB	nu Item	ecution Optimized	st Routine	nple Program				de Review	st Program	or Checking
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE KINEMATICS	X	Χ	X	X		Test Routine	Sample Program	SwerveKinematics_New4.VI	Function Prototype	For 4 module drives	Code Review	Test Program	
SWERVE DRIVE KINEMATICS	X	X	X	X		Test Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI			Code Review	Test Program	
SWERVE DRIVE KINEMATICS	X	Χ	X	X		Test Routine	Sample Program	SwerveKinematics_New4.VI	public static void normalizeWheelSpeeds(SwerveModuleState[For 4 module drives	Code Review	Test Program	
SWERVE DRIVE KINEMATICS	X X X	X X X	X X X	X X X		Test Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi		For 4 module drives uses array as input	Code Review	Test Program	
SWERVE DRIVE KINEMATICS	X X X	X X X	X X X	X X X		Test Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI	public static void normalizeWheelSpeeds(SwerveModuleState[For 4 module drives uses array as input For 4 module drives	Code Review	Test Program	
SWERVE DRIVE KINEMATICS	X X X	X X X	X X X	X X X		Test Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[]	For 4 module drives uses array as input	Code Review	Test Program	
SWERVE DRIVE KINEMATICS	X X X X	X X X X	X X X	X X X X		Test Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds,	For 4 module drives uses array as input For 4 module drives	Code Review	Test Program	
SWERVE DRIVE KINEMATICS	X X X X X	X X X X X	X X X	X X X X X		Test Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters)	For 4 module drives uses array as input For 4 module drives	Code Review	Test Program	
SWERVE DRIVE KINEMATICS	X X X X	X X X X	X X X	X X X X		Test Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)	For 4 module drives uses array as input For 4 module drives	Code Review	Test Program	
SWERVE DRIVE KINEMATICS	X X X X X	X X X X X	X X X	X X X X X		Test Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters)	For 4 module drives uses array as input For 4 module drives uses array as input variable parameters (replace with	Code Review	Test Program	
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SWERVE DRIVE KINEMATICS	X X X X X	X X X X X	X X X	X X X X X		Test Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds) public SwerveDriveKinematics(Translation2d wheelsMeters) public ChassisSpeeds toChassisSpeeds(SwerveModuleState	For 4 module drives uses array as input For 4 module drives uses array as input variable parameters (replace with array and "4" calls) variable parameters (replace with	Code Review	Test Program	
SWERVE DRIVE KINEMATICS	X X X X X	X X X X X	X X X	X X X X X		Test Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds) public SwerveDriveKinematics(Translation2d wheelsMeters)	For 4 module drives uses array as input For 4 module drives uses array as input variable parameters (replace with array and "4" calls)	Code Review	Test Program	
SWERVE DRIVE KINEMATICS	X X X X X	X X X X X	X X X	X X X X X		Test Routine	Sample Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds) public SwerveDriveKinematics(Translation2d wheelsMeters) public ChassisSpeeds toChassisSpeeds(SwerveModuleState	For 4 module drives uses array as input For 4 module drives uses array as input variable parameters (replace with array and "4" calls) variable parameters (replace with	Code Review	Test Program	
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SWERVE DRIVE KINEMATICS	X	X X X X X X X X X X X X X X X X X X X	X X X X	X X X X X X	Optimized Execution		asm.	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds) public SwerveDriveKinematics(Translation2d wheelsMeters) public ChassisSpeeds toChassisSpeeds(SwerveModuleState	For 4 module drives uses array as input For 4 module drives uses array as input variable parameters (replace with array and "4" calls) variable parameters (replace with	view Code Review	gram Test Program	Error
SWERVE DRIVE KINEMATICS	X	X X X X X X X X X X X X X X X X X X X	X X X X	X X X X X X	Optimized Execution		Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds) public SwerveDriveKinematics(Translation2d wheelsMeters) public ChassisSpeeds toChassisSpeeds(SwerveModuleState	For 4 module drives uses array as input For 4 module drives uses array as input variable parameters (replace with array and "4" calls) variable parameters (replace with	Review	Program Test Program	
SWERVE DRIVE KINEMATICS	X	X X X X X X X X X X X X X X X X X X X	X X X X	X X X X X X	Optimized Execution	Routine	Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds) public SwerveDriveKinematics(Translation2d wheelsMeters) public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)	For 4 module drives uses array as input For 4 module drives uses array as input variable parameters (replace with array and "4" calls) variable parameters (replace with array and "4" calls)	Review	Program	Checking
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SWERVE DRIVE KINEMATICS	X	X X X X X X X X X X X X X X X X X X X	X X X X	X X X X X X	Optimized Execution	Routine	Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI VI Name SwerveOdometry_Execute4.vi	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds) public SwerveDriveKinematics(Translation2d wheelsMeters) public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)	For 4 module drives uses array as input For 4 module drives uses array as input variable parameters (replace with array and "4" calls) variable parameters (replace with array and "4" calls)	Review	Program	Checking
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	X	X X X X X X X X X X X X X X X X X X X	X X X X	Menu Item	Execution Optimized Execution	Routine	Program	SwerveKinematics_New4.VI SwerveKinematics_NewX.VI SwerveKinematics_NormalizeWheelSpeeds.vi SwerveKinematics_ToChassisSpeeds4.VI SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI VI Name SwerveOdometry_Execute4.vi SwerveOdometry_ExecuteX.vi	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleStates(ChassisSpeeds chassisSpeeds) public SwerveModuleStates(ChassisSpeeds chassisSpeeds) public SwerveDriveKinematics(Translation2d wheelsMeters) public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates) Function Prototype public Pose2d getPoseMeters() public SwerveDriveOdometry(SwerveDriveKinematics kinematics,	For 4 module drives uses array as input For 4 module drives uses array as input variable parameters (replace with array and "4" calls) variable parameters (replace with array and "4" calls)	Review	Program	Checking
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SwerveOdometry_ResetPosition.VI SwerveOdometry_Update4.VI

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	X	X	X	X				SwerveOdometry_UpdateWithTime4.VI		For 4 module drives			
	X	X		X				SwerveOdometry_UpdateWithTimeX.VI		uses array as input			
	X	X	X	X				SwerveOdometry_UpdateX.VI		uses array as input			
								, <u> </u>	public Pose2d updateWithTime(double currentTimeSeconds,	variable parameters (replace with			
									Rotation2d gyroAngle, SwerveModuleState moduleStates)	array and "4" calls)			
									public Pose2d update(Rotation2d gyroAngle, SwerveModuleState moduleStates)	variable parameters (replace with array and "4" calls)			
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	_ <u>E</u> _	۵				 _	്	VI Name	Function Prototype	Notes	ၓ		Erro
SWERVE DRIVE MODULE STATE		X		X	SI			SwerveModuleState_CompareTo.vi	public int compareTo(SwerveModuleState o)				
	X	X		X	SI			SwerveModuleState_Get.vi	multipe Course and March along Chapter (decorated a superior and Martines Deserved				
	X	X		X	SI			SwerveModuleState_New.vi	public SwerveModuleState(double speedMetersPerSecond, Rotation2d angle)				
	X	X		X	SI			SwerveModuleState_Optimize.vi	public SwerveModuleState optimize(SwerveModuleState desired				
									Rotation2d angle)				
					Ø								
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	pa	þe	m		Ö	Je	ogi				e K	am	ķi
	ent	ent	WPILIB	em	6	outi	Ţ				e V	ogr	Checking
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	mplemente	Doc	Not	Menu Iten	Execution	Test Routine	Sample	VI Name	Function Prototype	Notes	Code Review	Test	Erro
CUBIC HERMITE SPLINE		7	_<	_ <			S	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	protected SimpleMatrix getCoefficients()	not needed, use cluster unpack	- 0		W
CODIC HERWITE OF LINE	X	X		X				CubicHermiteSpline getControlVectorFromArrays.vi	private SimpleMatrix getControlVectorFromArrays(double[]	not needed, use cluster unpack			
	,	,						,,	initialVector, double[] finalVector)				
	Χ	Χ		X				CubicHermiteSpline_makeHermiteBasis.vi	private SimpleMatrix makeHermiteBasis()				
	X	X		X				CubicHermiteSpline_New.vi	public CubicHermiteSpline(double[] xInitialControlVector, double[]				
									xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)				
									iyriilaiconiioivecior)				
					þe								
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			Not WPILIB	Item	tion	Test Routine	e F				Re		She
	mplen	Docun	3	nu	эсп	st F	Sample				ge	est Pı	or (
		Do	No	Menu	Execut	Ę.	Sai	VI Name	Function Prototype	Notes	Code		Error
POSE WITH CURVATURE	X	X		X	SI			PoseWithCurve_New.vi	public PoseWithCurvature(Pose2d poseMeters, double				
									curvatureRadPerMeter)	son use duster of at-at-			
									public PoseWithCurvature()	can use cluster constant			
				1					public Pose2d poseMeters public double curvatureRadPerMeter	not needed, use cluster unpack not needed, use cluster unpack			
				1					Papile double cui valui et taur et Metel	not needed, use cluster unpack			1
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	dw	Documen	Not WPILIE	Menu Item	Execution	Test Routine	Sam	VI Name	Function Prototype	Notes	Code Revien	Test	Error
QUINTIC HERMITE SPLINE	X	X		\overline{X}	_			QuinticHermiteSpline_getControlVectorFromArrays.vi	private SimpleMatrix getControlVectorFromArrays(double[]				
									initialVector, double[] finalVector)				
	X	X		X				QuinticHermiteSpline_makeHermiteBasis.vi	private SimpleMatrix makeHermiteBasis()				
	X	X		X				QuinticHermiteSpline_New.vi	public QuinticHermiteSpline(double[] xInitialControlVector,				
									double[] xFinalControlVector, double[] yInitialControlVector,				
		1				1			double[] yFinalControlVector)				

public void resetPosition(Pose2d pose, Rotation2d gyroAngle)

For 4 module drives

cumentation udpate.													
									protected SimpleMatrix getCoefficients()	not needed, use cluster unpack			
	mplemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
SPLINE (Abstract class)	X			\overline{X}				Spline_getPoint.vi	public PoseWithCurvature getPoint(double t)			-	
,								· -	Spline(int degree)				
									public static class ControlVector				
									public ControlVector(double[] x, double[] y)	implemented as data structure			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program				Code Review	Test Program	Error Checking
			_ ≥					VI Name		Notes	ပိ	76	<u>E</u>
SPLINE HELPER	X	X		X	SI	X		SplineHelp_GetCubicCtrlVector.vi SplineHelp_GetCubicCtrlVectorsFromWayPts.vi	private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point) public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints(Pose2d start,				
									Translation2d[] interiorWaypoints, Pose2d end)				
	Χ	X		X				SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi					
	X	X	X	No				SplineHelp_GetCubicSpline_Calc1.vi		internal			
	X	X	X	No No				SplineHelp_GetCubicSpline_Calc2.vi SplineHelp_GetCubicSpline_Calc3.vi		internal internal			
	X	X	^	X		X		SplineHelp_getCubicSplinesFromControlVectors.vi	public static CubicHermiteSpline[] getCubicSplinesFromControlVectors(Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end)	Internal			
	X	X		X	SI			SplineHelp_GetQuinticCtrlVector.vi	private static Spline.ControlVector getQuinticControlVector(double scalar, Pose2d point)				
								SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi	public static List <spline.controlvector> getQuinticControlVectorsFromWaypoints(List<pose2d> waypoints)</pose2d></spline.controlvector>	REMOVED 2762			
								SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi		REMOVED 2762			
	X	X		X				SplineHelp_getQuinticSplinesFromControlVectors.vi	public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors(Spline.ControlVector[] controlVectors)				
	Χ		X	X				SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi		New 2762			
	X	X		X				SplineHelp_GetQuinticSplinesFromWayPts.vi		New 2762			
	X	X		No				SplineHelp_ThomasAlgorithm.vi	private static void thomasAlgorithm(double[] a, double[] b, double[] c, double[] d, double[] solutionVector)	internal			L
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	V/I Nama	Function Protecting	Notes	Code Review	Test Program	Error Checking
SPLINE PARAMETERIZER		X		X		1		VI Name SplineParam_Spline_T0_T1.vi	Function Prototype public static List <posewithcurvature> parameterize(Spline spline, double t0, double t1)</posewithcurvature>	Notes	<u> </u>	<u> </u>	W
	Χ			X		X		SplineParam_Spline.vi	public static List <posewithcurvature> parameterize(Spline spline)</posewithcurvature>				
	Χ	Χ						SplineParam_StackGet.vi		internal			
	X	X	X	No				SplineParam_StackPop.vi		internal			
	X	X	X	No	1			SplineParam_StackPush.vi		internal			

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

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	. Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program		Function Prototype	Notes	Code Review	Test Program	Error Checking
TRAJECTORY		X		X				Trajectory_Concatenate.vi					
	X	X		X					boolean equals(other obj)	FUTURE			
	X	X		X					public List <state> getStates() public double getTotalTimeSeconds()</state>	not needed, use unpack not needed, use unpack			
	\hat{X}	$\frac{\lambda}{X}$		No					private static double lerp(double startValue, double endValue,	internal			
	^	^		/10	0,				double t)	Internal			
	Χ	X		No				Trajectory_lerp_Pose.vi	private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t)	internal			
	Χ	Χ		Χ				Trajectory_New_Empty.vi					
	Χ	Χ		X	SI				public Trajectory(final List <state> states)</state>				
	Χ	Χ		X					public Trajectory relativeTo(Pose2d pose)				
	Χ	Χ		X				Trajectory_Sample.vi	public State sample(double timeSeconds)				
	X	X	X	X				Trajectory_SampleReverse.vi		Sample in reverse order. Negate sample.			
	Χ	X		X					public Trajectory transformBy(Transform2d transform)				
									public Pose2d getInitialPose()	can use cluster unpack, array index			
	'mplemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRAJECTORY_STATE		X	_	X	SI				boolean equals(other obj)	Notes	0		
	X	X	X	X	SI			TrajectoryState_GetAll.vi	boolouri oqualo(otrior obj)				
	Χ	Χ		X				TrajectoryState_GetPose.vi					
	X	X		X					State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter) public State()				
TRA JECTORY CONFIC	X Implemented	< Documented	Not WPILIB	< Menu Item	Execution Optimized	Test Routine	Sample Program		Function Prototype public TrajectoryConstraint	Notes Implemented differently, can't	Code Review	Test Program	Error Checking
TRAJECTORY CONFIG	X	X		X					public TrajectoryConfig addConstraint(TrajectoryConstraint constraint)	duplicate.			
	X	X		X				TrajectoryConfig AddConstraints.vi	public TrajectoryConfig addConstraints(List extends TrajectoryConstraint constraints)	Implemented differently, can't duplicate.			
	Χ	X		X	SI			TrajectoryConfig Create.vi	public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq)	аарлошо.			
	Χ	Χ		X				TrajectoryConfig_GetCentripetalAccel.vi					
	X	X	X	X				TrajectoryConfig_GetConstraints.vi	public List <trajectoryconstraint> getConstraints()</trajectoryconstraint>	Implemented differently, can't duplicate.			
	Χ	Χ		X					public double getEndVelocity()	can use cluster unpack			
	Χ	Χ		X	1	1		TrajectoryConfig_GetKinematicsDiffDrive.vi					
	X	X		X	-			TrajectoryConfig_GetKinematicsMecanumfDrive.vi					
	X	X		X	1	1	1	TrajectoryConfig_GetKinematicsSwerveDrive.vi					
	X	X	Χ	X	1	1	-	TrajectoryConfig_GetMaxVelAccel.vi	nublic double watCtout\/ol==it:/\	an una aluatar coma ale			
	X	X		X	+	-	-		public double getStartVelocity()	can use cluster unpack			
	X	X		X	1	1	-	TrajectoryConfig_GetVoltageDiffDrive.vi	nublic boolean is Poversed ()	oon upo oluotar uppaak			
	X	X	~	X	01	1	1		public boolean isReversed()	can use cluster unpack			
	Χ	Χ	X	Χ	SI			TrajectoryConfig_setCentripetalAccel.vi					

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X	Χ	X		TrajectoryConfig_SetEndVelocity.vi	public TrajectoryConfig setEndVelocity(double	
					endVelocityMetersPerSecond)	
X	X	X	SI	TrajectoryConfig_setKinematicsDiffDrive.vi	public TrajectoryConfig setKinematics(DifferentialDriveKinematics	
					kinematics)	
X	X	X	SI	TrajectoryConfig_setKinematicsMecanumfDrive.vi	public TrajectoryConfig setKinematics(MecanumDriveKinematics	
					kinematics)	
X	X	X	SI	TrajectoryConfig_setKinematicsSwerveDrive.vi	public TrajectoryConfig setKinematics(SwerveDriveKinematics	
					kinematics)	
X	X	X	SI	TrajectoryConfig_setReversed.vi	public TrajectoryConfig setReversed(boolean reversed)	
X	X	X		TrajectoryConfig SetStartVelocity.vi	public TrajectoryConfig setStartVelocity(double	
					startVelocityMetersPerSecond)	
X	XX	X	SI	TrajectoryConfig_setVoltageDiffDrive.vi	,	
					public double getMaxVelocity()	Created function to return both
					public double getMaxAcceleration()	Created function to return both
						

				1	1				NOTE ADD OTHER "SET" ROUTINES FOR OTHER CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC.			1	
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRAJECTORY GENERATE	X	X		X				TrajectoryGenerate_Make_Cubic_CtrlVect.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVecto end, TrajectoryConfig config)</translation2d>	uses cubic splines			
	X	X		X				TrajectoryGenerate_Make_Cubic.vi	public static Trajectory generateTrajectory(Pose2d start, List <translation2d> interiorWaypoints. Pose2d end.</translation2d>	uses cubic splines			
	X	Χ	X	X				TrajectoryGenerate Make Generic.vi	TrajectoryConfig config) Helper to bring these all together	Use this one!!!			
	Χ	X		X				TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config)	uses quintic splines			
	Χ	Χ	X	X				TrajectoryGenerate_Make_Quintic_Weighted.vi		New 2762			
	X	X		X				TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(List <pose2d> waypoints, TrajectoryConfig config)</pose2d>	uses quintic splines			
	X	Χ		X				TrajectoryGenerate_splinePointsFromSplines.vi	public static List <posewithcurvature> splinePointsFromSplines(Spline[] splines)</posewithcurvature>				
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRAJECTORY GENERATE (Control Vector)									public ControlVectorList(int initialCapacity)	may not need, just data			
									public ControlVectorList() public ControlVectorList(Collection extends Spline.ControlVector collection)	may not need, just data may not need, just data			
	Implemented	Documented	Not WPILIB	: Menu Item	Execution Optimized	Test Routine		VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRAJECTORY PARAMETERIZE	X	X	X	No				TrajectoryParam_calcStuffFwd.vi					
	Χ		X	No				TrajectoryParam_calcStuffRev.vi					
	X	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.			
	X	X	X	No				TrajectoryParam_enforceVelocity.vi		This routines needs to be changed when new constraints are added.			

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 5/24/2022 - After documentation udpate TrajectoryParam timeParam.vi public static Trajectory timeParameterizeTrajectory(List<PoseWithCurvature> points. List<TrajectoryConstraint> constraints, double startVelocityMetersPerSecond, double endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double naxAccelerationMetersPerSecondSq, boolean reversed) Test Routine Not WPILIB Menu Item VI Name Function Prototype Notes TRAJECTORY PARAMETERIZE CONSTRAINED STATE X ConstrainedState New.vi X ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq) X X X X ConstrainedState SetMaxAccel.vi X X X ConstrainedState SetMinAccel.vi X X X X ConstrainedState SetVelAccel.vi X X X X ConstrainedState SetVelocity.vi ConstrainedState() Function Prototype Notes TrajectoryUtil_fromPathWeaverJSON.vi TRAJECTORY UTIL X X public static Trajectory fromPathweaverJson(Path path) X TrajectoryUtil MakeWeightedWayPoint ENG.vi $X \mid X \mid X \mid X$ Χ TrajectoryUtil_MakeWeightedWayPoint.vi X X X X TrajectoryUtil toPathWeaverJSON.vi Χ public static void toPathweaverJson(Trajectory trajectory, Path public static Trajectory deserializeTrajectory(String json) public static String serializeTrajectory(Trajectory trajectory) Menu Item Function Prototype Notes TRAPEZOID PROFILE X TrapProfConstraint New.vi X X TrapProfile Calculate.vi X X X X No TrapProfile_Direct.vi Χ Private, remove from menu X X X X TrapProfile_Execute.vi X X Χ Χ SI TrapProfile Execute AtGoal.vi X X TrapProfile IsFinished.vi X X TrapProfile New DefInitial.vi

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

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TrapProfile New.vi

TrapProfile_ShouldFlipAcceleration.vi

TrapProfile TimeLeftUntil.vi

TrapProfile TotalTime.vi

TrapProfState Equals.vi

TrapProfState New.vi

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Private, remove from menu

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 5/24/2022 – After documentation udpate. Execution Optir est Routine Menu Item Function Prototype VI Name Notes public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double CENTRIPETAL ACCELERATION CONSTRAINT CentripetalAccelConstraint getMaxVelocity.vi velocityMetersPerSecond) X CentripetalAccelConstraint getMinMaxAccel.vi getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) Χ Χ X SI CentripetalAccelConstraint_New.vi public CentripetalAccelerationConstraint(double Can use cluster pack for now maxCentripetalAccelerationMetersPerSecondSq) Execution Optimized Vot WPILIB Venu Item Function Prototype Notes public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double DIFF DRIVE KINEMATIC CONSTRAINT DiffDriveKinematicsConstraint getMaxVelocity.vi velocityMetersPerSecond)
public MinMax DiffDriveKinematicsConstraint_getMinMaxAccel.vi X X Χ getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) XX X SI public DifferentialDriveKinematicsConstraint(final DiffDriveKinematicsConstraint_New.vi DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond) Execution Optimized Menu Item Function Prototype Notes DIFF DRIVE VOLTAGE CONSTRAINT DiffDriveVoltageConstraint getMaxVelocity.vi public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) XX DiffDriveVoltageConstraint getMinMaxAccel.vi getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) XX X SI DiffDriveVoltageConstraint_New.vi DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)

	ІтрІете	Docume	Not WPI	Menu Ite	Executic	Test Ro	Sample	VI Name	Function Prototype	Notes
ELLIPTICAL REGION CONSTRAINT	Χ	X		X				EllipRegionConstraint_getMaxVelocity.vi		
	Χ	Χ		X				EllipRegionConstraint_getMinMaxAccel.vi		
	Χ	Χ		X				EllipRegionConstraint_IsPoseInRegion.vi		
	Χ	Χ		X				EllipRegionConstraint_New.vi		

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							Sample Program		
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	len	ın	Š	חמ	ca	it R	Jdu		
	du,	90	Λοτ	Me	EXe	7es	Sar	VI Name Function Prototype	Notes
JERK CONSTRAINT			X			Ò		JerkConstraint_getMaxVelocity.vi Routine exists, it is just a shell	FUTURE
	/		Χ					JerkConstraint_getMinMaxAccel.vi Routine exists, it is just a shell	FUTURE
	/		Χ		SI			JerkConstraint_New.vi Routine exists, it is just a shell	FUTURE
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MAX VELOCITY CONSTRAINT	X	X		\overline{X}	SI		- 0,	MaxVelocityConstraint getMaxVelocity.vi	Thousand the state of the state
	X	X		X	SI			MaxVelocityConstraint_getMinMaxAccel.vi	
	X	X		Χ	SI			MaxVelocityConstraint_New.vi	
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	Implementea	Documented	Not WPILIB	Menu Item	Execution	Test Routine	Sample Program	VI Name Function Prototype	Notes
MECANUM DRIVE KINEMATICS CONSTRAINT		X	$\overline{}$	\overline{X}		· -		MecaDriveKinematicsConstraint_getMaxVelocity.vi	
	X	X		Χ				MecaDriveKinematicsConstraint_getMinMaxAccel.vi	
	Χ	X		Χ	SI			MecaDriveKinematicsConstraint_New.vi	
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	Implemented	Documented	Not WPILIB	Menu Item	ion	Test Routine	Ð		
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	du,	8	Şo	Me	Ĕ	Tes	San	VI Name Function Prototype	Notes
RECTANGULAR REGION CONSTRAINT		\overline{X}	$\overline{}$	X				RectRegionConstraint getRectRegion.vi	
	X	X		Χ				RectRegionConstraint_getMinMaxAccel.vi	
	X	Χ		Χ				RectRegionConstraint_IsPoseInRegion.vi	
	X	Χ		Χ				RectRegionConstraint_New.vi	
					75				
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	Implemented	Documented	Not WPILIB	Menu Item	Execution	Test Routine	Sample Program	VI Name Function Prototype	Notes
SWERVE DRIVE KINEMATICS CONSTRAINT		X		\overline{X}		Ī		SwerveDriveKinematicsConstraint_getMaxVelocity.vi public_double_getMaxVelocityMetersPerSecond(Pose2d	
								poseMeters, double curvatureRadPerMeter, double	
	X	X		X				velocityMetersPerSecond)	
	^	^		^				public Minimax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters,	
								double curvatureRadPerMeter, double velocityMetersPerSecond)	
	~	X		X	SI			SwerveDriveKinematicsConstraint_New.vi Newpublic SwerveDriveKinematicsConstraint(final	Can use cluster pack for now
	X	^		^	SI			SwerveDriveKinematicsConstraint_New.vi Newpublic SwerveDriveKinematicsConstraint(linal SwerveDriveKinematics, double	Can use cluster pack for now
								maxSpeedMetersPerSecond)	
								· , , , , , , , , , , , , , , , , , , ,	

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	mplemented	Oocumented	Vot WPILIB	Jenu Item	Execution Opt	Fest Routine	Sample Progra	VI Name	Function Prototype	Notes
TRAJECTORY CONSTRAINT	X	\overline{X}	X	\overline{X}				TrajConstraint_GetMaxVelocity.vi		
	Y	\overline{X}	X	X				TrajConstraint_GetMinMaxAccel.vi		
-	^			~				TrajConstraint_OctiviniviaxAccel.vi		
	X	Χ	X	X				TrajConstraint_GetType.vi		

X X Menu Item 99 9 6 Execution Optimi TRAJECTORY CONSTRAINT (Min Max) X X X X Function Prototype
Constraint_MinMax_New Constraint_MinMax_New.vi Constraint_MinMax_NewMinMax.VI Constraint MinMax New

'======== UTILITY

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
UTIL		Χ	X	X	SI			Util ApproxEqual.vi		
	Χ	Χ	Χ	X				Util_Array_PoseWCurv_to_XY.vi		
	Χ	Χ	X	X	SI			Util_CalcDist.vi		
	Χ	Χ	X	X	SI			Util_GetLibraryVersion.vi		
	Χ	Χ	X	X	SI			Util_GetLibUsage.vi		
	X	X	X	X				Util_GetTime.vi		Once tested completely, this should be optimized!
	Χ	Χ	X	No	N/A			Util_LibraryGlobals.vi		Global Variables – no block diag.
	Χ	Χ	X	X				Util_Trajectory_Absolute_To_Relative.vi		
	Χ	Χ	X	X				Util_Trajectory_ReadFile.vi		
	Χ	Χ	Χ	X				Util_Trajectory_to_XY.vi		
	Χ	Χ	X	No				Util_Trajectory_WriteFile_Config.vi		internal
	Χ	Χ	X	No				Util_Trajectory_WriteFile_OneState.vi		internal
	Χ	Χ	X	X				Util_Trajectory_WriteFile_PathFinder.vi		
	Χ	Χ	X	No				Util_Trajectory_WriteFile_PathFinderConfig.vi		internal
	Χ	Χ	X	X				Util_Trajectory_WriteFile_Pathweaver.vi		
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_States.vi		internal
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_WayPoints.vi		internal
	Χ	Χ	Χ	X				Util_Trajectory_WriteFile.vi		
	Χ	Χ	X	X				Util_TrajectoryState_Meters_To_Inches.vi		
	Χ	Χ	Χ	X				Util_TrajState_to_DiffDrive_WheelPos.vi		
	Χ	Χ	Χ	X				Util_DispWaypoint_Eng_To_SI.vi		
	X	Χ	Χ	X				Util_DispWaypoint_To_CubicInput.vi		
	X	Χ	X	X				Util_DispWaypoint_To_QuinticInput.vi		
	X	Χ	X	X				Util_DispWeightedWaypiont_Eng_To_WeightedWaypoint		
	Χ	Χ	X	No				Util_DispWeightedWayPoint_To_WeightedWayPoint.vi		Sorry about the confusing name

Notes

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CONVERSIONS

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

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
CONV		X	X	X	SI			Conv_AngleDegrees_Heading.vi		
	Χ	Χ	Χ	Χ	SI			Conv_AngleRadians_Heading.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Centimeters_Meters.vi		
	X	Χ	Χ	Χ	SI			Conv_Deg_Radians.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Deg_Rotations.vi		
	X	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		
	Χ	Χ	Χ	Χ	SI			Conv_Inches_Meters.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Kilograms_Pounds.vi		
	X	Χ	Χ	Χ	SI			Conv_Meters_Feet.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Meters_Inches.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Pose2d_SI_Eng.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Pounds_Kilograms.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Radians_Deg.vi		
	X	Χ	Χ	Χ	SI			Conv_Radians_Rotations.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Rotations_Deg.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Rotations_Radians.vi		
	X	Χ	X	Χ	SI			Conv_Yards_Meters.vi		

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

'======== PATHFINDER UTIL

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

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

PathfinderUtil_ToTrajectoryStates.vi XXXXX

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

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

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

> Function Prototype Notes DIFFERENTIAL DRIVE POSE ESTIMATOR X XX DiffDrivePoseEst AddVisionMeasurement.vi X DiffDrivePoseEst_FillStateVector.vi DiffDrivePoseEst GetEstimatedPosition.vi Χ DiffDrivePoseEst_Kalman_F_Callback.vi Χ DiffDrivePoseEst_Kalman_H_Callback.vi Χ DiffDrivePoseEst_New.vi XX Χ DiffDrivePoseEst ResetPosition.vi XX Χ DiffDrivePoseEst SetVisionMeasurementStdDevs.vi

X 5/24/2022 – After documentation udpate.											
		X	X				DiffDrivePoseEst_Update.vi				
	X 2	X	X				DiffDrivePoseEst_UpdateWithTime.vi				
	X 2	X	X				DiffDrivePoseEst_VisionCorrect_Callback.vi				
	X	X	X				DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi				
EXTENDED KALMAN FILTER	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		Execution Optimized	Test Routine	Sample Program		Notes Just a shell, not functional!	Code Review	Test Program	Error Checking
		X	$\frac{\lambda}{X}$				ExtendedKalmanFilter Reset.vi				
		X	$\frac{\lambda}{X}$				ExtendedKalmanFilter SetP.vi				
		X	$\frac{x}{X}$				ExtendedKalmanFilter SetXHat Single.vi				
		X	$\frac{x}{X}$				ExtendedKalmanFilter SetXHat.vi				
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KALMAN FILTER	X	X X Documented X X X X X X X X X X X X X X X X X X X	X		X X X X X X X X X X X X X X X X X X X	Sample Progr	VI Name KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetK_Single.vi KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_DetXHat KalmanFilter_New.vi KalmanFilter_Predict.vi KalmanFilter_Predict.vi KalmanFilter_Reset.vi	Notes	Code Revie	Test Progra	Error Checking
		X	X				KalmanFilter_SetXHat				
	$\frac{\lambda}{X}$	X	X		Х		KalmanFilter_SetXHat_Single				
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KALMAN FILTER LATENCY COMPENSATOR	X 2	X Documented	X		Test Routine	Sample Program	KalmanFilterLatencyComp_AddObserverState.vi	Notes	Code Review	Test Program	Error Checking
/	X 2	X	X				KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi				
	X Z	X X	X				KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi KalmanFilterLatencyComp_FindClosestMeasurement.vi				
	X	X	X				KalmanFilterLatencyComp_New.vi				
		X	X				KalmanFllterLatencyComp_Observer_New.vi				
	X	X	X				KalmanFilterLatencyComp_Reset.vi				
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MECANUM DRIVE POSE ESTIMATOR								MecaDrivePoseEst_AddVisionMeasurement_StdDev.vi					
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	X			X No				MecaDrivePoseEst_GetEstimatedPosition.vi		+			
		X X		No				MecaDrivePoseEst_Kalman_F_Callback.vi MecaDrivePoseEst Kalman H Callback.vi		+			
		\hat{X}		X				MecaDrivePoseEst New.vi					
		X		X				MecaDrivePoseEst ResetPosition.vi					
		X		Χ				MecaDrivePoseEst_SetVisionMeasurementStdDevs.vi					
		Χ		Χ				MecaDrivePoseEst_Update.vi					
		X		X				MecaDrivePoseEst_UpdateWithTime.vi					
		X		No				MecaDrivePoseEst_VisionCorrect_Callback.vi		+			
	X	<i>X</i>		No				MecaDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi					
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	<u>E</u>	<u>8</u>	8	Σ	Ě			VI Name	Function Prototype	Notes	ပိ		Error
SWERVE DRIVE POSE ESTIMATOR								SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi					
	X	X		X				SwerveDrivePoseEst_AddVisionMeasurement.vi					
		X		X				SwerveDrivePoseEst_GetEstimatedPosition.vi		-			
		X X		X				SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst Kalman H Callback.vi					
		\hat{x}		X				SwerveDrivePoseEst_New.vi					
		X		X				SwerveDrivePoseEst ResetPosition.vi					
		X		Χ				SwerveDrivePoseEst SetVisionMeasurementStdDevs.vi					
	Χ	X		Χ				SwerveDrivePoseEst_Update.vi					
		X		Χ				SwerveDrivePoseEst_UpdateWithTime.vi					
		X		X				SwerveDrivePoseEst_VisionCorrect_Callback.vi					
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		X		Χ				UnscentedKalmanFilter_Correct_OnlyUY.vi					
		Χ		Χ				UnscentedKalmanFilter_Correct_OnlyUYR.vi					
		X		Χ				UnscentedKalmanFilter_Correct.vi					
		X		Χ				UnscentedKalmanFilter_GetP_Single.vi					
		X		X				UnscentedKalmanFilter_GetP.vi					
		X		X				UnscentedKalmanFilter_GetXHat_Single.vi UnscentedKalmanFilter_GetXHat.vi		-			
		X X		X X				UnscentedKalmanFilter_GetXHat.vi UnscentedKalmanFilter New Default.vi					
		X		X				UnscentedKalmanFilter_New_Default.vi UnscentedKalmanFilter_New_FuncGroup.vi					
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		$\frac{\lambda}{X}$		X				UnscentedKalmanFilter Predict.vi					
		X		X				UnscentedKalmanFilter Reset.vi					
		X		X				UnscentedKalmanFilter_SetP.vi					
	X	X		Χ				UnscentedKalmanFilter_SetXHat_Single.vi					
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X		X	X		Χ				LinearQuadraticRegulator_GetR_Single.vi					
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									LinearQuadraticRegulator_New_ELMS.vi					
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		X	X		Χ									

Χ	Χ	X		LinearSystemLoop_GetXHat.vi
				LinearSystemLoop_New_BBB
				LinearSystemLoop_New_LinearSystem_ClampFunc
X	X	X		LinearSystemLoop_New_LinearSystem_ClampVal.vi
Χ	Χ	X		LinearSystemLoop_New.vi
Χ	Χ	X		LinearSystemLoop_Predict.vi
Χ	Χ	X		LinearSystemLoop_Reset.vi
				LinearSystemLoop_SetClampFunction.vi
				LinearSystemLoop_SetNextR_Some.vi
Χ	Χ	X		LinearSystemLoop_SetNextR.vi
				LinearSystemLoop_SetXHat_Single.vi
				LinearSystemLoop_SetXHat.vi

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
LTV DIFFERENTIAL DRIVE CONTROLLER	Χ	Χ		Χ			LTVDiffDriveCtrl_Calculate.vi					
	Χ	Χ		Χ			LTVDiffDriveCtrl_New.vi					
	Χ	Χ		Χ			LTVDiffDriveCtrl_Calculate_TrajState.vi					
	Χ	Χ		Χ			LTVDiffDriveCtrl_Calculate_SetTolerance.vi					
	Χ	Χ		Χ			LTVDiffDriveCtrl_Calculate_AtReference.vi					

mplemented	Documented	Not WPILIB	Wenu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
LTV UNICYCLE CONTROLLER X	X		X		X	LTVUnicycleCtrl_AtReference.vi	,				
X	X		Χ		Χ	LTVUnicycleCtrl_Calculate_TrajState.vi					
X	X		Χ		Χ	LTVUnicycleCtrl_Calculate.vi					
X			X		Χ	LTVUnicycleCtrl_New.vi					
X	X		Χ		Χ	LTVUnicycleCtrl_SetEnabled.vi					
X	X		Χ		Χ	LTVUnicycleCtrl_SetTolerance.vi					

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

> Function Prototype Notes CALLBACK HELPER X X X X CallbackHelp_MatrixMinus.vi CallbackHelp_MatrixMult_CoerceSizeB.vi
> CallbackHelp_MatrixMult.vi
> CallbackHelp_MatrixPlus.vi

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

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

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

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

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

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					ized								
					tim			ram				-	
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	nen	ner	Not WPILIB	Item	Execution	Test Routine	30	Φ			Зе	rog	
	mplemer	Documen	<i>*</i>	Menu	noe		C N	S VI Name			de	st P	
		ρο	8	Me	Й	1	Ď		Function Prototype	Notes	00	Test	
ENTIAL DRIVE TRAIN SIM		Χ		X				DiffDriveTrainSim_ClampInput.vi					
	X			X				DiffDriveTrainSim_CreateKitbotSim_EstMass.vi					
	X	X		X			_	DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi DiffDriveTrainSim CreateKitbotSim.vi					
	X			X				DiffDriveTrainSim_CreateRitbotSim.vi		+			
	X	X		X				DiffDriveTrainSim_GetCurrentGearing.vi					
	X	X		X				DiffDriveTrainSim_GetDynamics.vi					
	X	Χ		X				DiffDriveTrainSim_GetHeading.vi					
	Χ	Χ		X				DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi					
	X	Χ		X				DiffDriveTrainSim_GetLeftPositionMeters.vi					
	X	X		X				DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi					
	X	X		X			_	DiffDriveTrainSim_GetOutput_Single.vi DiffDriveTrainSim GetPose.vi					-
	\overline{X}	X		$\frac{\lambda}{X}$				DiffDriveTrainSim_GetPose.vi					
	X	X		X				DiffDriveTrainSim GetRightPositionMeters.vi					
	Χ	Χ		X				DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi					
	X	Χ		X				DiffDriveTrainSim_GetState_Single.vi					
	X	Χ		X				DiffDriveTrainSim_GetState.vi					
	X	X		X				DiffDriveTrainSim_KitBotWheelSize.vi					
	X	X		X				DiffDriveTrainSim_New_Mass_MOI.vi					
	X	X		X				DiffDriveTrainSim_New.vi DiffDriveTrainSim_SetCurrentGearing.vi					
	\overline{X}	\hat{X}		$\frac{1}{X}$			_	DiffDriveTrainSim_SetUnputs.vi					
	X	X		X				DiffDriveTrainSim SetPose.vi					
								DiffDriveTrainSim_SetState.vi					
	X	Χ		X				DIIDIIVE HAIIISIII_SelSiale.vi					1
	X	Χ		X				DiffDriveTrainSim_ToughBoxMiniGearRatio.vi					
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ELEVATOR SIM	X X X Implemented	X X Documented X X X X	WPI	X X X Wenu Item	Execution Optimized	- ∓	PURPOR ISSUE	DiffDriveTrainSim_ToughBoxMiniGearRatio.vi DiffDriveTrainSim_ToughBoxMiniMotor.vi DiffDriveTrainSim_Update.vi VI Name ElevatorSim_GetCurrentDraw.vi ElevatorSim_GetPositionMeters.vi ElevatorSim_GetVelocityMetersPerSecond.vi ElevatorSim_HasHitLowerLimit.vi ElevatorSim_HasHitUpperLimit.vi ElevatorSim_New_LinSys_NoNoise.vi ElevatorSim_New_LinSys.vi	Function Prototype	Notes	_O	Test Program	
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ELEVATOR SIM	X X X X X X X X X X X X X X 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 WP.	X X X X X X X X X X X X X X X X X X X	Execution Optimized	- ∓		DiffDriveTrainSim_ToughBoxMiniGearRatio.vi DiffDriveTrainSim_ToughBoxMiniMotor.vi DiffDriveTrainSim_Update.vi VI Name ElevatorSim_GetCurrentDraw.vi ElevatorSim_GetPositionMeters.vi ElevatorSim_GetVelocityMetersPerSecond.vi ElevatorSim_HasHitLowerLimit.vi ElevatorSim_HasHitUpperLimit.vi ElevatorSim_New_LinSys_NoNoise.vi ElevatorSim_New_LinSys.vi ElevatorSim_New_NoNoise.vi ElevatorSim_New_NoNoise.vi ElevatorSim_New_NoNoise.vi ElevatorSim_New_NoNoise.vi	Function Prototype	Notes	_O	Test Program	
ELEVATOR SIM	X X X X X X X X X X X X X X X 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 WP.	X X X X X X X X X X X X X X X X X X X	Execution Optimized	- ∓	PERIOD VOICE	DiffDriveTrainSim_ToughBoxMiniGearRatio.vi DiffDriveTrainSim_ToughBoxMiniMotor.vi DiffDriveTrainSim_Update.vi VI Name ElevatorSim_GetCurrentDraw.vi ElevatorSim_GetPositionMeters.vi ElevatorSim_GetVelocityMetersPerSecond.vi ElevatorSim_HasHitLowerLimit.vi ElevatorSim_HasHitUpperLimit.vi ElevatorSim_New_LinSys_NoNoise.vi ElevatorSim_New_LinSys.vi ElevatorSim_New_NoNoise.vi	Function Prototype	Needed because this doesn't	_O	Test Program	
ELEVATOR SIM	X X X X X X X X X X X X X X X 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 WP.	X X X X X X X X X X X X X X X X X X X	Execution Optimized	- ∓	מאווואס ו	DiffDriveTrainSim_ToughBoxMiniGearRatio.vi DiffDriveTrainSim_ToughBoxMiniMotor.vi DiffDriveTrainSim_Update.vi VI Name ElevatorSim_GetCurrentDraw.vi ElevatorSim_GetPositionMeters.vi ElevatorSim_GetVelocityMetersPerSecond.vi ElevatorSim_HasHitLowerLimit.vi ElevatorSim_HasHitUpperLimit.vi ElevatorSim_New_LinSys_NoNoise.vi ElevatorSim_New_LinSys.vi ElevatorSim_New_NoNoise.vi ElevatorSim_SetInputVoltage.vi ElevatorSim_SetState.vi	Function Prototype		_O	Test Program	

ocumentation udpate.									_				
FLYWHEEL SIM	< Implemented	< Documented	Not WPILIB	< Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
FLYWHEEL SIIVI	X	X		X				FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetAngularVelocityRPM.vi					
	X	X		X				FlyWheelSim GetCurrentDrawAmps					
								FlyWheelSim New LinSys		Future			
								FlyWheelSim_New_LinSys_MOI_NoNoise		Future			
								FlyWheelSim_New_LinSys_NoNoise		Future			
	Χ	Χ		Χ				FlyWheelSim_New_MOI.vi					
	Χ	Χ		Χ				FlyWheelSim_SetInput.vi					
	Χ	Χ		Χ				FlyWheelSim_SetState.vi					
	Χ	Χ		Χ				FlyWheelSim_Update.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program				Code Review	st Program	or Checking
	ĮU,	å	Š	Me	Ĕ	Ğ	Sa	VI Name	Function Prototype	Notes	હ	Test	Error
LINEAR SYSTEM SIM	Χ	Χ		Χ				LinearSystemSim_ClampInput.vi					
								LinearSystemSim_GetCurrentDrawAmps.vi		DONT IMPLEMENT			
		Χ		Χ				LinearSystemSim_GetOutput_Single.vi					
	X	X		Χ				LinearSystemSim_GetOutput.vi					
	Χ	Χ		Χ				LinearSystemSim_New					
	V							LinearSystemSim_New_NoNoise.vi		D			
-	X	X		X				LinearSystemSim_SetInput_Array.vi		Doesn't use clamp ?			
	X			X				LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput.vi					
	X	X		X				LinearSystemSim_Setstate.vi					
	X	X		X				Linear System Sim_Update.vi					
	X	X		No				LinearSystemSim_UpdateX.vi					
	X	X	X	No				LinearSystemSim_UpdateY.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
SINGLE JOINT ARM SIM		X		Χ				SngJntArmSim_EsitmateMOI.vi					
-	X	X		X				SngJntArmSim_GetAngleRads.vi					
	X	X		X X				SngJntArmSim_GetCurrentDraw.vi SngJntArmSim_GetVelocityRadsPerSec.vi					
	X	X		X				SngJntArmSim_GetVelocityRadsPerSec.vi SngJntArmSim_HasHitLowerLimit.vi					
-	X	X		X				SngJntArmSim_HasHitUpperLimit.vi					
	X	X		X				SngJntArmSim_New.vi		+			
	X	X		No				SngJntArmSim_Rkf45_Func.vi					
	X	X		X				SngJntArmSim_SetInputVoltage.vi					
	X	Χ		Χ				SngJntArmSim_SetState.vi					
	Χ	Χ		Χ				SngJntArmSim_Update.vi					
	Χ	Χ		Χ				SngJntArmSim_UpdateX.vi					
	Χ	Χ		Χ				SngJntArmSim_WouldHitLowerLimit.vi					
	Χ	Χ		Χ				SngJntArmSim_WouldHitUpperLimit.vi					
	J					1	1						

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MAT BUILDER	X Implemented	X X Documented	Not WPILIB	X Menu Item	nized \(\O	Test Routine		VI Name MatBuilder_Create.vi MatBuilder_Fill.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX	X	X		X	SI			Matrix_AssignBlock.vi					
	X	X		X	SI			Matrix_Block.vi					
	X	X		X	SI			Matrix_ChangeBoundsUnchecked.vi Matrix_Create.vi					
	^	^		_^	31			Matrix Det.vi					
	X	X		X	SI			Matrix_Diag.vi					
								Matrix_Div_Scalar.vi		labview has function			
								Matrix ElementPower.vi					
	Χ	Χ		Χ	SI			Matrix_ElementSum.vi					
								Matrix_ElementTimes.vi					
								Matrix_Equals.vi					
	Χ	X		X	1			Matrix_Exp.vi					
	Χ	Χ		X	SI			Matrix_ExtractColumnVector.vi					
	X	X		Χ	SI			Matrix_ExtractFrom.vi					
								Matrix_ExtractMatrix.vi					
	X	X		X	SI			Matrix_ExtractRowVector.vi					
	X	X		X	SI			Matrix_Fill.vi		laboriary labor from ations			
	V			X	,			Matrix_Get.vi Matrix Ident.vi		labview has function WPILIB calls this EYE		-	-
-	X	X		X	I			Matrix Inv.vi		WPILIB calls this EYE			
	X	X		X	SI			Matrix_IIV.VI Matrix_IsEqual.vi					
	^	^		^	31			Matrix_IsIdentical.vi					
	Χ	X		X	1			Matrix_LLTDecompose.vi					
		,						Matrix Max.vi					
								Matrix MaxAbs.vi					
								Matrix_Mean.vi					
								Matrix_MinInternal.vi					
								Matrix_Minus_Matrix.vi					
								Matrix_Minus_Scalar.vi					
	Χ	X		X	1	_		Matrix_NormF.vi					
								Matrix_NormIndP1.vi					
								Matrix_Plus_Matrix.vi					
	~	X		X	,			Matrix_Plus_Scalar.vi Matrix_Pow.vi		THIS NEEDS WORK!!!!			
	X	X		X	SI	-		Matrix_SetColumn.vi		ITHO NEEDS WORK!!!!			
	X	X		X	SI			Matrix_SetRow.vi	THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT SHOULD BE INCLUDED HERE FOR ISOLATION.				
								Matrix_Solve.vi					
								Matrix_Times_Matrix.vi					
						-		Matrix_Times_Scalar.vi					
				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		-		Matrix_Trace.vi					
	X	X	V	X	SI	-	_	Matrix_Transpose.vi					
	X	X	X	X		-		Matrix_WithinTolerance.vi					
			1	L							1		

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MATH

/2022 – After documentation udpate.													
					zeq								
SIMPLE MATRIX		X Documented		X Menu Item	ଦ୍ର Execution Optimiz	Test Routine	Sample Program	/I Name SimpleMatrix_ExtractMatrix.vi		Notes NOTE Matrix also has an	Code Review	Test Program	Error Checking
OIMI EE WATKIX		^		^	0,		ľ	omplematrix_Lxtractiviatrix.vi		ExtractMatrix with different calling			
										parameters YUK.			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program				Code Review	Test Program	or Checking
	lmp	200	Not Not	Me		Tes	San		Function Prototype	Notes	S	7es	Error
MATRIX HELPER	X	X .	$X \perp$	$X \mid$	SI			MatrixHelper_CooerceSize.vi					
	X	X .	X	X	SI SI		I	MatrixHelper_MultCooerceBSize.vi MatrixHelper_Zero.vi					
	^	^ ^	^	^	31		ļ	wattixHelper_Zero.vi					
VECTOR BUILDER	X	X X		X	SI SI	Test Routine	,	/ecBuilder_1x1Fill.vi /ecBuilder_2x1Fill.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X	SI			/ecBuilder_3x1Fill.vi					
	X	X X		X X	SI SI			/ecBuilder_4x1Fill.vi /ecBuilder_5x1Fill.vi					
		X		X	SI			/ecBuilder_5x1Fill.vi					
		X		\overline{X}	SI		,	/ecBuilder_7x1Fill.vi					
		X			SI		,	/ecBuilder_8x1Fill.vi					
								/ecBuilder_9x1Fill.vi					
	V	v -	v	V	CI			/ecBuilder_10x1Fill.vi /ecBuilder_ArrayBy1Fill.vi					
	X	X .	^	^	SI			/ecbulider_Arrayby i Fill.vi					
	l	1	1			1						1	
	Implemented			Menu Item		Test Routine		/I Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
ANGLE STATISTICS					X		- /	AngleStats_AngleAdd_CallbackHelp.vi					
	X	<i>X X X</i>	Y	X	I X	<u>x</u>	/	AngleStats_AngleAdd.vi AngleStats_AngleMean_CallbackHelp.vi					
	X	$\frac{\lambda}{X}$	^+	X		X	- /	AngleStats_AngleMean.vi					
				^	1	^	1/	AngleStats Anglewean.vi		ļ ļ			
	X	$\frac{x}{x}$	X	X	X	^		AngleStats_AngleResidual_CallbackHelp.vi AngleStats_AngleResidual.vi					

– After documentation udpate.				pa						
	Implemented Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program emen IA	Function Prototype Notes	Code Review	Test Program	Error Checking
MATH UTILITY		_ <	<i>X</i>	SI	_	MathUtil_AngleModulus.vi	Full Citoti Prototype Notes	- 0	<u> </u>	
MATTOTIETT	X X		X	SI		MathUtil_ApplyDeadband.vi				
	XX		Χ	SI		MathUtil_Clamp_Int.vi				
	X X		X	SI		MathUtil_Clamp.vi				
-	X X		X	SI Si		MathUtil_InputModulus.vi				<u> </u>
	X X		Χ	31		MathUtil_Interpolate.vi				 I
MERWE SCALED SIGMA POINTS			X X X X X X X X X X X X X X X X X X X		Test Routine	WerwescsigPts_ComputeWeights.vi MerwescsigPts_GetNumSigmas.vi MerwescsigPts_GetWc_Single.vi MerwescsigPts_GetWc.vi MerwescsigPts_GetWm_Single.vi MerwescsigPts_GetWm.vi MerwescsigPts_GetWm.vi MerwescsigPts_New_Default.vi MerwescsigPts_New.vi MerwescsigPts_SigmaPoints.vi	Function Prototype Notes	Code Review	Test Program	Error Checking
NUMEDICAL INTEGRATION	Implemented	Not WPILIB	Menu Item	- Execution Optimized	Test Routine	Sample Program Sample Program Sample Program	Function Prototype Notes NOT USED. Should this be used	Code Review	Test Program	Error Checking
NUMERICAL INTEGRATION	X X		X	′		NumIntegrate_Func_Ax_Bu_K.vi	or abandoned???			I
	X X		Χ			NumIntegrate_Rk4_Dbl_X_U.vi				
	XX		X			NumIntegrate_Rk4_Dbl_X.vi			 	
	X X X X		X X			NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk4_Mat_X.vi				 I
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		No	SI		NumIntegrate Rkdp Func A.vi				
	XX		No	SI		NumIntegrate_Rkdp_Func_B1.vi				
	X X		No	SI		NumIntegrate_Rkdp_Func_B1B2.vi				
	V V	1			_				<u> </u>	
	X X					NumIntegrate_Rkdp_Func_B2.vi				í
	X X		No	SI I		Numintegrate_Rkdp_Impl.vi	New and a compating DI/E4E			
	X X X X		No X	I		Numintegrate_Rkdp_Impl.vi NumIntegrate_RKDP_Mat_X_U.vi	New replacement for RKF45			
	X X X X X X		No X No	I SI		Numintegrate Rkdp_Impl.vi NumIntegrate RKDP_Mat_X_U.vi NumIntegrate Rkf45 Func A.vi	New replacement for RKF45			
	X X X X X X		No X No No	I SI SI		Numintegrate Rkdp_Impl.vi NumIntegrate RKDP Mat_X_U.vi NumIntegrate Rkf45 Func_A.vi NumIntegrate Rkf45 Func_B1.vi	New replacement for RKF45			
	X X X X X X X X		No X No No	SI SI SI		Numintegrate Rkdp_Impl.vi NumIntegrate RKDP Mat_X_U.vi NumIntegrate Rkf45_Func_A.vi NumIntegrate Rkf45_Func_B1.vi NumIntegrate Rkf45_Func_B1B2.vi	New replacement for RKF45			
	X X X X X X		No X No No	SI SI SI		Numintegrate Rkdp_Impl.vi NumIntegrate RKDP Mat_X_U.vi NumIntegrate Rkf45 Func_A.vi NumIntegrate Rkf45 Func_B1.vi	Removed. Replaced with newer			
	X X X X X X X X		No X No No	SI SI SI		Numintegrate Rkdp_Impl.vi NumIntegrate RKDP Mat_X_U.vi NumIntegrate Rkf45_Func_A.vi NumIntegrate Rkf45_Func_B1.vi NumIntegrate Rkf45_Func_B1B2.vi NumIntegrate Rkf45_Func_B2.vi	Removed. Replaced with newer functions. Removed. Replaced with newer			
	X X X X X X X X		No X No No	SI SI SI		Numintegrate Rkdp Impl.vi NumIntegrate RKDP Mat X U.vi NumIntegrate Rkf45 Func A.vi NumIntegrate Rkf45 Func B1.vi NumIntegrate Rkf45 Func B1B2.vi NumIntegrate Rkf45 Func B2.vi NumIntegrate Rkf45 Func Bs.vi	Removed. Replaced with newer functions.			
	X X X X X X X X		No X No No	SI SI SI SI		Numintegrate Rkdp Impl.vi NumIntegrate RKDP Mat X U.vi NumIntegrate Rkf45 Func A.vi NumIntegrate Rkf45 Func B1.vi NumIntegrate Rkf45 Func B1B2.vi NumIntegrate Rkf45 Func B2.vi NumIntegrate Rkf45 Func Bs.vi NumIntegrate Rkf45 Func Ch.vi	Removed. Replaced with newer functions. Removed. Replaced with newer functions.			

	NumIntegrate_RKf45_New.vi	Removed. Never used.	
X X X X SI	NumIntegrate_Trap_Dbl.vi		
X X X X I	NumIntegrate_Trap_Mat.vi		
,			
njz j	£		

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	/I Name Function Prototype	Notes	Code Review	Test Program	Error Checking
NUMERICAL JACOBIAN	X	X		X				lumJacobian_U.vi				
	Χ	Χ		Χ				lumJacobian_X.vi				

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
RICCATI	Χ	Χ		Χ				Riccati_Check_Detectable.vi		Routine exists, it is just a shell			
	Χ	X		Χ				Riccati_Check_Stabilizable.vi		Not really done !!!			
								Riccati_DARE_Choose.vi		Intended to allow DARE method testing.			
	Χ	Χ	Χ	Χ		Χ		Riccati_DARE_Iterate.vi					
	Χ	Χ	Χ	Χ		Χ		Riccati_DARE_StructDoubling.vi					
	Χ	Χ		Χ				Riccati_DARE_N.vi					
	Χ	Χ		Χ		Χ		Riccati_DARE.vi					
	Χ	X		Χ				Riccati_Input_Check.vi					

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

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

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

e.					pez					
	Q	75			Optimized	ø,	Program			
	Implemented	Documented	IL IB	em		Test Routine	Pro			
	olem	cnw	Not WPILIB	Menu Item	Execution	st Rc	Sample			
T D - e	lu ₁			Me		je j		VI Name	Function Prototype	Notes
TypeDef	Z	Z Z	X X	X	N/A N/A			ARM_FF.CTL BANG BANG.CTL		
	1	_	X	X	N/A			BICon-Matrix_FUNC_TYPE.CTL		NOT USED. Should this be
	Z	Z	Χ	Χ	N/A			CALLBACK_FUNC_TYPE.CTL		deleted or abandoned???
	Z	Z	X	X	N/A			CHASSIS SPEEDS.CTL		
	Ζ	Ζ	Χ	Χ	N/A			CONTRAINED_STATE.CTL		
	Z	Z	X	X	N/A			COORDINATE_AXIS.CTL		
		Z Z	X	X	N/A N/A			COORDINATE_SYSTEM.CTL DCMOTOR TYPES ENUM.CTL		
	Z	Z	X	X	N/A			DCMOTOR.CTL		
	Ζ	Ζ	Χ	Χ	N/A			DCMOTOR_SIM.CTL		
		Z Z	X	X	N/A N/A			DEBOUNCER_TYPE_ENUM.Ctl DEBOUNCER.CTL		
	Z	Z	\hat{X}	X	N/A			DIFF_DRIVE_ACCEL_LIMIT.CTL		
	Z	Z	Χ	Χ	N/A			DIFF_DRIVE_KINEMATICS.CTL		
	Z	Z	Χ	X	N/A			DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl		
	Z	Z Z	X	X	N/A N/A			DiFF_DRIVE_Pose_EST.ctl DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl		
	Z	Z	\hat{X}	X	N/A			DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl		
	Z	Z	X	X	N/A			DIFF_DRIVE_TRAIN_SIM_STATE_ENUM.CTL		
	Ζ	Ζ	Χ	Χ	N/A			DIFF_DRIVE_TRAIN_SIM.ctl		
	Z	Z	X	X	NA NA			DISPLAY_WAYPOINT.ctl DISPLAY_WEIGHTED_WAYPOINT.ctl		Was UTIL_WAYPOINT.VI New V1.5. was UTIL_WEIGHTED_WAYPOINIT.VI
	Z	Z	X	Χ	N/A			ELEV_FF.CTL		
	Z	Ζ	Χ	X	N/A			ELEVATOR_SIM.CTL		
	Z	Z	X	X	N/A N/A			EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL EXTENDED_KALMAN_FILTER.CTL		
-	Z	Z	X	\overline{X}	N/A			FLYWHEEL SIM.ctl		
	Ζ	Ζ	X	Χ	N/A			FUNCTION_GENERATOR.ctl		
	Z	Z	X	X	N/A			FUNCTION_GENERATOR_MATRIX.ctl		1/00/04
	Z	<i>Z Z</i>	X	X	N/A N/A			HOLONOMIC_DRV_CTRL.CTL TIME INTERPOLATABLE BOOLEAN.CTL		New 1/26/21
	Z	Z	X	X	N/A			TIME INTERPOLATABLE DOUBLE.CTL		
	Ζ	Ζ	Χ	Χ	N/A			TIME_INTERPOLATABLE_POSE2D.CTL		
	Z	Z	X	X	N/A			TIME_INTERPOLATABLE_ROTATION2D.CTL		
		<i>Z Z</i>	X	X	N/A N/A			KALMAN_FILTER_LATENCY_COMP_FUNC_GROUP.CTL KALMAN FILTER LATENCY COMP.CTL		
	Z	Z	X	X	N/A			KALMAN FILTER.ctl		
	Ζ	Ζ	Χ	Χ	N/A			LINEAR_FILTER.CTL		
-	Z	Z	X	X	N/A			LINEAR_PLANT_INV_FF.ctl		
		<i>Z Z</i>	X	X	N/A N/A			LINEAR_QUADRATIC_REGULATOR.ctl LINEAR_SYSTEM_LOOP.ctl		
	Z	Z	X	X	N/A			LINEAR SYSTEM SIM.ctl		
	Ζ	Ζ	Χ	Χ	N/A			LINEAR_SYSTEM.ctl		
	Z	Z	X	X	N/A			LTV_DIFF_DRIVE_CTRL.ctl		
		<i>Z Z</i>	X	X	N/A N/A			LTV_DIFF_DRIVE_CTRL_STATE_ENUM.ctl LTV_UNICYCLE_CONTROLLER.CTL		
	Z	Z	X	X	N/A			LTV UNICYCLE CONTROLLER INPUT ENUM.ctl		
	Ζ	Ζ	Χ	Χ	N/A			LTV_UNICYCLE_CONTROLLER_STATE_ENUM.ctl		
	Z	Z	X	X	N/A			MECA_DRIVE_KINEMATICS.CTL		
		<i>Z Z</i>	X	X	N/A N/A			MECA_DRIVE_ODOMETRY.CTL MECA DRIVE POSE EST.CTL		
	Z	Z	X	X	N/A			MECA_BRIVE_T COL_ESTICITE MECA_WHEEL_SPEEDS.CTL		
	Ζ	Ζ	Χ	Χ	N/A			MEDIAN_FILTER.CTL		
	<u>Z</u>	Z	X	X	N/A			MERWE_SCALED_SIGMA_PTS.ctl		
-	Z		X	X	N/A N/A			OBSERVER_SNAP_LIST_ITEM.CTL OBSERVER_SNAPSHOT.CTL		
L	_	_	^	^\	1 10/7			OBSELTATIN_STATE		

Z	Ζ	Χ	Χ	N/A	PARAM STACK ITEM.CTL	
Z	Z	X		N/A	PARAM STACK.CTL	
Z	Z	X	X		PID ADV LIMITS.CTL	
Z	Z	X	X		PID ADV TUNING.CTL	
	Z	X		N/A	PID_CONTROLLER.CTL	
Z					PID_CONTROLLER.CTL PID_ERROR_TOLERANCE.CTL	
Z	Z	X	X			
Z	Z	X		N/A	PID_INPUT_LIMITS.CTL	
Z	Ζ	Χ	Χ	N/A	PID_TUNING.CTL	
Z	Ζ	Χ		N/A	POSE2D.CTL	
Z	Ζ	Χ		N/A	POSE3D.CTL	
Z	Ζ	Χ	Χ		POSEwCURVATURE.CTL	
Z	Ζ	Χ	Χ		PROFILED_PID_CONTROLLER.CTL	
Z	Ζ	Χ	Χ		QUATERNION.CTL	
Z	Ζ	X	Χ	N/A	RAMSETE_EXE_TUNING.CTL	
Z	Ζ	X	Χ	N/A	RAMSETE.CTL	
Z	Ζ	X	Χ	N/A	ROTATION2D.CTL	
Z	Ζ	X	Χ	N/A	ROTATION3D.CTL	
Z	Ζ	Χ	X		SIMPLE MOTOR FF.CTL	
Z	Z	X	X		SINGLE JOINT ARM SIM.CTL	
Z	Z	X	X	N/A	SLEW RATE LIMITER.CTL	
Z	Z	X	X		SPLINE CTRL VECTOR.CTL	
Z	Z	X	X		SPLINE.CTL	
Z	Z	X	X	N/A	SWERVE DRIVE KINEMATICS.CTL	
Z	Z	X	X		SWERVE DRIVE MODULE STATE.CTL	
Z	Z	X	\hat{x}		SWERVE_DRIVE_MODULE_STATE.CTL SWERVE DRIVE ODOMETRY.CTL	
		X		N/A	SWERVE_DRIVE_ODOMETRY.CTL SWERVE DRIVE Pose EST.CTL	
Z	Z	X			TIMER.CTL	
Z	Z		X			
Z	Z	X		N/A	TRAJ_CONFIG.CTL	
Z	Z	X		N/A	TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL	
Z	Z	X	X		TRAJ_CONSTRAINT_DIIF_DRIVE_KINEMATICS.CTL	
Z	Z	X	Χ		TRAJ_CONSTRAINT_DIIF_DRIVE_VOLTAGE.CTL	
Z	Ζ	Χ	Χ		TRAJ_CONSTRAINT_ELLIP_REGION.CTL	
١		Χ		N/A	TRAJ_CONSTRAINT_JERK.CTL	Routine exists, it is just a shell
Z	Ζ	Χ	Χ		TRAJ_CONSTRAINT_MAX_VELOCITY.CTL	
Z	Ζ	Χ	Χ		TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL	
Z	Ζ	Χ	Χ		TRAJ_CONSTRAINT_MINMAX.CTL	
Z	Ζ	Χ	Χ		TRAJ_CONSTRAINT_RECT_REGION.CTL	
Z	Ζ	Χ	Χ		TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	
Z	Ζ	X	Χ	N/A	TRAJ_STATE.CTL	
Z	Ζ	X	Χ	N/A	TRAJECTORY_SPLINE_TYPE_ENUM.CTL	
Z	Ζ	Χ		N/A	TRAJECTORY.CTL	
Z	Ζ	Χ	Χ	N/A	TRANSFORM2D.CTL	
Z	Ζ	Χ	Χ	N/A	TRANSFORM3D.CTL	
Z	Ζ		Х		TRANSLATION2D.CTL	
Z	Z	X		N/A	TRANSLATION3D.CTL	
Z	Z	X		N/A	TRAPEZOID PROFILE CONSTRAINT.CTL	
Z	Z	X	X		TRAPEZOID PROFILE STATE.CTL	
Z	Z	X	X		TRAPEZOID PROFILE.CTL	
Z	Z	X		N/A	TWIST2D.CTL	
Z	Z	X		N/A	TWIST3D.CTL	
Z	Z	X	\hat{x}	N/A	UNSCENTED KALMAN CORRECT FUNC GROUP.CTL	
	Z	X	\hat{x}		UNSCENTED KALMAN FILTER.ctl	
Z						
Z	Z	X	X		UNSCENTED_KALMAN_NEW_FUNC_GROUP.CTL	
Z	Z	X	Χ		UTIL_PATHFINDER_CONFIG.CTL	Dill (control to
N/A		N/A		N/A	WAYPOINTS.CTL	Delete – obsolete
Z	Ζ	X	Χ		WEIGHTED_WAYPOINT.CTL	New V1.5
N/A		N/A		N/A	X_Y_HEADINGS.CTL	Delete – obsolete
Z	Ζ	X	Χ	N/A	X_Y_PAIR.CTL	

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