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

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 Total (X) 958
> CTL Total (Z) 111
> VI Shell Total (/) 4
> CTRL Shell Total (\) 2

Doc completed Pct 94.48% 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.)

BAS

======== BASE													
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		/I Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
ANALOG DELAY	X	Χ	X	X	1			AnalogDelay.vi		Similar to interpolated tree map			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	ample Program				ode Review	Test Program	rror Checking
FUNCTION GENERATOR	2		_>_			<u> </u>		/I Name	Function Prototype	Notes	_ ပိ	<u> </u>	Em
FUNCTION GENERATOR	X	X		X	1			FunctionGenerator_Add_Value.vi FunctionGenerator_Add_XY.vi		Similar to interpolated tree map Similar to interpolated tree map			
-	X			X				FunctionGenerator_Add_X1.vi		Similar to interpolated tree map	+		
	X	X		X	91			FunctionGenerator Clear.vi		Similar to interpolated tree map			
	X	X	X	\hat{x}	1			FunctionGenerator Execute.vi		Similar to interpolated tree map			
	X	Y	^	\hat{x}	91			FunctionGenerator New.vi		Similar to interpolated tree map			
L	^	^		^	31			TunctionGenerator_ivew.vi		Similar to interpolated tree map			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		∕I Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
FUNCTION GENERATOR MATRIX		Χ	Χ		1			FunctionGeneratoMatrixr_Add.vi		Similar to interpolated tree map			
	Χ	Χ	Χ	Χ	1			FunctionGenerator_Calculate.vi		Similar to interpolated tree map			
	X	Χ	X	Χ	SI			FunctionGenerator_New.vi		Similar to interpolated tree map			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	∕I Name	Function Prototype	Notes	Code Review	Test Program	Error Checking

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LINEAR FILTER X X X I LinearFilter BackwardFiniteDiffe

LINEAR FILTER	X			Χ	1			LinearFilter_BackwardFiniteDifference.vi					
	Χ	Χ		Χ	SI			LinearFilter_Calculate.vi					
	Χ	Χ	Χ	Χ				LinearFilter_CutoffFrequency.vi					
	X	X	X	X	1		X	LinearFilter_Execute.vi		Labview style helper			
	X	X		No	1			LinearFilter_Factorial.vi		AN INTERNAL ROUTINE			
	X	X		Χ	I X			LinearFilter_FiniteDifference.vi LinearFilter_HighPass.vi					
	X		Χ	X	X			LinearFilter HighPassBW1.vi					
	X	X	X	X	X			LinearFilter_HighPassBW2.vi					
	X	X	X	X	X			LinearFilter_LowPassBW1.vi					
	X		X	X	X			LinearFilter LowPassBW2.vi					
	Χ	X		Χ	Х			LinearFilter_MovingAverage.vi					
	Χ	Χ		Χ	- 1			LinearFilter_New.vi					
	Χ	Χ		Χ	SI			LinearFilter_Reset.vi					
	Χ		Χ	Χ	SI			LinearFilter_ResetToValue.vi					
	Χ	Χ		Χ	Χ			LinearFilter_SinglePoleIIR.vi					
	X	Χ	Χ	Χ	Χ			LinearFilter_TimeConst.vi					
MEDIAN FILTER	X Implemented	X Documented	Not WPILIB	X Menu Item	X Execution Optimized	Test Routine	Sample Program	VI Name MedianFilter Calculate.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X		Χ	X	1		X	MedianFilter Execute.vi		Labview style helper			
	Χ	X		Χ	SI			MedianFilter New.vi		, ,			
	Χ	Χ		Χ	SI			MedianFilter_Reset.vi					
	Χ	Χ	Χ	Χ	SI			MedianFilter_ResetToValue.vi					
SLEW RATE FILTER	X	X X Documented	X X Not WPILIB	X X Menu Item	S Execution Optimized	Test Routine		VI Name SlewRateLimiter_Calculate.vi SlewRateLimiter_Close.vi SlewRateLimiter_Execute.vi	Function Prototype	Notes Labview style helper	Code Review	Test Program	Error Checking
	X X X X	X X X X	X	X X X X	I I SI			SlewRateLimiter_GetRate.vi SlewRateLimiter_New.vi SlewRateLimiter_NewInitialZero.vi SlewRateLimiter_Reset.vi SlewRateLimiter_SetRate.vi					
TIMER	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X	X X X X X X X X X X X X X X X X X X X		Test Routine	X X X X X X X X X X X X X X X X X X X	SlewRateLimiter_New.vi SlewRateLimiter_Reset.vi SlewRateLimiter_SetRate.vi SlewRateLimiter_SetRate.vi VI Name Timer_Close.vi Timer_Get.vi Timer_GetAndReset.vi Timer_GetInternal.vi Timer_HasPeriodPassedOnce.vi Timer_New.vi Timer_Reset.vi Timer_Reset.vi Timer_Reset.vi Timer_Reset.vi	Function Prototype	Notes releases semaphore Internal (private) only	Code Review	Test Program	Error Checking
TIMER	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X 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 92	Test Routine	X X X X X X X X X X X X X X X X X X X	SlewRateLimiter_New.vi SlewRateLimiter_Reset.vi SlewRateLimiter_SetRate.vi SlewRateLimiter_SetRate.vi VI Name Timer_Close.vi Timer_Get.vi Timer_GetAndReset.vi Timer_GetInternal.vi Timer_HasPeriodPassed.vi Timer_HasPeriodPassedOnce.vi Timer_New.vi Timer_Reset.vi Timer_Reset.vi Timer_Reset.vi Timer_Reset.vi Timer_Reset.vi	Function Prototype	Internal (private) only	Code Review	Test Program	Error Checking
TIMER	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X 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 92	Test Routine	X X X X X X X X X X X X X X X X X X X	SlewRateLimiter_New.vi SlewRateLimiter_Reset.vi SlewRateLimiter_SetRate.vi SlewRateLimiter_SetRate.vi VI Name Timer_Close.vi Timer_Get.vi Timer_GetAndReset.vi Timer_GetInternal.vi Timer_HasPeriodPassedOnce.vi Timer_New.vi Timer_Reset.vi Timer_Reset.vi Timer_Reset.vi Timer_Reset.vi	Function Prototype	Internal (private) only	Code Review	Test Program	Error Checking

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2/2022 – added implicit model follower and time i	nterpola	able rol	utines	•								
TIME INTERPOLATABLE BOOLEAN	X X Implemented	X X Not WPILIB	X	1		Sample Program	VI Name TimeInterpBoolean_AddSample.vi TimeInterpBoolean_CleanUp.vi	Function Prototype	Notes Update to use create matrix Update to use create matrix	Code Review	Test Program	Error Checking
	X X	\ X	X	SI			TimeInterpBoolean_Clean.vi		opuate to use create matrix			
	$X \setminus X$	(X	X	1			TimeInterpBoolean_GetSample.vi					
-	X X	(X (X	$\frac{X}{X}$	SI			TimeInterpBoolean_New.vi TimeInterpBoolean_SetMaxTime.vi					
	X		X No X X			Sample Program	VI Name TimeInterpDouble_AddSample.vi TimeInterpDouble_CleanUp.vi TimeInterpDouble_Clear.vi TimeInterpDouble_GetSample.vi TimeInterpDouble_New.vi TimeInterpDouble_SetMaxTime.vi	Function Prototype	Notes Update to use create matrix Update to use create matrix	Code Review	Test Program	Error Checking
TIME INTERPOLATABLE POSE2D	X X X	Not WPILIB	No X	$\overline{1}$		Sample Program	VI Name TimeInterpPose2d_AddSample.vi TimeInterpPose2d_CleanUp.vi TimeInterpPose2d_Clear.vi TimeInterpPose2d_GetSample.vi	Function Prototype	Notes Update to use create matrix Update to use create matrix	Code Review	Test Program	Error Checking
	X X X	(X (X	X	SI			TimeInterpPose2d_New.vi TimeInterpPose2d_SetMaxTime.vi					
TIME INTERPOLATABLE ROTATION2D	X Implemented	X Not WPILIB	X Menu Item	- Execution Optimized		Sample Program	VI Name TimeInterpRotation2d_AddSample.vi	Function Prototype	Notes Update to use create matrix	Code Review	Test Program	Error Checking
	X	(X (X	No	SI			TimeInterpRotation2d_CleanUp.vi TimeInterpRotation2d_Clear.vi		Update to use create matrix			
	X	(X	X	1			TimeInterpRotation2d_GetSample.vi					
	X	(X (X	X	SI			TimeInterpRotation2d_New.vi TimeInterpRotation2d_SetMaxTime.vi					
	Implemented	Not WPILIB	Menu Item	Optimized	.ue		VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
		(X	X				DigSeqLogic_Delay.vi					
L	X	<i>X</i>	X				DigSeqLogic_On_Delay.vi					

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Function Prototype

Notes

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CONTROLLER UTIL	V	X		X									
	^			^	SI			ControllerUtil_GetModulusError.vi		This was short lived in WPILIB, but still useful here.			
	fed	pə,	99	,	Optimized	ine	Sample Program				iew	ram	Error Checking
	Implemented	Documentea	Not WPILIB	ltem	Execution	Test Routine	ď				SeV.	,60 <u>0</u>	, he
	em,	Ш	Ž	ת ש	cuti	Ř	əJdι				Code Rev	Ţ	Ő
	Jdπ	၁၀	lot	Menu	ě	esi	an	VI Name	Function Prototype	Notes	bo	-est	<u> 2</u>
ELEV FF	: X	X	_	- <u>X</u>	Щ_	_		ElevFF Calculate.vi	unction r rototype	Notes			<u>w</u>
LLLVII	X			X				ElevFF CalculateVelocityOnly.vi					
	,,	, ,	X					ElevFF Execute.vi		LabVIEW style single call			
			Χ					ElevFF_ExecuteVelocityOnly.vi		LabVIEW style single call			
	Χ	Χ		Χ				ElevFF_MaxAchieveAccel.vi					
	Χ	Χ		Χ				ElevFF_MaxAchieveVelocity.vi					
	X	X		Χ				ElevFF_MinAchieveAccel.vi					
	X			Χ				ElevFF_MinAchieveVelocity.vi					
	X	X		X				ElevFF_New_ZeroAccel.vi					
	X	Χ		Χ				ElevFF_New.vi					
	Implemented	X Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program				de Review	st Program	or Checking
	du,	õ	Λοί	Me	Ж	7es	Sar	VI Name	Function Prototype	Notes	Code	Zes	Error
HOL_DRV_CTRL	. X	X	\overline{X}	\overline{X}		•	, , , , , , , , , , , , , , , , , , ,	HolDrvCtrl_AdvCalculate_Trajectory.vi	71	Added 1/24/2022			
	Χ	Χ	Χ	Χ				HolDrvCtrl_AdvCalculate.vi		Added 1/24/2022			
	Χ	Χ			SI			HolDrvCtrl_AtReference.vi		Added 1/26/21			
	Χ	X		Χ	- 1			HolDrvCtrl_Calculate_Trajectory.vi		Added 1/26/21			
	X	Χ		Χ	- 1			HolDrvCtrl_Calculate.vi		Added 1/26/21			
	X	Χ	Χ	Χ				HolDrvCtrl_Execute_Trajectory.vi		Added 1/24/2022			
	X	X	Χ	X				HolDrvCtrl_Execute.vi		Future			
	X	Χ		X	SI			HolDrvCtrl_New.vi		Added 1/26/21			
			\ \ \					HolDrvCtrl_PackExecuteSP.vi		Added 1/24/2022			
	Χ	Χ	X	X	SI								
	X	X	Χ	Χ	31			HolDrvCtrl_PackPID.vi					
	X X X	X X X	Χ	X				HolDrvCtrl_PackProfPID.vi		Added 1/24/2022			
	X	X X X	Χ	Χ	SI SI								
PID CONTROLLER	X	X X X X	Not WPILIB	Menu Item X X	SI	Test Routine	Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi	Function Prototype	Added 1/24/2022 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 Not WPILIB	X X X X X	Optimized 19 19	Test Routine	Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 Added 1/26/21 Added 1/26/21 Notes Advanced PID	Code Review	Test Program	Error Checking
PID CONTROLLER	X	X X X X X	Not WPILIB	Menu Item X X	Optimized 19 19	Test Routine	Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 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 X Not WPILIB	X X X X X X X X X X X X X X X X X X X	Optimized 19 19	Test Routine	X Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 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 Documented X X	X X Not WPILIB	X X X X X X X X X X X X X X X X X X X	Execution Optimized 9 9	Test Routine	X Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 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 Documented 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	Secution Optimized 19 19	Test Routine	X Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 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 Documented X X X	X X Not WPILIB	X X X X X X X X X X X X X X X X X X X	S Execution Optimized S IS	Test Routine	X Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 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 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 19 19	Test Routine	X Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi	Function Prototype	Added 1/24/2022 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 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	S Execution Optimized S IS	Test Routine	X Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi PIDController_Execute.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID Labview style helper.	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 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	X Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi PIDController_Execute.vi PIDController_Execute.vi PIDController_Execute.vi PIDController_GetContinuousError.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID	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 X X X X X X X X X X X X X X X X X X	X X X X X	X X X X X X X X X X X X X X X X X X X	19 19 19 19 19 19 19 19 19 19 19 19 19 1	Test Routine	X Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi PIDController_Execute.vi PIDController_GetContinuousError.vi PIDController_GetPeriod.vi PIDController_GetPeriod.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID Labview style helper.	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 X X X X X	19 19 19 19 19 19 19 19 19 19 19 19 19 1	Test Routine	X Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi PIDController_Execute.vi PIDController_GetPeriod.vi PIDController_GetPeriod.vi PIDController_GetPlD.vi PIDController_GetPositionError.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID Labview style helper.	Code Review	Test Program	Error Checking
PID CONTROLLEF	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X	X X X X X X X X X X X X X X X X X X X	IS I	Test Routine	X Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi PIDController_Execute.vi PIDController_GetContinuousError.vi PIDController_GetPeriod.vi PIDController_GetPlD.vi PIDController_GetPositionError.vi PIDController_GetSetpoint.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID Labview style helper.	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 X X X X X	19 19 19 19 19 19 19 19 19 19 19 19 19 1	Test Routine	X Sample Program	HolDrvCtrl_PackProfPID.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi PIDController_Execute.vi PIDController_GetPeriod.vi PIDController_GetPeriod.vi PIDController_GetPlD.vi PIDController_GetPositionError.vi	Function Prototype	Added 1/24/2022 Added 1/26/21 Added 1/26/21 Notes Advanced PID Advanced PID Labview style helper. Advanced PID Labview style helper.	Code Review	Test Program	Error Checking

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

me interp	olatab	le rout	ines.			
X	X		X	I	PIDController_NewPeriod.vi	
X	X	X	X	SI	PIDController_Pack_AdvLimits.vi	
X	X	X	X	SI	PIDController_Pack_AdvTuning.vi	
X	X	X	X	SI	PIDController_Pack_ErrorTolerance.vi	
X	X	X	X	SI	PIDController_Pack_InputLimits.vi	
X	X	X	X	SI	PIDController_Pack_Tuning.vi	
X	Χ		X	SI	PIDController_Reset.vi	
X	Χ		X	SI	PIDController_SetD.vi	
X	X	X	X	SI	PIDController_SetDerivativeFilter.vi	Advanced PID
X	X	X	No		PIDController_SetFeedForward_OBSOLETE_DELETE.vi	Advanced PID, Obsolete – DELETE
X	X	X	No		PIDController SetFFGain OBSOLETE DELETE.vi	Advanced PID, Obsolete – DELETE
			/10		TIDOGRADIOI_CONTCONIT_ODGGEETE_DEEETE.VI	Navarious 115, Observe Delette
X	Χ		Χ	SI	PIDController_Setl.vi	
					PIDController_SetInputRange.vi	OBSOLETE – Removed
X	X		X	SI	PIDController_SetIntegratorRange.vi	
X	X	X	X	SI	PIDController_SetOutputLimits.vi	Advanced PID
X	Χ		X	SI	PIDController_SetP.vi	
X	X	X	X	SI	PIDController_SetPeriod.vi	
X	X		X	SI	PIDController_SetPID.vi	
X	Χ	X	X	SI	PIDController_SetPIDF.vi	Advanced PID
X	Χ		X	SI	PIDController_SetSetpoint.vi	
X	X		X	SI	PIDController_SetTolerance.vi	
X	X		X	SI	PIDController_SetTolerancePandV.vi	

PROFILED PID CONTROLLER									h					
X		_=		Not WPILIB	Menu		Test Routine	Sample Program	·	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	PROFILED PID CONTROLLER	X	X		X	SI			ProfiledPIDController_AtGoal.vi					
X		X	Χ		X	SI			ProfiledPIDController AtSetpoint.vi					
ProfiledPIDController_Calculate Meas StateGoal.vi		X	Χ		X				ProfiledPIDController Calculate Meas Goal.vi					
X		X	Χ						ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi					
X		X	Χ						ProfiledPIDController_Calculate_Meas_StateGoal.vi					
X		Χ	Χ						ProfiledPIDController_Calculate_Meas.vi					
		Χ	Χ		X	SI			ProfiledPIDController_DisableContInput.vi					
X			Χ		X	SI			ProfiledPIDController_EnableContInput.vi					
X X SI ProfiledPIDController GetPeriod vi WPILIB has separate getters. X X X SI ProfiledPIDController GetPositionError vi X X X SI ProfiledPIDController GetSetpoint.vi X X X SI ProfiledPIDController GetVelocityError.vi X X X SI ProfiledPIDController New vi X X X I ProfiledPIDController New Period.vi X X X I ProfiledPIDController NewPeriod.vi X X X I ProfiledPIDController Reset PosOnly.vi X X X SI ProfiledPIDController Reset PosVel.vi X X X SI ProfiledPIDController SetSoal PosOnly.vi X X X SI ProfiledPIDController SetGoal PosOnly.vi X X X SI ProfiledPIDController SetGoal PosOnly.vi X X X SI ProfiledPIDController SetGoal PosOnly.vi X X		X	X	X	X	1			ProfiledPIDController_Execute.vi		Single call LabVIEW style function.			
X X X SI ProfiledPIDController_ GetPolity WPILIB has separate getters. X X X SI ProfiledPIDController_ GetPositionError.vi X X X SI ProfiledPIDController_ GetVelocityError.vi X X X SI ProfiledPIDController_ GetVelocityError.vi X X X I ProfiledPIDController_ New Period.vi X X X I ProfiledPIDController_ NewPeriod.vi X X X I ProfiledPIDController_ NewPeriod.vi X X X SI ProfiledPIDController_ Reset_ PosOnly.vi X X X SI ProfiledPIDController_ Reset_ PosVel.vi X X X SI ProfiledPIDController_ SetConstraints.vi X X X SI ProfiledPIDController_ SetConstraints.vi X X X SI ProfiledPIDController_ SetConstraints.vi X X X SI ProfiledPIDController_ SetConstraints.vi		Χ			X	SI			ProfiledPIDController_GetGoal.vi					
X X SI ProfiledPIDController_ GetPositionError.vi X X X SI ProfiledPIDController_ GetSetpoint.vi X X X SI ProfiledPIDController_ New.vi X X X I ProfiledPIDController_ New.vi X X X I ProfiledPIDController_ NewPeriod.vi X X X 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 X SI ProfiledPIDController_ SetGoal_vi X X X X SI ProfiledPIDController_ SetGoal_vi X X X X X X X X X X X X<			Χ		X	SI								
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X X X SI ProfiledPIDController_GetVelocityError.vi X X X I ProfiledPIDController_New.vi X X X I ProfiledPIDController_NewPeriod.vi X X X SI ProfiledPIDController_Reset_PosOnly.vi X X X SI ProfiledPIDController_Reset.vi X X X SI ProfiledPIDController_SetConstraints.vi X X X SI ProfiledPIDController_SetGoal_vi X X X SI ProfiledPIDController_SetGoal_vi X X X SI ProfiledPIDController_SetIngatorRange.vi X X X SI ProfiledPIDController_SetIngatorRange.vi X X X SI ProfiledPIDController_SetTolerance_PosOnly.vi			Χ		X									
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X X SI ProfiledPIDController_Reset_PosOnly.vi X X X SI ProfiledPIDController_Reset_PosVel.vi X X X SI ProfiledPIDController_SetGost_vi X X X SI ProfiledPIDController_SetGost_PosOnly.vi X X X SI ProfiledPIDController_SetGosl_vi X X X SI ProfiledPIDController_SetGosl_vi X X X SI ProfiledPIDController_SetIntegratorRange.vi X X X SI ProfiledPIDController_SetID.vi X X X SI ProfiledPIDController_SetTolerance_PosOnly.vi						1			_					
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 ProfiledPIDController_SetIntegratorRange.vi X X X SI ProfiledPIDController_SetPID.vi X X X SI ProfiledPIDController_SetTolerance_PosOnly.vi														
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 ProfiledPIDController_SetIntegratorRange.vi X X X SI ProfiledPIDController_SetPID.vi X X X SI ProfiledPIDController_SetTolerance_PosOnly.vi														
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X X SI ProfiledPIDController_SetTolerance_PosOnly.vi														
X X X SI ProfiledPIDController_SetTolerance_PosVel.vi														
		X	X		X	SI			ProfiledPIDController_SetTolerance_PosVel.vi					

FRC LabVIEW Trajectory Library – VI Implementation I	List										
Revision 2.X 5/2/2022 – added implicit model follower and time	interpola	atable rout	tines.								
		Documented Not WPILIB	Menu Item	Execution Optimized Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
RAMSETE		X		SI		Ramsete_AtReference.vi	AtReference				
		X X		X		Ramsete_Calculate_Trajectory.vi Ramsete_Calculate.vi	calculate_trajectory calculate				
		\hat{X} X	X	X		Ramsete_Diff_DO_Eng.vi	calculate				
		$\begin{array}{c c} X & X \\ \hline X & X \end{array}$	X	X		Ramsete Diff DO SI.vi					
		XX	X	1		Ramsete Execute ENG.vi	Use this one!!				
		XX		SI		Ramsete_Execute_PackTuning_ENG.vi					
		XX	X	SI		Ramsete_Execute_PackTuning.vi					
		X X		1		Ramsete_Execute.vi					
		X		SI		Ramsete_New_B_Z.vi	new(b, zeta)				
		X		SI		Ramsete_New.vi	new SetEnekled				
}		X X		SI SI		Ramsete_SetEnabled.vi Ramsete_SetTolerance.vi	SetEnabled SetTolerance				
		X		X		Ramsete SINC.vi	sinc	internal			
l	_ ^	^		^		Namsete_Silvo.vi	SITIC	Internal			
	nplemented	Documented Not WPILIB	Menu Item	Execution Optir Test Routine	Sample Prograi	MAN	Foresting Posts to a	Notes	Code Review	Test Program	Error Checking
SIMPLE MOTOR FEEDFORWARD		$X \mid X$		SI	<u></u>	VI Name SimpleMotorFF_Calculate_CalcAccel.vi	Function Prototype	Notes	<u> </u>	<u> </u>	Ш
SIMPLE MOTOR FEEDFORWARD		X	X	SI		SimpleMotorFF Calculate NextV Dt.vi					
		X		SI		SimpleMotorFF Calculate.vi	public double calculate(double velocity, double acceleration)				
		X		SI		SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)				
	Χ .	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				
	X	X	X	X		SimpleMotorFF_MinAchieveAccel.vi	acceleration) public double minAchievableAcceleration(double maxVoltage,				
		^					double velocity)				
		X		X		SimpleMotorFF_MinAchieveVel.vi	public double minAchievableVelocity(double maxVoltage, double acceleration)				
	X .	X	X	SI		SimpleMotorFF_New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)				
							public SimpleMotorFeedforward(double ks, double kv)				
'====== GEOMETRY '========											
		Documented Not WPILIB	Menu Item	Execution Optimized Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
COORDINATE AXIS		X		SI		CoordAxis_D.vi					
		X	X	SI		CoordAxis_E.vi					
		X X	X	SI		CoordAxis_N.vi CoordAxis_New.vi					
		X		SI		CoordAxis_New.vi					
		X		SI		CoordAxis U.vi					
		X	X			CoordAxis_W.vi					
· ·			'			· -	'	1	<u>'</u>		

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Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. Routine Function Prototype Notes **COORDINATE SYSTEM** XX CoordSystem Convert Pose3d.vi X SI CoordSystem_Convert_Rotation3d.vi Χ Χ X SI X X X SI CoordSystem_Convert_Translation3d.vi XX X SI X CoordSystem EDN.vi X X X SI X CoordSystem NED.vi XX X SI X CoordSystem New.vi X SI X CoordSystem_NWU.vi XX Function Prototype VI Name Notes POSE2D Pose2d_Equals.VI boolean equals(other obj) Χ X X SI X X XX Pose2d_Exp.vi pose2d exp(twist2d twist) Χ Χ Χ 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 SI Pose2d getXY.vi X X X X SI Pose2d_getXYAngle.vi Pose2d Interpolate.vi XX X I XX XX Pose2d Log.vi twist2d log(pose2d end) $X \mid X$ X SI Pose2d Minus.vi transform2d minus(pose2d other) XX X SI Pose2d New TRRO.vi pose2d new(translation2d, rotation2d) XX X SI Pose2d New.vi pose2d new(double x, double y, rotation2d) Χ X X SI Pose2d Plus.vi pose2d plus(transform2d other) Χ Χ X SI Pose2d RelativeTo.vi pose2d relativeto(pose2d other) XX X SI Pose2d TransformBy.vi pose2d transformby(transform2d other) pose2d new() can use cluster constant VI Name Function Prototype Notes POSE3D Χ Pose3d Equals.VI SI XX Χ X Pose3d Exp.vi XX X SI Pose3d getRotation.vi XX X SI Pose3d getTranslation.vi $X \mid X$ X X SI Pose3d getXYZ.vi X X X Pose3d Interpolate.vi Χ XX Χ Pose3d_Log.vi X X SI Pose3d Minus.vi Χ Χ X X SI Pose3d New.vi X X X X X SI Pose3d New Default.vi X SI Pose3d_New_Trans3dRot3d.vi XX X SI Pose3d Plus.vi XX X SI Pose3d RelativeTo.vi XX No SI Pose3d RotationVectorToMatrix.vi Pose3d ToPose2d.vi $X \mid X$ X SI XX X SI Pose3d TransformBy.vi

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Colaterior Col	FRC LabVIEW Trajectory Library – VI									_				
## MOTATIONS Fig. F	Revision 2.X 5/2/2022 – added implicit mode	el follower and time	e interpo	olatable	routin	es. Şed		_						
GUATIONO X X X X X X X X X X			lemented	:umented	WPILIB	nu Item cution Optim	t Routine	nple Program				le Review	t Program	or Checking
### A X X & S S Spanning On Miles A X X			-		Not					Function Prototype	Notes		Tes	Erro
### A		QUATERNION				X S					+			
NOTATION			X	X		X S			Quaternion_Get_LVQuat.vi					
X														
### ROTATIONED						X S								
X			X	X		X S			Quaternion_New.vi					
X						X S								
X														
Note			X	X		X S			Quaternion_Plus.vi					
ROTATIONAD For the part of t						X S								
### Princition Prototype			Χ	X		X S			Quaternion_ i orotation/ector.vi					
### Princition Prototype			fed	<i>p</i> e,	g	n Optimized	ne ne	rogram				iew	'am	cking
### Princition Prototype			nen	nent	ЫГI	Item	outi	e P				Rev	rogi	Che
ROTATION2D X X X S F Rotation2d CreateAngle w (national new) double agelges) conwell to radiants then create			pler	cnu	× 1	ecu	st R	dui				apc	st F	ō
X		DOTATIONSD	_=		<u>₹</u>	Ž Ž					Notes	ၓ		<u> </u>
X		ROTATION2D									convert to radians then create			
X X X S Rotation/G Equate; boolean equals (rotation/d other)			X	X		X S			Rotation2d_CreateAngleRotations.vi					
X										rotation2d new(double x, double y)				
X					X	X S				boolean equals(rotation2d otner)	New 1/26/21			
Rotation2d GelRedians VI double gelRadians() use cluster unpack			X	X	,	X S			Rotation2d_GetCos.VI					
X														
X										double getRadians()				
X										double getSin()	use cluster unnack			
X			X	X		X S								
X			Χ	Χ		X S								
X			X	X		X S								
X						X S			Rotation2d_Pius.vi Rotation2d_RotateBv.vi					
Totation2d new()			X	X		X S			Rotation2d_Times.vi	rotation2d times(double scalar)				
Part			X	X		X S			Rotation2d_UnaryMinus.vi					
ROTATION3D X X X SI Rotation3d_Create_AxisAngle.vi X										rotation2d new()	can use cluster constant			
ROTATION3D X X X SI Rotation3d_Create_AxisAngle.vi X			plemented	cumented	nt WPILIB		st Routine	mple Program				ide Review	st Program	õ
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 X X X SI Rotation3d_GetXYZ.vi			2	Q	8_	Me Exe				Function Prototype	Notes	8		Err
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		ROTATION3D	X	X		X S					+			
X X X SI Rotation3d_Create_RollPitchYaw.vi X X X SI Rotation3d_Equals.vi X X X X SI Rotation3d_GetAxisAngle.vi X X X SI Rotation3d_GetQuaternion.vi X X X SI Rotation3d_GetXYZ.vi			X	X		X S					+			
X X X SI Rotation3d_GetAxisAngle.vi X X X SI Rotation3d_GetQuaternion.vi X X X SI Rotation3d_GetXYZ.vi			X	X		X S			Rotation3d_Create_RollPitchYaw.vi					
X X SI Rotation3d_GetQuaternion.vi X X X SI Rotation3d_GetXYZ.vi				X	_	X S								
X X X SI Rotation3d GetXYZ.vi					*	X S					+			
X X SI Rotation3d_Interpolate.vi			X	X		X S			Rotation3d_GetXYZ.vi					
			X	X		X S			Rotation3d_Interpolate.vi					

X	X	X	SI	Rotation3d_Minus.vi	
X	X	X	SI	Rotation3d_Plus.vi	
X	X	X	SI	Rotation3d_RotateBy.vi	
X	X	X	SI	Rotation3d_Times.vi	Т
X	X	X		Rotation3d_ToRotation2d.vi	\Box
X	X	X	SI	Rotation3d_UnaryMinus.vi	

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimi	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRANSFORM3D	Χ	Χ		Χ	SI			Transform3d_Create_Default.vi					
	Χ	Χ		Χ	SI			Transform3d_Create_Pose3dPose.3dvi					
	Χ	Χ		Χ	SI			Transform3d_Create_Trans3dRot3d.vi					
	Χ	Χ		Χ	SI			Transform3d_Equals.VI					
	Χ	X		Χ	SI			Transform3d_GetRotation3d.VI					
	Χ	Χ		Χ	SI			Transform3d_GetTranslation3d.VI					
	Χ	Χ	Χ	Χ	SI			Transform3d_GetXYZ.vi					
	Χ	Χ		Χ	SI			Transform3d_Inverse.vi					
	Χ	Χ		Χ	Si			Transform3d_Plus.vi					
	Χ	Χ		Χ	SI			Transform3d_Times.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Op	Test Routine Sample Prog	VI Name	Function Prototype	Notes	Code Review	Test Progran	Error Checkir
TRANSLATION2D	Χ	X		X	SI		Translation2d_Create_DistAng.vi					
	Χ	X		X	SI		Translation2d_Create.vi	translation2d new(double x, double y)				
	Χ	X		X	SI		Translation2d_Equals.vi	boolean equals(translation other)				
	Χ	X		X	SI		Translation2d_GetAngle.vi					
	Χ	Χ		X	SI		Translation2d_GetDistance.vi	double getDistance(translation2d other)				
	Χ	X		X	SI		Translation2d_GetNorm.VI	double getNorm()	can use cluster unpack			
	Χ	X		X	SI		Translation2d_GetX.VI	double getX()	can use cluster unpack			
	Χ	X	X	X	SI		Translation2d_GetXY.VI					
	Χ	X		X	SI		Translation2d_GetY.VI	double getY()	can use cluster unpack			
	Χ	Χ		X	SI		Translation2d_Interpolate.vi					
	Χ	Χ		X	SI		Translation2d_Minus.vi	translation2d minus(translation2d other)				
	Χ	X		X	SI		Translation2d_Plus.vi	translation2d plus(translation2d other)				
	X	X		X	SI		Translation2d_RotateBy.vi	translation2d rotateBy(rotation2d other)				

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. XX Translation2d Times.vi translation2d times(double scalar) XX X SI Translation2d UnaryMinus.vi translation2d unaryminus() translation2d new() can use cluster constant translation2d div(double scalar) can multiply by 1/scalar Function Prototype Notes TRANSLATION3D X Χ SI Translation3d Create.vi Translation3d_Create_Default.vi Χ X SI X Χ SI Translation3d_Create_DistAng.vi X X Χ Χ Χ SI Translation3d Div.vi Χ Translation3d Equals.vi X Χ SI X X SI Translation3d GetDistance.vi Translation3d_GetNorm.VI Χ Χ X SI XX X X SI Translation3d GetXYZ.vi XX X SI Translation3d Interpolate.vi XX X SI Translation3d Minus.vi XX X SI Translation3d Plus.vi Translation3d_RotateBy.vi XX X SI X X X SI Translation3d Times.vi Χ Χ X SI Translation3d_ToTranslation2d.vi X Χ X SI Translation3d UnaryMinus.vi VI Name Function Prototype Notes X TWIST2D X Χ SI Twist2d Create.vi twist new(x, y, theta) Twist2d Equals.VI SI boolean equals(obj other) X X X X SI Twist2d GetAll.VI Function Prototype Notes X TWIST3D SI Twist3d Create.vi Χ Χ X X X X SI X Twist3d Equals.VI X X X X SI X Twist3d GetAll.VI '======= **KINEMATICS** '======== Execution Optimized Menu Item Function Prototype Notes CHASSIS SPEEDS X ChassisSpeeds FromFieldRelativeSpeeds.VI chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) ChassisSPeeds GetXYOmega.vi X X X X SI chassisspeeds new (double xvel, double yvel, double angvel) XX X SI ChassisSpeeds New.vi can use cluster constant chassisspeeds new ()

RC LabVIEW Trajectory Library – VI Implementation Louision 2.X 5/2/2022 – added implicit model follower and time i		atable									
	Implemented	Documented	Not WPILIB	Menu Item Execution Optimized	Test Routine	Sample Program In Management	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE KINEMATICS		X		X I		DiffKinematics_New.vi	diffDriveKine new(double trackWidth)				
-	X	X -	+	X X X SI	X	DiffKinematics_toChassisSpeed.vi DiffKinematics_toWheelSpeed.vi	chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds)	+			+
	nted	nted	1/8	m n Optimized	tine	Program			view	gram	ecking
	plemen	ocumente	Vot WPILIE	Menu Item Execution	Fest Routine	ample F			ode Re	st Pro	ror Che
	4	<u> </u>	<u> </u>	<u>× ×</u>		δ VI Name	Function Prototype	Notes	ა		<u> </u>
DIFFERENTIAL DRIVE ODOMETRY		X	X	XX		DiffOdometry_Execute.vi DiffOdometry_Update.vi	pose2d update(rotation2d gyro, double leftdist, double right dist)	DONT NEED Incorporates enhanced reset			
							diffDrOdom new(rotation gyro, pose initial)				\perp
							diffDrOdom new(rotation gyro) void resetPosition(pose2d, rotation2d) pose2d getPoseMeters()	incorporated into "update"			
DIFFERENTIAL DRIVE WHEEL SPEEDS		Documented	Not WPILIB	Menu Item Execution Op	Test Routine	A Name No Name	Function Prototype diffDrWheelSpeeds new()	Notes	Code Review	Test Progran	Error Checki
	X	<u>_</u>	+	XX		DiffWheel Normalize.vi	diffDrWheelSpeeds new(double leftVel, double rightVel) void normalize(double maxVel)				+
	ted	umented	Not WPILIB	X Menu Item		So VI Name MecaKinematics_New.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
MECANUM DRIVE KINEMATICS											+
MECANUM DRIVE KINEMATICS	X	X X		XX		MecaKinematics_SetInverseKinematics.vi					
MECANUM DRIVE KINEMATICS	X X X	X X X		X X X X		MecaKinematics_ToChassisSpeeds.vi					_
MECANUM DRIVE KINEMATICS	X	X X X		XX							
MECANUM 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	MPILIB WPILIB	X X X X X X	est Routine	MecaKinematics_ToChassisSpeeds.vi MecaKinematics_ToWheelSpeeds.vi MecaKinematics_ToWheelSpeedsZeroCenter.vi			ode Review	est Program	rror Checking
MECANUM DRIVE KINEMATICS	X	X X X X X X X X X X X X X X X X X X X	PILIB	Item X X X X X Item Optimized		MecaKinematics_ToChassisSpeeds.vi MecaKinematics_ToWheelSpeeds.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking

2 – added implicit model follower and time		latable ro	outines.									
				pa								
				niz		4						
	75	_		ptin	4.	Jrai				>	æ	Checking
	Implementea	Documented Not WPILIB	j ²	0	Test Routine	Progr				Code Review	Test Program	Ç
	леи	nen oll	fer t	iò	ont	Ø.				Şe	δĝ	γhe
	len,	\$ \$	2	cnt	Œ.	βle				e F	Ţ	Ž
	ďu	Documente Not WPILIB	Menu Item	Execution	es.	Sample	VI Name	Function Prototype	Notes	Ö	esi	Error
MECANUM DRIVE ODOMETRY	=	$\frac{\Box}{X}$			_		MecaOdometry_Execute.vi	Function Flototype	Notes	- 0		Ш
MILOANOM BRIVE OBOMETRI	Х	X X		X		_	MecaOdometry_CatKinematics.vi					
	X	X	X				MecaOdometry_GetPose.vi					
	X	X	X				MecaOdometry_New.vi					
	X	X	X				MecaOdometry NewDefaultPose.vi					
	X	X	X				MecaOdometry_Reset.VI					
		X	X				MecaOdometry_Update.vi					
	X	X	X				MecaOdometry_UpdateWithTime.vi					
	I						7_ 1					
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	tec	ted B	j -	Ō	ije	Progi				je.	rar	Cki
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	nplementec	Documented Not WPILIB	Menu Item	Execution	Test Routine	Sample				Code Review	Ţ.	Ž
	ημ	000	j je	ĕ	est.	an	VI Name	Function Prototype	Notes	ροχ	Test	Error
MECANUM DRIVE WHEEL SPEEDS	<u> </u>	$\frac{Q}{X}$	$X \ge X$	<u>₩</u>	_		MecaWheel_New.Vi	public MecanumDriveWheelSpeeds(double	NOGS	0	7	
WIECANOW DRIVE WHEEL SPEEDS	^	^	^	31			INECAVITEEL_NEW.VI	frontLeftMetersPerSecond, double frontRightMetersPerSecond,				
								double rearLeftMetersPerSecond, double				
								rearRightMetersPerSecond)				
		X X	(X	SI			MecaWheel_GetAll.vi	· ·				
	X	X	X	X			MecaWheel_Normalize.vi	public void normalize(double				
L								attainableMaxSpeedMetersPerSecond)				
	mplemented	Documented Not WPILIB	Menu Item	Execution Opti	Test Routine	Sample Progra	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE KINEMATICS	X	$X \mid X$			Τ_	T ,	SwerveKinematics New4.VI		For 4 module drives			- 4
OVERVE BRIVE RINEMATION	X		$X \times X$				SwerveKinematics NewX.VI		uses array as input			
		X X					SwerveKinematics NormalizeWheelSpeeds.vi	public static void normalizeWheelSpeeds(SwerveModuleState[]	acco array ac input			
			, ,					moduleStates, double attainableMaxSpeedMetersPerSecond)				
			(X				SwerveKinematics_ToChassisSpeeds4.VI		For 4 module drives			
	Χ	X X	(X				SwerveKinematics_ToChassisSpeedsX.VI		uses array as input			
	X	Χ	X				SwerveKinematics_ToSwerveModuleStates.VI	public SwerveModuleState[]				
								toSwerveModuleStates(ChassisSpeeds chassisSpeeds,				
	~	X	X	+	-	+	SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI	Translation2d centerOfRotationMeters)				
	X	^	^				Ower vernitiernatics_100wervervioudieotateszerocenter.VI	public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)				
								public SwerveDriveKinematics(Translation2d wheelsMeters)	variable parameters (replace with			
									array and "4" calls)			
								public ChassisSpeeds to ChassisSpeeds (Swerve Module State	variable parameters (replace with			
l								wheelStates)	array and "4" calls)			
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	<u>u</u>	<u>۵</u> 8	Me	ĬŽ.	7e	Sa		Function Prototype	Notes	ပိ		En
SWERVE DRIVE ODOMETRY							SwerveOdometry_Execute4.vi					
							SwerveOdometry_ExecuteX.vi					
		Χ	X				SwerveOdometry_GetPosition.VI	public Pose2d getPoseMeters()				
	X	Χ	X				SwerveOdometry_New.VI	public SwerveDriveOdometry(SwerveDriveKinematics kinematics,				
	^	^`	^				· —					
							Out and Other state Name 7 and 1 Miles	Rotation2d gyroAngle, Pose2d initialPose)				
-		X	X				SwerveOdometry_NewZeroCenter.VI	Rotation2d gyroAngle, Pose2d initialPose) public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle)				

Revision 2.X 5/2/2022 – added implicit model follower and time			ole routi					_					
	X			X					oublic void resetPosition(Pose2d pose, Rotation2d gyroAngle)				
	X		X	X				verveOdometry_Update4.VI		For 4 module drives			
	X							verveOdometry_UpdateWithTime4.VI		For 4 module drives			
	X		X	X				verveOdometry_UpdateWithTimeX.VI		uses array as input			
	X	Χ	X	X			S	verveOdometry_UpdateX.VI		uses array as input			
								lp lp	public Pose2d updateWithTime(double currentTimeSeconds,	variable parameters (replace with array and "4" calls)			
								R		variable parameters (replace with			
								μ S	SwerveModuleState moduleStates)	array and "4" calls)			
								, o	Weivelveriodale otale module otale of	urray and 4 odilo)			
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SWERVE DRIVE MODULE STATE	X	\overline{X}		X	SI				public int compareTo(SwerveModuleState o)				
				X	SI			verveModuleState Get.vi					
	X	X		X	SI				public SwerveModuleState(double speedMetersPerSecond,				
								ir	Rotation2d angle)				
	X	X		Χ	SI		S	verveModuleState_Optimize.vi p	public SwerveModuleState optimize(SwerveModuleState desired,				
								<u> R</u>	Rotation2d angle)				
'======== SPLINE													
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CUBIC HERMITE SPLINE										not needed, use cluster unpack			
	X	X		X			C	ubicHermiteSpline_getControlVectorFromArrays.vi	rivate SimpleMatrix getControlVectorFromArrays(double[]				
				X				ılır ubicHermiteSpline makeHermiteBasis.vi p	nitialVector, double[]finalVector) vivate SimpleMatrix makeHermiteBasis()				
	X			X					ublic CubicHermiteSpline(double[] xInitialControlVector, double[]				
	^	^		^			۲	y abici lettiliteSpilite_New.vi	FinalControlVector, double[] yInitialControlVector, double[]				
								V	FinalControlVector)				
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POSE WITH CURVATURE	X	\overline{X}	\sqcap	\overline{X}	SI				public PoseWithCurvature(Pose2d poseMeters, double				7
. 332 33							[c	urvatureRadPerMeter)				
								p	oublic PoseWithCurvature()	can use cluster constant			
								p	public Pose2d poseMeters	not needed, use cluster unpack			
								p	ublic double curvatureRadPerMeter	not needed, use cluster unpack			
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QUINTIC HERMITE SPLINE	X	X		X	7 —				rivate SimpleMatrix getControlVectorFromArrays(double[]			- 17	7
CONTROL CONTROL	Ľ		<u> </u>	Ľ,				ir	nitialVector, double[] finalVector)				
	X	Χ		Χ			_ C	uinticHermiteSpline makeHermiteBasis.vi p	rivate SimpleMatrix makeHermiteBasis()				
	X	Χ		Χ				uinticHermiteSpline_New.vi p	ublic QuinticHermiteSpline(double[] xInitialControlVector, louble[] xFinalControlVector, double[] yInitialControlVector,				
								d	louble[] xFinalControlVector, double[] yInitialControlVector,				
								d	ouble[] yFinalControlVector)				

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. protected SimpleMatrix getCoefficients() not needed, use cluster unpack Execution Optin Vot WPILIB Menu Item VI Name Function Prototype Notes SPLINE (Abstract class) X X Spline_getPoint.vi public PoseWithCurvature getPoint(double t) Spline(int degree) public static class ControlVector public ControlVector(double[] x, double[] y) implemented as data structure Execution Optimized Routine Test VI Name Function Prototype Notes SPLINE HELPER X SplineHelp GetCubicCtrlVector.vi private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point) XX Χ SplineHelp GetCubicCtrlVectorsFromWayPts.vi public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints(Pose2d start, Translation2d[] interiorWaypoints, Pose2d end) X X X X SplineHelp GetCubicCtrlVectorsFromWeightedWayPts.vi X X X No SplineHelp GetCubicSpline Calc1.vi internal X X X No SplineHelp GetCubicSpline Calc2.vi internal X X X No SplineHelp GetCubicSpline Calc3.vi internal Χ X X SplineHelp getCubicSplinesFromControlVectors.vi public static CubicHermiteSpline[] qetCubicSplinesFromControlVectors(Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end) X X X SI SplineHelp GetQuinticCtrlVector.vi private static Spline ControlVector getQuinticControlVector(double scalar, Pose2d point) SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi public static List<Spline.ControlVector> REMOVED 2762 getQuinticControlVectorsFromWaypoints(List<Pose2d> waypoints) SplineHelp GetQuinticCtrlVectorsFromWeightedWayPts.vi REMOVED 2762 SplineHelp getQuinticSplinesFromControlVectors.vi public static QuinticHermiteSpline[] X X Χ getQuinticSplinesFromControlVectors(Spline.ControlVector[] controlVectors) X X X X SplineHelp GetQuinticSplinesFromWeightedWayPts.vi New 2762 XX Χ SplineHelp_GetQuinticSplinesFromWayPts.vi New 2762 X Χ No SplineHelp ThomasAlgorithm.vi private static void thomasAlgorithm(double[] a, double[] b, double[] internal c, double[] d, double[] solutionVector) Optim WPILIB Jenu Item Execution 'est Function Prototype Notes SPLINE PARAMETERIZER X X SplineParam Spline T0 T1.vi public static List<PoseWithCurvature> parameterize(Spline spline, double t0, double t1) X X X SplineParam Spline.vi public static List<PoseWithCurvature> parameterize(Spline spline) X X No SplineParam StackGet.vi internal X X No SplineParam_StackPop.vi internal X X X No SplineParam StackPush.vi internal

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

FRC LabVIEW Trajectory Library – VI Implementation List											
Revision 2.X 5/2/2022 – added implicit model follower and time inter	polatak	ole routin	es.	,							
mplemented	ocumented	Not WPILIB	Menu Item Execution Ontimizer		st Routine mple Program				de Review	st Program	or Checking
	Ğ			1	Test Sam _i	VI Name	Function Prototype	Notes	Š	ĕ	Err
TRAJECTORY X	X		X			Trajectory_Concatenate.vi	hadran and Adhandh	ELITUDE			
$\frac{X}{X}$	X		X S	2/		Trajectory_equals.vi Trajectory_GetStates.vi	boolean equals(other obj) public List <state> getStates()</state>	FUTURE not needed, use unpack			
$\frac{\lambda}{X}$	X		XS			Trajectory_GetTotalTime.vi	public double getTotalTimeSeconds()	not needed, use unpack			
X			No S			Trajectory_lerp_double.vi	private static double lerp(double startValue, double endValue, double t)	internal			
X	X		No S	S/		Trajectory_lerp_Pose.vi	private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t)	internal			
X			x s	3/		Trajectory_New_Empty.vi	double t/				
X			X S	3/		Trajectory_New.vi	public Trajectory(final List <state> states)</state>				
X			X			Trajectory_RelativeTo.vi	public Trajectory relativeTo(Pose2d pose)				
X			X			Trajectory_Sample.vi	public State sample(double timeSeconds)	Ola in management and a Nameta			
X	X	X	X			Trajectory_SampleReverse.vi		Sample in reverse order. Negate sample.			
X	X		X			Trajectory_TransformBy.vi	public Trajectory transformBy(Transform2d transform)	•			
							public Pose2d getInitialPose()	can use cluster unpack, array index			
plemented	Documented	Not WPILIB	Menu Item Execution Ontimized		st Routine mple Program				de Review	st Program	or Checking
<u>¥</u>					Test Sam _l	VI Name	Function Prototype	Notes	ပိ		Ē
	X		X S	8/		TrajectoryState_Equals.vi	boolean equals(other obj)				
$\frac{X}{X}$	X		X S			TrajectoryState_GetAll.vi TrajectoryState GetPose.vi					
$\frac{\lambda}{X}$	X		X S	01		TrajectoryState_GetPose.vi	State interpolate(State endValue, double i)				
X			X S	SI .		TrajectoryState_New.vi	public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter) public State()				
							public State()				
TRAJECTORY CONFIG X	Documented	Not N	X Menu Item Execution Ontimized		Test Routine Sample Program	VI Name TrajectoryConfig_AddConstraint.vi	Function Prototype public TrajectoryConfig addConstraint(TrajectoryConstraint	Notes Implemented differently, can't	Code Review	Test Program	Error Checking
							constraint)	duplicate.			
X			X			TrajectoryConfig_AddConstraints.vi	public TrajectoryConfig addConstraints(List extends TrajectoryConstraint constraints)	Implemented differently, can't duplicate.			
$\frac{X}{X}$			X S	01		TrajectoryConfig_Create.vi TrajectoryConfig_GetCentripetalAccel.vi	public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq)				
$\frac{\lambda}{X}$			X	+		TrajectoryConfig_GetConstraints.vi	public List <trajectoryconstraint> getConstraints()</trajectoryconstraint>	Implemented differently, can't			
X			X	+		TrajectoryConfig_GetEndVelocity.vi	public double getEndVelocity()	duplicate. can use cluster unpack			
$\frac{x}{x}$			X	\top		TrajectoryConfig_GetKinematicsDiffDrive.vi	3,()				
X			X			TrajectoryConfig_GetKinematicsMecanumfDrive.vi					
X			X			TrajectoryConfig_GetKinematicsSwerveDrive.vi					
X			X	+		TrajectoryConfig_GetMaxVelAccel.vi	nublic double matCtart\/-lit-/\	een use slusten inneed			
$\frac{X}{X}$			X	-		TrajectoryConfig_GetStartVelocity.vi TrajectoryConfig_GetVoltageDiffDrive.vi	public double getStartVelocity()	can use cluster unpack			
$\frac{\lambda}{X}$			$\frac{\lambda}{X}$	+		TrajectoryConfig_GetVoltageDiffDrive.vi TrajectoryConfig_IsReversed.vi	public boolean isReversed()	can use cluster unpack			
X	X		X S	3/		TrajectoryConfig_setCentripetalAccel.vi	pasio socioni in totalood()	San add diddtor dripdott			

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

ne mierk	Julatan	ie iout	uiics.					
X			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		TrajectoryConfig SetStartVelocity.vi	public TrajectoryConfig setStartVelocity(double		
						startVelocityMetersPerSecond)		
X	Χ	Χ	X	SI	TrajectoryConfig_setVoltageDiffDrive.vi			
						public double getMaxVelocity()	can use cluster unpack	
						public double getMaxAcceleration()	can use cluster unpack	
	_							

NOTE ADD OTHER "SET" ROUTINES FOR OTHER

								CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC.				
								SPECIFIC AND NOT GENERIC.				
					zed							
					Execution Optimized	Test Routine Sample Program					_	g
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	oler	cnu	<i>*</i>	กน	ecn	st F mp				ge	st F	ð
,	_==		_ ≥		Ŭ,	Sa Te	VI Name	Function Prototype	Notes	ပိ	Je Je	Err
TRAJECTORY GENERATE	X	X		X			TrajectoryGenerate_Make_Cubic_CtrlVect.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig.config.)</translation2d>	uses cubic splines			
	X	Χ		X			TrajectoryGenerate_Make_Cubic.vi	end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List <translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config.)</translation2d>	uses cubic splines			
	X	X	X	X			TrajectoryGenerate_Make_Generic.vi	TrajectoryConfig config) Helper to bring these all together	Use this one!!!			
	X	X		X			TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config)	uses quintic splines			
	Χ	Χ	Χ	Χ			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	X		X			TrajectoryGenerate_splinePointsFromSplines.vi	public static List <posewithcurvature> splinePointsFromSplines(Spline[] splines)</posewithcurvature>				
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	em(ш	Μ	72	ecution	g e				Œ O	Pro	Õ
	nple	700	10t	Wenu Item	Sec.	est	VI Name	Function Prototype	Notes	ode	est	Error
TRAJECTORY GENERATE (Control Vector)	_	Q	2	2	Щ	<u> </u>	VI Name	Function Prototype public ControlVectorList(int initialCapacity)	may not need, just data	0		Щ
TRAJECTORT GENERATE (CONTION VECTOR)								public ControlVectorList(III IIIIIIaiCapacity)	may not need, just data			
								public ControlVectorList() public ControlVectorList(Collection extends</td <td>may not need, just data</td> <td></td> <td></td> <td></td>	may not need, just data			
								Spline.ControlVector> collection)	ayetea, jaet aa.a			
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	'mplementec	Documentec	Not WPILIB	Menu Item	Execution	Test Routine Sample Progra				Code Review	Test Program	Č
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	ĺμ,	9	Ş	Je	آ	Sai	VI Name	Function Prototype	Notes	ပိ	<u>1</u> 6	Error
				<	4							
TRAJECTORY PARAMETERIZE		Χ	Χ	No			TrajectoryParam_calcStuffFwd.vi					
TRAJECTORY PARAMETERIZE	Χ	X	Χ	No No			TrajectoryParam_calcStuffRev.vi					
TRAJECTORY PARAMETERIZE		Χ	Χ	No				private static void enforceAccelerationLimits(boolean reverse,	This routines needs to be changed			
TRAJECTORY PARAMETERIZE	Χ	X	X X	No No			TrajectoryParam_calcStuffRev.vi	private static void enforceAccelerationLimits(boolean reverse, List <trajectoryconstraint> constraints, ConstrainedState state)</trajectoryconstraint>	This routines needs to be changed when new constraints are added. This routines needs to be changed when new constraints are added.			

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. TrajectoryParam timeParam.vi public static Trajectory timeParameterizeTrajectory(List<PoseWithCurvature> points. List<TrajectoryConstraint> constraints, double startVelocityMetersPerSecond, double endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double naxAccelerationMetersPerSecondSq, boolean reversed) Not WPILIB Menu Item **Test** 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 Χ Χ Χ TrapProfile New.vi XX TrapProfile_ShouldFlipAcceleration.vi No Private, remove from menu XX Χ TrapProfile TimeLeftUntil.vi XX Χ TrapProfile TotalTime.vi $X \mid X$ X TrapProfState Equals.vi TrapProfState New.vi $X \mid X$ X

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

/ Trajectory Library – VI Implementation I	_ist									
2/2022 – added implicit model follower and time		olatab	ole rou	tines.						
INTRIPETAL ACCELERATION CONSTRAINT	X	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name CentripetalAccelConstraint_getMaxVelocity.vi CentripetalAccelConstraint_getMinMaxAccel.vi	Function Prototype public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	Notes
	X	X		X	SI			CentripetalAccelConstraint_New.vi	public CentripetalAccelerationConstraint(double maxCentripetalAccelerationMetersPerSecondSq)	Can use cluster pack for now
·	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		VI Name	Function Prototype	Notes
DIFF DRIVE KINEMATIC CONSTRAINT	X	X		X				DiffDriveKinematicsConstraint_getMaxVelocity.vi DiffDriveKinematicsConstraint_getMinMaxAccel.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters,	
	X	X		X	SI			DiffDriveKinematicsConstraint_New.vi	double curvatureRadPerMeter, double velocityMetersPerSecond) public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond)	
DIFF DRIVE VOLTAGE CONSTRAINT	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine		VI Name DiffDriveVoltageConstraint_getMaxVelocity.vi DiffDriveVoltageConstraint_getMinMaxAccel.vi	Function Prototype public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public MinMax	Notes
									getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI			DiffDriveVoltageConstraint_New.vi	public DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)	
ELLIPTICAL REGION CONSTRAINT	< Implemented	Documented	Not WPILIB	< Menu Item	Execution Optimized	Test Routine		VI Name	Function Prototype	Notes
ELLIPTICAL REGION CONSTRAINT	X X X			X X X				EllipRegionConstraint_getEllipRegion.vi EllipRegionConstraint_getMinMaxAccel.vi EllipRegionConstraint_lsPoseInRegion.vi EllipRegionConstraint_New.vi		
l	^							Limbrive Ground rather Time w. vi		<u> </u>

5/2/2022 – added implicit model follower and time	interp	olatab	ole rout	tines.					_	
JERK CONSTRAINT	/ / Implemented	Documented	X X X X X X X X X X X X X X X X X X X	Menu Item	ত Execution Optimized	Test Routine	Sample Program	VI Name JerkConstraint_getMaxVelocity.vi JerkConstraint_getMinMaxAccel.vi JerkConstraint_New.vi	Routine exists, it is just a shell Routine exists, it is just a shell	Notes FUTURE FUTURE FUTURE FUTURE
MAX VELOCITY CONSTRAINT	X X Implemented	Documented	Not WPILIB	X X Wenu Item	いい い Execution Optimized	Test Routine	Sample Program	VI Name MaxVelocityConstraint_getMaxVelocity.vi MaxVelocityConstraint_getMinMaxAccel.vi MaxVelocityConstraint_New.vi	Function Prototype	Notes
MECANUM DRIVE KINEMATICS CONSTRAINT	X X Implemented	X X Documented		X X Menu Item	S Execution Optimized	Test Routine	Sample Program	VI Name MecaDriveKinematicsConstraint_getMaxVelocity.vi MecaDriveKinematicsConstraint_getMinMaxAccel.vi MecaDriveKinematicsConstraint_New.vi	Function Prototype	Notes
RECTANGULAR REGION CONSTRAINT	X X Implemented	Documented	Not WPILIB	X X Wenu Item		Test Routine	Sample Program	VI Name RectRegionConstraint_getRectRegion.vi RectRegionConstraint_getMinMaxAccel.vi RectRegionConstraint_IsPoseInRegion.vi RectRegionConstraint New.vi	Function Prototype	Notes
SWERVE DRIVE KINEMATICS CONSTRAINT	Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name SwerveDriveKinematicsConstraint_getMaxVelocity.vi SwerveDriveKinematicsConstraint_getMinMaxAccel.vi	Function Prototype public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	Notes
	X	X		X	SI			SwerveDriveKinematicsConstraint_New.vi	Newpublic SwerveDriveKinematicsConstraint(final SwerveDriveKinematics kinematics, double maxSpeedMetersPerSecond)	Can use cluster pack for now

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

a miphon moder follower and time									
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes
TRAJECTORY CONSTRAINT	X		X	X			TrajConstraint_GetMaxVelocity.vi		
	X		X	Χ			TrajConstraint_GetMinMaxAccel.vi		
	Χ		Χ	Χ			TrajConstraint_GetType.vi		

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

'======== UTILITY

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
UTIL	Χ	Χ	X	X	SI			Util ApproxEqual.vi		
	Χ	Χ	Χ	X				Util_Array_PoseWCurv_to_XY.vi		
	Χ	Χ	Χ	X	SI			Util_CalcDist.vi		
	Χ	Χ	X	X	SI			Util_GetLibraryVersion.vi		
	Χ	Χ	X	X	SI			Util_GetLibUsage.vi		
	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	X	No				Util_Trajectory_WriteFile_States.vi		internal
	Χ	Χ	X	No				Util_Trajectory_WriteFile_WayPoints.vi		internal
	Χ	Χ	X	X				Util_Trajectory_WriteFile.vi		
	Χ	Χ	X	X				Util_TrajectoryState_Meters_To_Inches.vi		
	Χ	Χ	X	X				Util_TrajState_to_DiffDrive_WheelPos.vi		
	Χ	Χ	Χ	X				Util_DispWaypoint_Eng_To_SI.vi		
	Χ	Χ	X	X				Util_DispWaypoint_To_CubicInput.vi		
	Χ	Χ	Χ	X			_	Util_DispWaypoint_To_QuinticInput.vi		
	Χ	Χ	Χ	X			_	Util_DispWeightedWaypiont_Eng_To_WeightedWaypoint		
	Χ	Χ	X	No				Util_DispWeightedWayPoint_To_WeightedWayPoint.vi		Sorry about the confusing name

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CONVERSIONS

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

FRC LabVIEW Trajectory Library – VI Implementation List
Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines.
JAVA / C++ WPILIB EQUIVALENT

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

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

'======== PATHFINDER UTIL

'=======

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	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	X				PathfinderUtil_ToTrajectory.vi		

FRC LabVIEW Trajectory Library – VI Implementation List

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

X X X X X

PathfinderUtil_ToTrajectoryStates.vi

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program I Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
DC MOTOR		Χ		Χ	SI		DCMotor_GetAndymark9015.vi					
	Χ	Χ		X	SI		DCMotor_GetAndymarkRs775_125.vi					
	Χ	Χ		Χ	SI		DCMotor_GetBag.vi					
	Χ	X		Χ	SI		DCMotor_GetBanebotsRs550.vi					
	Χ	X		X	SI		DCMotor_GetBanebotsRs775.vi					
	Χ	X		X	SI		DCMotor_GetCIM.vi					
	Χ	Χ		Χ	SI		DCMotor_GetCurrent.vi					
	Χ	X		Χ	SI		DCMotor_GetFalcon500.vi					
	Χ	Χ		X	SI		DCMotor_GetMiniCIM.vi					
	Χ	X		X	SI		DCMotor_GetNEO.vi					
	Χ	X		Χ	SI		DCMotor_GetNEO550.vi					
	Χ	X		Χ	SI		DCMotor_GetRomiBuiltIn.vi					
	Χ	X		Χ	SI		DCMotor_GetVex775Pro.vi					
	Χ	X		Χ	SI		DCMotor_New.vi					
	Χ	Χ		Χ	SI		DCMotor_PickMotor.vi					

	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		Χ			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 '========

> VI Name 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

n 2.X 5/2/2022 – added implicit model follower and tim						DiffDrive Decer Eat Handata vii			T
	X	X	X			DiffDrivePoseEst_Update.vi DiffDrivePoseEst_UpdateWithTime.vi			
	X	X	X			DiffDrivePoseEst_OpuateWithTime.vi DiffDrivePoseEst_VisionCorrect_Callback.vi			
	X	\hat{x}	X			DiffDrivePoseEst VisionCorrect Kalman H Callback.vi			
				De G		DIND I VOI COCCE CE L'ALIMAI E I E CAMBACKEN		<u> </u>	
	olemented	Documented	Menu Item	Execution Optimize Test Routine	mple Program		Code Review	st Program	
				Ä P		VI Name Function Prototype Notes	රි		
EXTENDED KALMAN FILTE			X			ExtendedKalmanFilter_Correct_OnlyUY.vi			
	X	X	X			ExtendedKalmanFilter_Correct.vi Just a shell, not functional!			
	X	X	X			ExtendedKalmanFilter_GetP_Single.vi			
	X	X	X			ExtendedKalmanFilter_GetP.vi			
	X	X	X			ExtendedKalmanFilter_GetXHat_Single.vi			
	X	X	X			ExtendedKalmanFilter_GetXHat.vi			
	X	X	X			ExtendedKalmanFilter_New.vi			
	X	X	X			ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter Reset.vi			
	X	X	X			ExtendedKalmanFilter_Reset.vi ExtendedKalmanFilter_SetP.vi			-
	X	X	X			ExtendedKalmanFilter_SetF.vi ExtendedKalmanFilter_SetXHat_Single.vi			
	X	\hat{x}	X			ExtendedKalmanFilter SetXHat.vi			
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				timize	'am			~	
	Implemented	Documented Not Mel 18	Menu Item	Execution Optimize Test Routine		VI Name Function Prototype Notes	Code Review	Test Program	
KALMAN FILTE	7	X	X	Execution Optimize X Test Routine		KalmanFilter_Correct.vi	ge	Test Program	
KALMAN FILTE	R X	X X	X			KalmanFilter_Correct.vi KalmanFilter_GetK	ge	Test Program	
KALMAN FILTE	R X X X	X X X	X X X			KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetK_Single.vi	ge	Test Program	
KALMAN FILTE	ER X X X X X X X X X	X X X	X X X X	X		KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetK_Single.vi KalmanFilter_GetXHat	ge	Test Program	
KALMAN FILTE	X X X X X	X X X X	X X X X	X		KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetK_Single.vi KalmanFilter_GetXHat KalmanFilter_GetXHat	ge	Test Program	
KALMAN FILTE		X X X X X	X X X X X	X		KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetK_Single.vi KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_GetXHat_Single KalmanFilter_New.vi	ge	Test Program	
KALMAN FILTE	X X X X X X X X	X X X X X	X X X X X X	X		KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetK_Single.vi KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_New.vi KalmanFilter_New.vi KalmanFilter_New.vi	ge	Test Program	
KALMAN FILTE	X X X X X X X X	X X X X X	X X X X X X X	X		KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetK_Single.vi KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_GetXHat_Single KalmanFilter_New.vi KalmanFilter_Predict.vi KalmanFilter_Reset.vi	ge	Test Program	
KALMAN FILTE	X X X X X X X X X X X X X X X X X X X	X X X X X X X	X X X X X X X X	X X X		KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetK_Single.vi KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_GetXHat_Single KalmanFilter_New.vi KalmanFilter_Predict.vi KalmanFilter_Reset.vi KalmanFilter_Reset.vi	ge	Test Program	
KALMAN FILTE	X X X X X X X X	X X X X X X X	X X X X X X X	X		KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetK_Single.vi KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_GetXHat_Single KalmanFilter_New.vi KalmanFilter_Predict.vi KalmanFilter_Reset.vi	ge	Test Program	
KALMAN FILTE	X X X X X X X X X X X X X X X X X X X	ocumented X X X X X X X X X X X X X X X X X X X	ite and the state of the state	Optimized X X X X X	mple Program	KalmanFilter_CetK KalmanFilter_GetKSingle.vi KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_New.vi KalmanFilter_Predict.vi KalmanFilter_Reset.vi KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat	Review	est Program Test Program	
	IR X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X 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 Program	KalmanFilter_Cott	ge	Program	
KALMAN FILTER	R X X X X X X X X X X X X X X X 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 X X X X X	Sample Program	KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetK_Single.vi KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_DetXHat KalmanFilter_New.vi KalmanFilter_Predict.vi KalmanFilter_Reset.vi KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat_Single VI Name Function Prototype Notes	Review	Program	
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	R X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X 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 X X X X X	Sample Program	KalmanFilter_Correct.vi KalmanFilter_GetK KalmanFilter_GetS Single.vi KalmanFilter_GetXHat KalmanFilter_GetXHat KalmanFilter_New.vi KalmanFilter_New.vi KalmanFilter_Reset.vi KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat KalmanFilter_SetXHat_Single VI Name VI Name Function Prototype Notes KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi	Review	Program	
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Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. Function Prototype Notes FLYWHEEL SIM X FlyWheelSim_GetAngularVelocityRadPerSec.vi X X FlyWheelSim_GetAngularVelocityRPM.vi Χ X Χ X X X FlyWheelSim GetCurrentDrawAmps FlyWheelSim_New_LinSys Future FlyWheelSim_New_LinSys_MOI_NoNoise Future FlyWheelSim New LinSys NoNoise Future FlyWheelSim_New_MOI.vi X X Χ XX X FlyWheelSim SetInput.vi XX Χ FlyWheelSim SetState.vi XX Χ FlyWheelSim Update.vi Function Prototype Notes LINEAR SYSTEM SIM X X LinearSystemSim_ClampInput.vi X LinearSystemSim_GetCurrentDrawAmps.vi DONT IMPLEMENT... LinearSystemSim_GetOutput_Single.vi X X X Χ LinearSystemSim_GetOutput.vi Χ Χ X X X LinearSystemSim New LinearSystemSim_New_NoNoise.vi Χ X LinearSystemSim SetInput Array.vi Doesn't use clamp? Χ Χ Χ LinearSystemSim_SetInput_Single.vi X X Χ LinearSystemSim_SetInput.vi X X Χ LinearSystemSim Setstate.vi XX Χ LinearSystemSim_Update.vi XX No LinearSystemSim_UpdateX.vi X X X No LinearSystemSim_UpdateY.vi Venu Item Function Prototype Notes SINGLE JOINT ARM SIM X Χ SngJntArmSim EsitmateMOI.vi XX X SngJntArmSim_GetAngleRads.vi X X SngJntArmSim GetCurrentDraw.vi Χ SngJntArmSim_GetVelocityRadsPerSec.vi XX Χ X X X SngJntArmSim_HasHitLowerLimit.vi Χ Χ Χ SngJntArmSim_HasHitUpperLimit.vi Χ Χ SngJntArmSim New.vi Χ X X No SngJntArmSim Rkf45 Func.vi Χ Χ Χ SngJntArmSim_SetInputVoltage.vi X X Χ SngJntArmSim SetState.vi X X SngJntArmSim_Update.vi X Χ Χ SngJntArmSim_UpdateX.vi Χ Χ Χ X SngJntArmSim_WouldHitLowerLimit.vi Χ Χ Χ SngJntArmSim_WouldHitUpperLimit.vi

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

MAT BUILDER	X Implemented	X Documented	Not WPILIB	X Menu Item	<u>ত</u> Execution Optimized	Test Routine	Sample Program	VI Name Function Prototype MatBuilder_Create.vi	Notes	Code Review	Test Program	Error Checking
WAT BOILDER	X	X		X	SI			MatBuilder Fill.vi				
l	Implemented	Documented	Not WPILIB	Item	Execution Optimized [5]	Test Routine	Sample Program	Interpolation Interpolation Interpolation		Code Review	ogram	Error Checking
	eu	ĬĮ.	Ν	Į,	inti	8	ple			C O	Progr	õ
	ldu	700	ot	Menu	Ş.	est	am	VI Name Function Prototype	Natas	oqe ,oq	est	<u>0</u>
MATRIX	X	X	_<	<u> </u>	SI	_		VI Name Function Prototype Matrix_AssignBlock.vi	Notes			
WATRIA	\hat{X}	\hat{x}		X	SI			Matrix Block.vi				
					O,			Matrix_ChangeBoundsUnchecked.vi				
	Χ	Х		Χ	SI			Matrix_Create.vi				
								Matrix Det.vi				
	Χ	Χ		Χ	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				
		X		X	1			Matrix_Exp.vi				
•	X	X		X	SI			Matrix_ExtractColumnVector.vi				
	Χ	Χ		Χ	SI			Matrix_ExtractFrom.vi				
	~	X		X	SI			Matrix_ExtractMatrix.vi Matrix ExtractRowVector.vi				
	X	X		X	SI			Matrix_Extractrowvector.vi				
	^	^		^	SI			Matrix Get.vi	labview has function			
	Χ	X		Χ	1			Matrix Ident.vi	WPILIB calls this EYE			
								Matrix Inv.vi	VVI IEID GAIIG TIIG ETE			
	Χ	Χ		Χ	SI			Matrix_IsEqual.vi				
								Matrix_IsIdentical.vi				
	Χ	Χ		Χ	I			Matrix_LLTDecompose.vi				
								Matrix_Max.vi				
								Matrix_MaxAbs.vi				
								Matrix_Mean.vi				
								Matrix_MinInternal.vi				
								Matrix_Minus_Matrix.vi				
	V	V		V	,			Matrix_Minus_Scalar.vi				
	Χ	X		Χ	I			Matrix_NormF.vi Matrix_NormIndP1.vi				
								Matrix_Plus_Matrix.vi				
								Matrix_Plus_Scalar.vi				
	Χ	X		X	I			Matrix_Pow.vi	THIS NEEDS WORK!!!!			
	X	X		X	SI			Matrix_SetColumn.vi				
	X	X		Χ	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				
	V	~		V	0/		_	Matrix_Trace.vi				
	X	X	Χ	X	SI			Matrix_Transpose.vi Matrix WithinTolerance.vi				
	۸		^	٨				IVIAUIX_VVIUIIII I OIEIAIIGE.VI				

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. VI Name Function Prototype Notes NOTE Matrix also has an SIMPLE MATRIX X SimpleMatrix ExtractMatrix.vi ExtractMatrix with different calling parameters.... YUK. Function Prototype Notes MATRIX HELPER X X X X SI MatrixHelper CooerceSize.vi MatrixHelper_MultCooerceBSize.vi MatrixHelper_Zero.vi VI Name Function Prototype Notes VECTOR BUILDER X VecBuilder_1x1Fill.vi Χ Χ SI X X X VecBuilder 2x1Fill.vi X SI VecBuilder 3x1Fill.vi X SI X X SI VecBuilder 4x1Fill.vi X X X SI VecBuilder_5x1Fill.vi X X X SI VecBuilder 6x1Fill.vi X X X SI VecBuilder 7x1Fill.vi XX X SI VecBuilder_8x1Fill.vi VecBuilder 9x1Fill.vi VecBuilder 10x1Fill.vi X X X X SI VecBuilder_ArrayBy1Fill.vi '======== MATH '======== Not WPILIB Function Prototype Notes ANGLE STATISTICS X X X X AngleStats_AngleAdd_CallbackHelp.vi AngleStats_AngleAdd.vi
AngleStats_AngleMean_CallbackHelp.vi X X X X X X ΧI AngleStats_AngleMean.vi X X X X X AngleStats_AngleResidual_CallbackHelp.vi XX XI AngleStats AngleResidual.vi

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. Execution Optir Routine Menu Item Function Prototype VI Name Notes MathUtil AngleModulus.vi MATH UTILITY X X SI X MathUtil_ApplyDeadband.vi X Χ Χ SI Χ X SI MathUtil Clamp Int.vi X MathUtil_Clamp.vi Χ Χ X SI Χ X SI Χ MathUtil InputModulus.vi Χ X Si MathUtil Interpolate.vi Χ Optin Menu Item Function Prototype Notes MERWE SCALED SIGMA POINTS X X X MerweScSigPts ComputeWeights.vi Χ X SI MerweScSigPts GetNumSigmas.vi XX X SI MerweScSigPts GetWc Single.vi XX X SI MerweScSigPts_GetWc.vi MerweScSigPts_GetWm_Single.vi XX X SI Χ MerweScSigPts_GetWm.vi X X SI Χ MerweScSigPts_New_Default.vi Χ XI Χ Χ X MerweScSigPts_New.vi Χ Χ Χ MerweScSigPts SigmaPoints.vi Optim Checking Not WPILIB Venu Item VI Name Function Prototype Notes NUMERICAL INTEGRATION X NumIntegrate Func Ax Bu K.vi NOT USED. Should this be used X or abandoned??? X NumIntegrate Rk4 Dbl X U.vi X X Χ NumIntegrate_Rk4_Dbl_X.vi X Χ Χ NumIntegrate_Rk4_Mat_X_U.vi X Χ Χ Χ Χ NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rkdp_Func_A.vi Χ Χ No NumIntegrate Rkdp Func B1.vi X X No SI Χ Χ No SI NumIntegrate_Rkdp_Func_B1B2.vi X X NumIntegrate Rkdp Func B2.vi No SI XX No I Numintegrate Rkdp Impl.vi XX Χ NumIntegrate_RKDP_Mat_X_U.vi New replacement for RKF45 NumIntegrate Rkf45 Func A.vi XX No SI NumIntegrate_Rkf45_Func_B1.vi XX No SI NumIntegrate_Rkf45_Func_B1B2.vi XX No SI XX No SI NumIntegrate Rkf45 Func B2.vi NumIntegrate_RKf45_Func_Bs.vi Removed. Replaced with newer functions. NumIntegrate_RKf45_Func_Ch.vi Removed. Replaced with newer functions. NumIntegrate_RKf45_Func_Ct.vi Removed. Replaced with newer functions. NumIntegrate_Rkf45_Impl.vi $X \mid X$ No I X Χ X NumIntegrate_Rkf45_Mat_X_U.vi Note that this Feinberg method has been changed and a Dormand Price method has been implemented TODO

Revision 2.X 5/2/2022 – added implicit model follower and time interpolatable routines. 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 Menu Item VI Name Function Prototype Notes RUNGE KUTTA TIME VARYING X X No RungeKuttaTimeVarying RK4 Mat T Y.vi Function Prototype Notes NUMERICAL JACOBIAN X X NumJacobian U.vi Χ $X \mid X$ X NumJacobian X.vi Function Prototype Notes RICCATI X Riccati Check Detectable.vi X Routine exists, it is just a shell X Riccati_Check_Stabilizable.vi Χ Not really done !!! Χ Χ X X X X Riccati DARE Iterate.vi X XX Χ Riccati_DARE_StructDoubling.vi Χ X Χ Riccati DARE N.vi Riccati DARE.vi Χ X X Riccati Input Check.vi X X '======= VISION '======== Menu Item Function Prototype Notes COMPUTER VISION UTILITIES X CompVisionUtil CalculateDistanceToTarget.vi Χ X X X CompVisionUtil_EstimateCameraToTarget.vi X X CompVisionUtil_EstimateFieldToCamera.vi X X X X CompVisionUtil_EstimateFieldToRobot.vi X X X CompVisionUtil EstimateFieldToRobot Alt.vi

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	ample Program	VI Name	Function Deptatus	Notes
peDef		X		_ ≥	N/A		S	ARM FF.CTL	Function Prototype	Notes
ровоі	Z	X	X	X	N/A			BANG BANG.CTL		
	_	,,	X	X	N/A			BICon-Matrix_FUNC_TYPE.CTL		NOT USED. Should this be
										deleted or abandoned???
	Z	X	X	X	N/A			CALLBACK_FUNC_TYPE.CTL		
	Z	X	X	X	N/A			CHASSIS_SPEEDS.CTL		
		X	X	X	N/A N/A			CONTRAINED_STATE.CTL COORDINATE AXIS.CTL		
	Z	X	\overline{X}	X	N/A			COORDINATE_AXIS.CTL COORDINATE SYSTEM.CTL		
	Z	X	X	X	N/A			DCMOTOR TYPES ENUM.CTL		
	Z	Χ	X	X	N/A			DCMOTOR.CTL		
	Ζ	Χ	Χ	X	N/A			DCMOTOR_SIM.CTL		
	Ζ	Χ	Χ	X	N/A			DEBOUNCER_TYPE_ENUM.Ctl		
	Z	X	X	X	N/A			DEBOUNCER.CTL		
	Z	X	X	X				DIFF_DRIVE_ACCEL_LIMIT.CTL		
	Z Z	X	X	X	N/A N/A			DIFF_DRIVE_KINEMATICS.CTL DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl		
	Z	X	X	X	N/A N/A			DIFF_DRIVE_NIDOL_WHEEISIZE_ENDIVI.CII DIFF_DRIVE_Pose_EST.ctl		
	Z	X	X	X	N/A			DIFF DRIVE ToughBoxMini GearChoice ENUM.ctl		
	Z	X	X	X	N/A			DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl		
	Z	Χ	X	X	N/A			DIFF DRIVE TRAIN SIM STATE ENUM.CTL		
	Ζ	Χ	Χ	X	N/A			DIFF_DRIVE_TRAIN_SIM.ctl		
	Ζ	X	X	X	NA			DISPLAY_WAYPOINT.ctl		Was UTIL_WAYPOINT.VI
	Ζ	X	X	X	NA			DISPLAY_WEIGHTED_WAYPOINT.ctl		New V1.5. was UTIL_WEIGHTED_WAYPOINIT.
	Ζ	Χ	Χ	X	N/A			ELEV_FF.CTL		
	Ζ	Χ	X	X				ELEVATOR_SIM.CTL		
	Z	Χ	X	X	N/A			EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL		
	Z	V	X	X				EXTENDED_KALMAN_FILTER.CTL		
		X	X	X	N/A N/A			FLYWHEEL_SIM.ctl FUNCTION GENERATOR.ctl		
	Z	X	\overline{X}	X	N/A			FUNCTION_GENERATOR_MATRIX.ctl		
	Z	X	X	X				HOLONOMIC_DRV_CTRL.CTL		New 1/26/21
	Z	Χ	Χ	X				TIME_INTERPOLATABLE_BOOLEAN.CTL		
	Ζ	Χ	X	X				TIME_INTERPOLATABLE_DOUBLE.CTL		
	Ζ	Χ	Χ	X				TIME_INTERPOLATABLE_POSE2D.CTL		
	Z	X	X		N/A			TIME_INTERPOLATABLE_ROTATION2D.CTL		
	Z	X	X	X				KALMAN_FILTER_LATENCY_COMP_FUNC_GROUP.CTL		
	Z Z	X	X	X	N/A N/A			KALMAN_FILTER_LATENCY_COMP.CTL KALMAN_FILTER.ctl		
	Z	X	X	X				LINEAR FILTER.CTL		
	Z	X	X	X				LINEAR PLANT INV FF.ctl		
	Z	X	X	X				LINEAR QUADRATIC REGULATOR.ctl		
	Ζ	Χ	Χ	X				LINEAR_SYSTEM_LOOP.ctl		
	Ζ	Χ	X	X				LINEAR_SYSTEM_SIM.ctl		
	Ζ	Χ	Χ	X				LINEAR_SYSTEM.ctl		
	Z		X	X				LTV_DIFF_DRIVE_CTRL.ctl		
	Z		X	X				LTV_DIFF_DRIVE_CTRL_STATE_ENUM.ctl		
			X	X				LTV_UNICYCLE_CONTROLLER.CTL LTV_UNICYCLE_CONTROLLER_INPUT_ENUM.ctl		
	Z		X	X				LTV_UNICYCLE_CONTROLLER_INPUT_ENUM.cti		
	Z	X	X	X				MECA DRIVE KINEMATICS.CTL		
	Z	X	X	X				MECA DRIVE ODOMETRY.CTL		
	Z		Χ	X	N/A			MECA_DRIVE_POSE_EST.CTL		
	Ζ	Χ	Χ	X	N/A			MECA_WHEEL_SPEEDS.CTL		
	Ζ	Χ	Χ	X				MEDIAN_FILTER.CTL		
	Z	X	X	X				MERWE_SCALED_SIGMA_PTS.ctl		
	Z	X	Χ	Χ	N/A			OBSERVER SNAP LIST ITEM.CTL	İ	

e interpo	latabl	e routi	nes.			
Z	Χ	X	X	N/A	PARAM STACK ITEM.CTL	
Z	X	X		N/A	PARAM STACK.CTL	
Z	X	X		N/A	PID ADV LIMITS.CTL	
Z	X	X		N/A	PID ADV TUNING.CTL	
Z	X	X		N/A	PID CONTROLLER.CTL	
Z	X	X		N/A	PID ERROR TOLERANCE.CTL	
Z	\dot{x}	X		N/A	PID_INPUT_LIMITS.CTL	
Z	\hat{X}	X	X	N/A	PID TUNING.CTL	
Z	X	X		N/A	POSE2D.CTL	
				N/A	POSE3D.CTL POSE3D.CTL	
Z	X	X		N/A	POSEWCURVATURE.CTL	
Z	X					
Z	X	X		N/A	PROFILED_PID_CONTROLLER.CTL	
Z	X	X		N/A	QUATERNION.CTL	
Z	X	X			RAMSETE_EXE_TUNING.CTL	
Z	X	X		N/A	RAMSETE.CTL PARTY OF THE PARTY	
Z	Χ	X		N/A	ROTATION2D.CTL	
Z	Χ	X		N/A	ROTATION3D.CTL	
Z	Χ	Χ		N/A	SIMPLE_MOTOR_FF.CTL	
Z	Χ	Χ		N/A	SINGLE_JOINT_ARM_SIM.CTL	
Z	Χ	X	Χ	N/A	SLEW_RATE_LIMITER.CTL	
Z	Χ	Χ			SPLINE_CTRL_VECTOR.CTL	
Z	Χ	Χ		N/A	SPLINE.CTL	
Z	Χ	Χ		N/A	SWERVE_DRIVE_KINEMATICS.CTL	
Z	Χ	X		N/A	SWERVE_DRIVE_MODULE_STATE.CTL	
Z	Χ	X		N/A	SWERVE_DRIVE_ODOMETRY.CTL	
Z	X	X		N/A	SWERVE_DRIVE_Pose_EST.CTL	
Z	X	X	Χ	N/A	TIMER.CTL	
Z	Χ	X	Χ	N/A	TRAJ_CONFIG.CTL	
Z	Χ	X	Χ	N/A	TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL	
Ζ	Χ	X	Χ	N/A	TRAJ CONSTRAINT DIIF DRIVE KINEMATICS.CTL	
Z	Χ	X	Χ	N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_VOLTAGE.CTL	
Z		X	X	N/A	TRAJ_CONSTRAINT_ELLIP_REGION.CTL	
		,,				
1		X		N/A	TRAJ_CONSTRAINT_JERK.CTL	Routine exists, it is just a shell
Z			X		TRAJ_CONSTRAINT_JERK.CTL TRAJ_CONSTRAINT_MAX_VELOCITY.CTL	Routine exists, it is just a shell
	X	Χ	Χ			Routine exists, it is just a shell
	X X	X X	X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL	Routine exists, it is just a shell
Z		X X X	X X X	N/A N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL	Routine exists, it is just a shell
Z Z		X X X X	X X X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL	Routine exists, it is just a shell
Z Z Z	X	X X X X	X X X X	N/A N/A N/A N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL	Routine exists, it is just a shell
Z Z Z Z	X X X	X X X X X X	X X X X X	N/A N/A N/A N/A N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	Routine exists, it is just a shell
Z Z Z Z	X	X X X X X X X	X X X X X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJECTORY_SPLINE_TYPE_ENUM.CTL	Routine exists, it is just a shell
Z Z Z Z Z	X X X X	X X X X X X	X X X X X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL	Routine exists, it is just a shell
Z Z Z Z Z Z Z	X X X X	X X X X X X X X	X X X X X X X	N/A N/A N/A N/A N/A N/A N/A N/A N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJECTORY_SPLINE_TYPE_ENUM.CTL TRAJECTORY.CTL	Routine exists, it is just a shell
Z Z Z Z Z Z Z	X X X X X	X X X X X X X X X X X X	X X X X X X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJECTORY_SPLINE_TYPE_ENUM.CTL TRAJECTORY.CTL TRANSFORM2D.CTL TRANSFORM3D.CTL	Routine exists, it is just a shell
Z Z Z Z Z Z Z Z Z	X X X X X X	X X X X X X X X X X X X	X X X X X X X X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJECTORY_SPLINE_TYPE_ENUM.CTL TRAJECTORY.CTL TRANSFORM2D.CTL	Routine exists, it is just a shell
Z Z Z Z Z Z Z Z Z	X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJECTORY_SPLINE_TYPE_ENUM.CTL TRAJECTORY.CTL TRANSFORM2D.CTL TRANSFORM3D.CTL TRANSLATION2D.CTL TRANSLATION3D.CTL	Routine exists, it is just a shell
Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJECTORY_SPLINE_TYPE_ENUM.CTL TRAJECTORY.CTL TRANSFORM2D.CTL TRANSFORM3D.CTL TRANSLATION2D.CTL	Routine exists, it is just a shell
Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJECTORY_SPLINE_TYPE_ENUM.CTL TRAJECTORY.CTL TRANSFORM2D.CTL TRANSFORM3D.CTL TRANSLATION2D.CTL TRANSLATION3D.CTL TRAPEZOID_PROFILE_CONSTRAINT.CTL TRAPEZOID_PROFILE_STATE.CTL	Routine exists, it is just a shell
Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJECTORY_SPLINE_TYPE_ENUM.CTL TRAJECTORY.CTL TRANSFORM2D.CTL TRANSFORM3D.CTL TRANSLATION2D.CTL TRANSLATION3D.CTL TRAPEZOID_PROFILE_CONSTRAINT.CTL	Routine exists, it is just a shell
Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJECTORY_SPLINE_TYPE_ENUM.CTL TRAJECTORY_CTL TRANSFORM2D.CTL TRANSFORM3D.CTL TRANSLATION2D.CTL TRANSLATION3D.CTL TRAPEZOID_PROFILE_CONSTRAINT.CTL TRAPEZOID_PROFILE_STATE.CTL TRAPEZOID_PROFILE_CTL	Routine exists, it is just a shell
Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_RECT_REGION.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJ_ECTORY_SPLINE_TYPE_ENUM.CTL TRAJECTORY_CTL TRANSFORM2D.CTL TRANSFORM3D.CTL TRANSLATION2D.CTL TRANSLATION3D.CTL TRAPEZOID_PROFILE_CONSTRAINT.CTL TRAPEZOID_PROFILE_STATE.CTL TRAPEZOID_PROFILE.CTL TWIST2D.CTL	Routine exists, it is just a shell
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