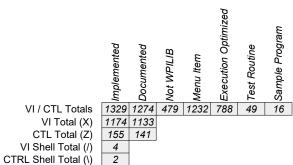
Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

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...



X X X SI

FunctionGenerator New.vi

Doc completed Pct 95.86% Optimization Pct 59.29%

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

AUTONOMOUS

AUTO HELPER X X X X S AutoHelper\_DelayedAction.vi Similar to interpolated tree map...

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

BUMPLESS TRANSFER X X X X X X I BumplessTransfer\_Execute.vi

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	X	X		X	1			FunctionGenerator_Add_XY.vi		Similar to interpolated tree map	·		
	Χ	X		X	1			FunctionGenerator_Calculate.vi		Similar to interpolated tree map			
	Χ	X		X	SI			FunctionGenerator_Clear.vi					
	X	X	X	X	1			FunctionGenerator Execute.vi		Similar to interpolated tree map			

FRC\_LabVIEW\_Trajectory\_Library\_Routines.xlsx

Similar to interpolated tree map..

WPILib LabVIEW Math Library – VI Implementation List

Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

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WPILib LabVIEW Math Library – VI Implementation List

Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

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CONTROLLI	ER UTIL				X Menu Item	☑ Execution Optimized	Test Routine	VI Name  ControllerUtil_GetModulusError.vi	Function Prototype	Notes This was short lived in WPILIB, but still useful here.	Code Review	Test Program	
<u>-</u>	LEV FF				X Menu Item	Execution Optimized	Test Routine	VI Name ElevFF_Calculate.vi	Function Prototype	Notes	Code Review	Test Program	
-	Y 2 2	( )	\ \		$\frac{X}{X}$	+		ElevFF_CalculateVelocityOnly.vi					
				X				ElevFF_Execute.vi		LabVIEW style single call			
				^	- 1		1						1
				X				ElevFF ExecuteVelocityOnly.vi		LabVIEW style single call			
	>	( )	· .	X	X X			ElevFF_ExecuteVelocityOnly.vi ElevFF_MaxAchieveAccel.vi ElevFF_MaxAchieveVelocity.vi		LabVIEW style single call			

Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse XX ElevFF MinAchieveVelocity.vi  $X \mid X$ X ElevFF\_New\_ZeroAccel.vi ElevFF New.vi  $X \mid X$ ltem VI Name Function Prototype Notes HolDrvCtrl AdvCalculate Trajectory.vi Added 1/24/2022 Added 1/24/2022 HolDrvCtrl AdvCalculate.vi XX X SI HolDrvCtrl AtReference.vi Added 1/26/21 HolDrvCtrl Calculate Trajectory.vi Added 1/26/21  $X \mid X$ X HolDrvCtrl Calculate.vi Added 1/26/21 XX Χ HolDrvCtrl Execute Trajectory.vi Added 1/24/2022 HolDrvCtrl Execute.vi Future X X X SI HolDrvCtrl New.vi Added 1/26/21 HolDrvCtrl\_PackExecuteSP.vi X X X X SI HolDrvCtrl PackPID.vi Added 1/24/2022 X X X X HolDrvCtrl PackProfPID.vi X X X X Added 1/24/2022 XX X SI HolDrvCtrl SetEnabled.vi Added 1/26/21 X SI HolDrvCtrl SetTolerance.vi Added 1/26/21 Not WPILIB VI Name Function Prototype Notes PID AUTOTUNE X X X No PIDAutoTune ClosedLoopStep.vi PIDAutoTune\_Convert\_Academic\_To\_NonInteracting.vi X X X No x X X No PIDAutoTune\_OpenLoopStep.vi X X X X PIDAutoTune SetTuningArguments.vi  $X \mid X \mid X \mid X$ PIDAutoTune Step Execute.vi ζo VI Name Function Prototype Notes PID CONTROLLER X X X X PIDController AdvCalculate FF Sp Pv Per.vi Advanced PID PIDController\_AdvCalculate\_FF\_Sp\_Pv.vi Advanced PID X X X X Х PIDController AdvExecute.vi X X X X Labview style helper. Advanced X X X X X PIDController AtSetpoint.vi SI PIDController Calculate PV.vi XX X PIDController Calculate SP PV.vi XX X SI PIDController DisableContinousInput.vi PIDController\_EnableContinousInput.vi X SI  $X \mid X$ X X X X PIDController Execute.vi Labview style helper PIDController\_GetContinuousError.vi OBSOLETE - Removed XX X SI PIDController GetPeriod.vi XX X SI PIDController GetPID.vi X SI PIDController GetPositionError.vi XX X SI X SI PIDController GetSetpoint.vi XX PIDController\_GetTolerance.vi XX X SI PIDController\_GetVelocityError.vi XX X SI PIDController IsContinuousInputEnabled.vi PIDController New.vi  $X \mid X \mid$ X I X X X X I X X X X X SI X X X X X SI PIDController NewPeriod.vi PIDController Pack AdvLimits.vi PIDController\_Pack\_AdvTuning.vi X X X X SI PIDController Pack ErrorTolerance.vi X X X X SI PIDController Pack InputLimits.vi Х PIDController Pack Tuning.vi X X X X SI X X X SI PIDController Reset.vi

3.08 11/07/2023 – Added edge detect, bool cmd, drum	X X		X S		PIDController SetD.vi				
	X X	X	XS	,	PIDController SetDerivativeFilter.vi	Advanced PID			
		X	No		PIDController_SetFeedForward_OBSOLETE_DELETE.vi	Advanced PID, Obsolete –			
						DELETE			
	X X		No		PIDController_SetFFGain_OBSOLETE_DELETE.vi	Advanced PID, Obsolete – DELETE			
	X X	(	X S	'	PIDController_SetI.vi				
					PIDController_SetInputRange.vi	OBSOLETE – Removed			
	XX		X S		PIDController_SetIntegratorRange.vi				
	XX	. X	X S		PIDController_SetIntegralZonevi PIDController SetOutputLimits.vi	Advanced PID			
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		X S		PIDController_SetOutputclimits.vi	Advanced PID			
<b>⊢</b>		. X	X S	,	PIDController SetPeriod.vi				
	X X		XS	,	PIDController SetPID.vi				
		( X	X S	'	PIDController SetPIDF.vi	Advanced PID			
	XX		X S		PIDController_SetSetpoint.vi				
	XX		X S	'	PIDController_SetTolerance.vi				
	$X \mid X$	(	X S	'	PIDController_SetTolerancePandV.vi				
	Implemented Documented	Not WPILIB	Menu Item Execution Ontir	Test Routine	ซื้อ อีล อีล อีล VI Name Function Prototype	Notes	Code Review	Test Program	
POSITION CONTROL	X	X			PosCtrl_Config_Threshold.vi	140103			Т
	X	X			PosCtrl Execute.vi				
	inted	TIB	im Optimize	tine	Program		eview	gram	ē. Skis
	plemented ocumented	ot WPILIB	enu Item xecution Ontimize	est Routine	ample Program		ode Review	est Program	ror Checkina
PROFILED BID CONTROLLED	Implemented Documented	Not WPILIB	Menu Item  Fxecution Optimize	Test	e by O VI Name Function Prototype  Profiled PID Controller, At Goal vi	Notes	Code Review	Test Program	Fror Checking
PROFILED PID CONTROLLER			X S	Test	ProfiledPIDController_AtGoal.vi	Notes	Code Review	Test Program	Fror Checking
	XX		X S	Test	ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi	Notes	Code Review	Test Program	Fror Checking
			X S	Test	ProfiledPIDController_AtGoal.vi	Notes	Code Review	Test Program	Frror Checking
	X X X X X X		X S X S X X	Test	ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi	Notes	Code Review	Test Program	Fron Cherking
	X X X X X X X X X X X X		X S X S X X X X	Test	ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi	Notes	Code Review	Test Program	Error Checking
	X X X X X X X X X X X X X X X X X X X		X S X S X X X X X X X X X X S	Test	ProfiledPIDController AtGoal.vi ProfiledPIDController AtSetpoint.vi ProfiledPIDController Calculate Meas Goal.vi ProfiledPIDController Calculate Meas StateGoal_TrapCnsrt.vi ProfiledPIDController Calculate Meas StateGoal.vi ProfiledPIDController Calculate Meas.vi ProfiledPIDController Calculate Meas.vi ProfiledPIDController DisableContInput.vi	Notes	Code Review	Test Program	Two r Observing
	X X X X X X X X X X X X X X X X X X X		X S X S X X X X X X X X X X X X S X X S	Test	ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi		Code Review	Test Program	Tron Charling
	X X X X X X X X X X X X X X X X X X X		X S X S X X X X X X X X X X X X X X X X	Test	ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi	Notes  Single call LabVIEW style function.	Code Review	Test Program	Emor Chaoking
	X X X X X X X X X X X X X X X X X X X		X S X X X X X X X X X X X X X X X X S X X S X X S	Test	ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi  ProfiledPIDController_Execute.vi		Code Review	Test Program	Emor Charking
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	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi  ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPositionError.vi	Single call LabVIEW style function.	Code Review	Test Program	Error Charling
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi  ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi	Single call LabVIEW style function.	Code Review	Test Program	orivord O your
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi  ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetSetpoint.vi	Single call LabVIEW style function.	Code Review	Test Program	Error Charling
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi  ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi	Single call LabVIEW style function.	Code Review	Test Program	Error Observing
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi  ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetPiD.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetVelocityError.vi	Single call LabVIEW style function.	Code Review	Test Program	Error Observing
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas_vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi  ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_New.vi ProfiledPIDController_New.vi ProfiledPIDController_NewPeriod.vi	Single call LabVIEW style function.	Code Review	Test Program	Error Observing
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal_vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi  ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_New.vi ProfiledPIDController_New.vi ProfiledPIDController_Reset_PosOnly.vi	Single call LabVIEW style function.	Code Review	Test Program	Error Observing
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi  ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_New.vi ProfiledPIDController_New.vi ProfiledPIDController_NewPeriod.vi ProfiledPIDController_Reset_PosOnly.vi ProfiledPIDController_Reset_PosVel.vi ProfiledPIDController_Reset_vosVel.vi	Single call LabVIEW style function.	Code Review	Test Program	Error Obentina
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi  ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPoid.vi ProfiledPIDController_GetPoid.vi ProfiledPIDController_GetPoid.vi ProfiledPIDController_GetPoid.vi ProfiledPIDController_GetPoid.vi ProfiledPIDController_GetTolerance.vi ProfiledPIDController_GetTolerance.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_New.vi ProfiledPIDController_New.vi ProfiledPIDController_Reset_PosOnly.vi ProfiledPIDController_Reset_PosVel.vi ProfiledPIDController_Reset_vi ProfiledPIDController_Reset_vi ProfiledPIDController_Reset_vi ProfiledPIDController_Reset_vi	Single call LabVIEW style function.	Code Review	Test Program	Error Obentina
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal_Vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas_Vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi  ProfiledPIDController_Execute.vi  ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPlD.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetPositionError.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_New.vi ProfiledPIDController_New.vi ProfiledPIDController_New.vi ProfiledPIDController_Reset_PosOnly.vi ProfiledPIDController_Reset_PosVel.vi ProfiledPIDController_Reset_PosVel.vi ProfiledPIDController_SetConstraints.vi ProfiledPIDController_SetConstraints.vi	Single call LabVIEW style function.	Code Review	Test Program	Error Cherking
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController AtGoal.vi ProfiledPIDController AtSetpoint.vi ProfiledPIDController Calculate Meas Goal.vi ProfiledPIDController Calculate Meas StateGoal TrapCnsrt.vi ProfiledPIDController Calculate Meas StateGoal.vi ProfiledPIDController Calculate Meas StateGoal.vi ProfiledPIDController Calculate Meas.vi ProfiledPIDController DisableContInput.vi ProfiledPIDController EnableContInput.vi ProfiledPIDController Execute.vi  ProfiledPIDController GetGoal.vi ProfiledPIDController GetPoi.vi ProfiledPIDController GetPoi.vi ProfiledPIDController GetPoistionError.vi ProfiledPIDController GetPoistionError.vi ProfiledPIDController GetSetpoint.vi ProfiledPIDController GetSetpoint.vi ProfiledPIDController GetVelocityError.vi ProfiledPIDController GetVelocityError.vi ProfiledPIDController New.vi ProfiledPIDController New.vi ProfiledPIDController Reset PosOnly.vi ProfiledPIDController Reset PosOnly.vi ProfiledPIDController SetConstraints.vi ProfiledPIDController SetConstraints.vi ProfiledPIDController SetGoal.posOnly.vi	Single call LabVIEW style function.	Code Review	Test Program	Error Cherking
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController AtSetpoint.vi ProfiledPIDController AtSetpoint.vi ProfiledPIDController Calculate Meas Goal.vi ProfiledPIDController Calculate Meas StateGoal_TrapCnsrt.vi ProfiledPIDController Calculate Meas StateGoal.vi ProfiledPIDController Calculate Meas StateGoal.vi ProfiledPIDController Calculate Meas.vi ProfiledPIDController DisableContInput.vi ProfiledPIDController EnableContInput.vi ProfiledPIDController EnableContInput.vi ProfiledPIDController GetGoal.vi ProfiledPIDController GetPeriod.vi ProfiledPIDController GetPeriod.vi ProfiledPIDController GetPositionError.vi ProfiledPIDController GetSetpoint.vi ProfiledPIDController GetSetpoint.vi ProfiledPIDController GetVelocityError.vi ProfiledPIDController GetVelocityError.vi ProfiledPIDController New.vi ProfiledPIDController New.vi ProfiledPIDController Reset PosOnly.vi ProfiledPIDController Reset PosOnly.vi ProfiledPIDController Reset.vi ProfiledPIDController SetConstraints.vi ProfiledPIDController SetConstraints.vi ProfiledPIDController SetGoal.vi ProfiledPIDController SetGoal.vi ProfiledPIDController SetGoal.vi ProfiledPIDController SetGoal.vi ProfiledPIDController SetGoal.vi	Single call LabVIEW style function.	Code Review	Test Program	Error Chackina
	X X X X X X X X X X X X X X X X X X X		X S X S X S X S X S X S X S X S X S X S	Test	ProfiledPIDController AtGoal.vi ProfiledPIDController AtSetpoint.vi ProfiledPIDController Calculate Meas Goal.vi ProfiledPIDController Calculate Meas StateGoal TrapCnsrt.vi ProfiledPIDController Calculate Meas StateGoal.vi ProfiledPIDController Calculate Meas StateGoal.vi ProfiledPIDController Calculate Meas.vi ProfiledPIDController DisableContInput.vi ProfiledPIDController EnableContInput.vi ProfiledPIDController Execute.vi  ProfiledPIDController GetGoal.vi ProfiledPIDController GetPoi.vi ProfiledPIDController GetPoi.vi ProfiledPIDController GetPoistionError.vi ProfiledPIDController GetPoistionError.vi ProfiledPIDController GetSetpoint.vi ProfiledPIDController GetSetpoint.vi ProfiledPIDController GetVelocityError.vi ProfiledPIDController GetVelocityError.vi ProfiledPIDController New.vi ProfiledPIDController New.vi ProfiledPIDController Reset PosOnly.vi ProfiledPIDController Reset PosOnly.vi ProfiledPIDController SetConstraints.vi ProfiledPIDController SetConstraints.vi ProfiledPIDController SetGoal.posOnly.vi	Single call LabVIEW style function.	Code Review	Test Program	Error Observing

FRC\_LabVIEW\_Trajectory\_Library\_Routines.xlsx

VPILib LabVIEW Math Library – VI Implementation	_ist							_				
Revision 3.08 11/07/2023 – Added edge detect, bool cmd, o	trum sec	quence	er, doub	ole sol	enoid pul	se						
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	e)d	noc	, t	nue	ě t	7				эр	st	rōr
		ర	≥	Mer		D	VI Name	Function Prototype	Notes	රි		<u>ii</u>
RAMSE	TE X			Χ	SI		Ramsete_AtReference.vi	AtReference				
	X			Χ	X		Ramsete_Calculate_Trajectory.vi	calculate_trajectory				
	X			Χ	X		Ramsete_Calculate.vi	calculate				
	X	X	X	Χ	1		Ramsete_Execute_ENG.vi	Use this one!!				
	X		X				Ramsete_Execute_Ext_Odom.vi					
	X	X	X	Χ	1		Ramsete_Execute_Ext_Odom_ENG.vi					
	X		X				Ramsete_Execute_PackTuning_ENG.vi					
	X		X	Χ	SI		Ramsete_Execute_PackTuning.vi					
	X	X	X	Χ	1		Ramsete_Execute.vi					
	X	X		Χ	SI		Ramsete_New_B_Z.vi	new(b, zeta)				
	X			Χ	SI		Ramsete_New.vi	new				
	X	X		Χ	SI		Ramsete_SetEnabled.vi	SetEnabled				
	X	X		X	SI		Ramsete_SetTolerance.vi	SetTolerance				
	X			Χ	X		Ramsete_SINC.vi	sinc	internal			
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	ďμ	8	Vot WPILIB	Menu	EX E	20	ହିଁ VI Name	Function Prototype	Notes	8	Test	irc
SIMPLE MOTOR FEEDFORWA	on	$\perp X$	_	X	SI	<u></u>	SimpleMotorFF Calculate CalcAccel.vi	T unction i Tototype	Notes	$\overline{}$		
SIMPLE MOTOR FEEDFORWA	X			X	31		SimpleMotorFF_Calculate_NextV_Dt.vi				<del></del>	
					SI		SimpleMotorFF_Calculate_vi	mublic double coloulate/double valents, double concloustion)		$\longrightarrow$		
	X			X V			SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity, double acceleration)			$\longrightarrow$	
	X		X	X	SI		SimpleMotorFF_Ka_AutoTune.vi	public double calculate(double velocity)				
	X				V			mublic double many Ashiovable Assolaration (double many) (alterna			$\longrightarrow$	
	X	X		X	X		SimpleMotorFF_MaxAchieveAccel.vi	public double maxAchievableAcceleration(double maxVoltage, double velocity)				
	X	X		X	X		SimpleMotorFF_MaxAchieveVel.vi	public double maxAchievableVelocity(double maxVoltage, double			<del></del>	
	^	^		^	^		Simple violor F_iviaxAchieve vel.vi	acceleration)				
	X	X		Х	X		SimpleMotorFF_MinAchieveAccel.vi	public double minAchievableAcceleration(double maxVoltage,				
		''						double velocity)				
	X	X		Χ	Χ		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)				
		+	1			$\perp$	0: 144: 55 8 1 1/2 5					
	X	<u> </u>	Χ	Χ	SI		SimpleMotorFF_Pack_Ka_Tune_Params.vi					
								public SimpleMotorFeedforward(double ks, double kv)				
========												
EOMETRY												
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COORDINATE	IC \( \frac{\circ}{\circ} \)	$\frac{1}{2}$	_ <	~	U F		· ·	rundion Prototype	Notes			Щ
COORDINATE AX			+ +	X	SI	+	CoordAxis_D.vi					
	X			X	SI	_	CoordAxis_E.vi					
	X			X		$\perp$	CoordAxis_N.vi					
		X	1		C/	- 1	CoordAxis New.vi					
	X			X	SI	_						
	X	X		Χ	SI		CoordAxis_S.vi					
	X	X		X	SI SI		CoordAxis_S.vi CoordAxis_U.vi					
	X	X		Χ	SI SI		CoordAxis_S.vi					

FRC\_LabVIEW\_Trajectory\_Library\_Routines.xlsx

Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse Menu Item Function Prototype Notes X SI X COORDINATE SYSTEM XX CoordSystem\_Convert\_Pose3d.vi  $X \mid X$ CoordSystem Convert Rotation3d.vi CoordSystem Convert Translation3d.vi  $X \mid X$ X SI X X X X CoordSystem Convert Transform3d.vi X SI SI CoordSystem EDN.vi X SI X CoordSystem\_NED.vi XX X SI X CoordSystem\_New.vi X SI X CoordSystem\_NWU.vi VI Name Function Prototype Notes POSE2D Pose2d Div.VI SI XX SI Pose2d Equals.VI boolean equals( other obj ) XX X Pose2d Exp.vi pose2d exp( twist2d twist ) XX X SI Pose2d\_getRotation.vi rotation2d getRotation() can also use cluster unpack | X | X | X | SI | X | X | SI | X | X | X | X | X | SI | Pose2d\_getTranslation.vi translation2d getTranslation() can also use cluster unpack Pose2d\_getXY.vi X X X X SI Pose2d getXYAngle.vi XX XI Pose2d Interpolate.vi XX XX Pose2d Log.vi twist2d log( pose2d end ) XX X SI Pose2d Minus.vi transform2d minus( pose2d other ) X X X X X SI Pose2d New TRRO.vi pose2d new( translation2d, rotation2d ) Pose2d New.vi pose2d new( double x, double y, rotation2d ) Pose2d Plus.vi pose2d plus( transform2d other ) XX X SI Pose2d RelativeTo.vi pose2d relativeto( pose2d other ) XX X SI Pose2d\_Times.vi X SI  $X \mid X$ X SI Pose2d TransformBy.vi pose2d transformby( transform2d other ) pose2d new() can use cluster constant Menu Item VI Name Function Prototype Notes POSE3D XX X SI Pose3d Div.vi XX X SI Pose3d Equals.VI Pose3d Exp.vi XX  $X \mid X$ X SI X SI Pose3d getRotation.vi XX Pose3d getTranslation.vi X X X X SI Pose3d\_getXYZ.vi  $X \mid X$ X I Pose3d\_Interpolate.vi X X X X Pose3d\_Log.vi XX X SI X SI Pose3d Minus.vi XX Pose3d\_New.vi XX X SI Pose3d New Default.vi X SI Pose3d\_New\_Pose2d.vi  $X \mid X$ X X X X X SI X SI Pose3d New Trans3dRot3d.vi Pose3d Plus.vi XX X SI Pose3d RelativeTo.vi XX No SI Pose3d RotationVectorToMatrix.vi Pose3d\_ToPose2d.vi  $X \mid X$ X SI X X X X X SI X SI Pose3d Times.vi Pose3d TransformBy.vi

Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse Menu Item Test Function Prototype Notes XX X SI QUATERNION Quaternion\_Equals.vi XX Quaternion Get All.vi X SI Quaternion Get LVQuat.vi  $X \mid X$ X X X X X SI Quaternion\_Get\_Vect.vi X SI X SI Quaternion Get W.vi Quaternion Inverse.vi XX X SI Quaternion New.vi X SI Quaternion New Default.vi  $X \mid X$ Quaternion\_New\_LVQuat.vi X SI SI Quaternion Normalize.vi XX X SI Quaternion Plus.vi XX X SI Quaternion Times.vi Quaternion\_ToRotationVector.vi X SI  $X \mid X \mid$ **Test Routine** Function Prototype VI Name Notes ROTATION2D X X X SI X SI Rotation2d CreateAngle.vi rotation2d new( double value ) SI XX Rotation2d CreateAngleDegrees.vi rotation2d fromDegrees( double degrees ) convert to radians then create XX X SI Rotation2d CreateAngleRotations.vi X SI Rotation2d\_CreateXY.vi  $X \mid X$ rotation2d new( double x, double y ) X SI Rotation2d Div.vi XX Rotation2d\_Equals.vi boolean equals( rotation2d other ) X X X X SI Rotation2d GetAngleCosSin.vi New 1/26/21  $X \mid X$ X SI Rotation2d GetCos.VI double getCos() use cluster unpack Rotation2d GetDegrees.VI use cluster unpack, then convert to double getDegrees() XX X SI Rotation2d\_GetRadians.VI double getRadians() use cluster unpack X SI Rotation2d GetRotations.vi X X X X X SI X SI Rotation2d GetSin.VI double getSin() use cluster unpack Rotation2d GetTan.VI double getTan() can calculate XX X SI Rotation2d Interpolate.vi X SI Rotation2d Minus.vi rotation2d minus( rotation2d other ) XX Rotation2d Plus.vi rotation2d plus( rotation2d other ) XX X SI SI Rotation2d RotateBy.vi rotation2d rotateby( rotation2d other ) XX X SI Rotation2d Times.vi rotation2d times( double scalar ) XX X SI Rotation2d UnaryMinus.vi rotation2d unaryminus() rotation2d new() can use cluster constant VI Name Function Prototype Notes ROTATION3D X X Rotation3d\_Create\_AxisAngle.vi XX Χ SI Rotation3d\_Create\_Default.vi XX X SI Rotation3d Create Quaternion.vi Rotation3d\_Create\_InitialFinalVector.vi XX  $X \mid I$ X SI X I Rotation3d Create RollPitchYaw.vi Rotation3d\_Create\_RotMatrix.vi XX X SI Rotation3d Div.vi XX X SI Rotation3d Equals.vi X X X X SI Rotation3d\_GetAxisAngle.vi X SI X SI Rotation3d GetQuaternion.vi Rotation3d GetXYZ.vi XX X SI Rotation3d Interpolate.vi

1		X		Χ	SI		ļr	Rotation3d Minus.vi					
,	X	X		X	SI			Rotation3d Plus.vi					
!	X	X		X	SI			Rotation3d RotateBy.vi					
ŀ	X	X		X	SI			Rotation3d Times.vi					
ŀ	X	X		X	SI			Rotation3d ToRotation2d.vi					
ŀ	X	X		X				Rotation3d_UnaryMinus.vi					
	-			-									
TRANSFORM2D	x Implemented	X Documented	Not WPILIB	X Menu Item	<u>ර</u> Execution Optimized	Test Routine		/I Name Fransform2d Create PosePose.vi	Function Prototype transform2d new( pose2d, pose2d )	Notes	Code Review	Test Program	:
TRAITOT OTTIMED	X	X		X	SI			Fransform2d Create TransRot.vi	transform2d new( translation2d, rotation2d )				
ŀ	X	X		X	SI			Fransform2d Div.vi	transformed flow transferred, rotationed				
!	X	X		X	SI			Fransform2d_Equals.VI	boolean equals( other transform2d )				
!	X	X		X	SI			Fransform2d GetRotation.VI	rotation2d getRotation()	use cluster unpack			
ŀ	X	X		X	SI			Fransform2d GetTranslation.VI	translation2d getTranslation()	use cluster unpack			
ŀ	X	X	X	X	SI			Transform2d GetXY.vi	V	,			
ŀ	X		X	X	SI			Fransform2d_GetXYAngle.vi					
ŀ	Χ	Χ		Χ	SI		1	Transform2d_Inverse.vi	transform inverse()	new			
ŀ	X	Χ		Χ	Si			Transform2d_Plus.vi					
ŀ	Χ	Χ		Χ	SI			Transform2d_Times.vi	transform2d times( double scalar )				
									transform2d new()	can use cluster constant			
					pəz								
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optir	Test Routine		/I Name	Function Prototype	Notes	Code Review	Test Program	
TRANSFORM3D	X	X		X	SI			Transform3d_Create_Default.vi					
	X	Χ		Χ	SI			Transform3d_Create_Pose3dPose.3dvi					
!	X	X		X				Transform3d_Create_Trans3dRot3d.vi					
	X	X		Χ	SI			Transform3d_Div.vi					
!	X	X		X	SI			Transform3d_Equals.VI					
	X	X		Χ	SI			Transform3d_GetRotation3d.VI					
	X	X		X				Transform3d_GetTranslation3d.VI					
!	X		Χ	X	SI			Transform3d_GetXYZ.vi					
1	X	X		X	SI			Transform3d_Inverse.vi			1		
	X	Χ		Χ			1-	Fransform3d_Plus.vi					1
ŀ					Si								
}	X	X		Χ				Transform3d_Times.vi					
	X		g,	X	Optimized 😢	,ue	am	Transform3d_Times.vi			wei	am	
	Implemented X	Documented	Not WPILIB	Menu Item X	Execution Optimized	Test Routine	Sample Program	/I Name	Function Prototype	Notes	Code Review	Test Program	
RANSLATION2D	X Implemented	X Documented	Not WPILIB	X Menu Item X	ଓ Execution Optimized ଦ	Test Routine	Sample Program	/I Name Franslation2d_Create_DistAng.vi		Notes	Code Review	Test Program	
RANSLATION2D	X   Implemented	X X Documented	Not WPILIB	X Menu Item	ଓ ଓ Execution Optimized	Test Routine	Sample Program	/I Name Гranslation2d_Create_DistAng.vi Гranslation2d_Create.vi	Function Prototype translation2d new( double x, double y )	Notes	Code Review	Test Program	
RANSLATION2D	X   X   X   X   X   X   X   X   X   X	X X Documented	Not WPILIB	X   X   Menu Item   X   X	ଓ ଓ Execution Optimized	Test Routine	Sample Program	/I Name Гranslation2d_Create_DistAng.vi Гranslation2d_Create.vi Гranslation2d_Div.vi	translation2d new( double x, double y )	Notes	Code Review	Test Program	
RANSLATION2D	X X X Implemented	X X Documented	Not WPILIB	X X Menu Item	ଦ୍ର ବ୍ୟ Execution Optimized	Test Routine	Sample Program	/I Name Γranslation2d_Create_DistAng.vi Γranslation2d_Create.vi Γranslation2d_Div.vi Γranslation2d_Equals.vi		Notes	Code Review	Test Program	
RANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X Documented	Not WPILIB	X X Menu Item	ଓ ଓ ଓ Execution Optimized	Test Routine	Sample Program	/I Name  Franslation2d_Create_DistAng.vi  Franslation2d_Create.vi  Franslation2d_Div.vi  Franslation2d_Equals.vi  Franslation2d_GetAngle.vi	translation2d new( double x, double y ) boolean equals( translation other )	Notes	Code Review	Test Program	
RANSLATION2D	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	Not WPILIB	X X X X X X X X X X X X X X X X X X X	ଓ ଓ ଓ Execution Optimized	Test Routine	Sample Program	/I Name  Franslation2d_Create_DistAng.vi  Franslation2d_Create.vi  Franslation2d_Div.vi  Franslation2d_Equals.vi  Franslation2d_GetAngle.vi  Franslation2d_GetDistance.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other )		Code Review	Test Program	
RANSLATION2D	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	ଓ ଓ Execution Optimized	Test Routine	Sample Program	/I Name  Franslation2d_Create_DistAng.vi  Franslation2d_Create.vi  Franslation2d_Div.vi  Franslation2d_Equals.vi  Franslation2d_GetAngle.vi  Franslation2d_GetDistance.vi  Franslation2d_GetNorm.VI	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm()	can use cluster unpack	Code Review	Test Program	L
RANSLATION2D	X   X   X   X   X   X   X   X   X   X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	IO     IO       IO	Test Routine	Sample Program	/I Name  Franslation2d_Create_DistAng.vi  Franslation2d_Create.vi  Franslation2d_Div.vi  Franslation2d_Equals.vi  Franslation2d_GetAngle.vi  Franslation2d_GetDistance.vi  Franslation2d_GetNorm.VI  Franslation2d_GetX.VI	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other )		Code Review	Test Program	
RANSLATION2D	X   X   X   X   X   X   X   X   X   X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	IS     IS       IS	Test Routine	Sample Program	VI Name  Translation2d_Create_DistAng.vi  Translation2d_Dreate.vi  Translation2d_Div.vi  Translation2d_Equals.vi  Translation2d_GetAngle.vi  Translation2d_GetDistance.vi  Translation2d_GetNorm.VI  Translation2d_GetX.VI  Translation2d_GetX.VI  Translation2d_GetXY.VI	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()	can use cluster unpack can use cluster unpack	Code Review	Test Program	C
RANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	ର ର ଜଣ ଅଧିକ ପ୍ରତ୍ତ କ୍ଷମ ବର୍ଷ ବର୍ଷ ବର୍ଷ ବର୍ଷ ବର୍ଷ ବର୍ଷ ବର୍ଷ ବର୍ଷ	Test Routine	Sample Program	VI Name  Franslation2d_Create_DistAng.vi  Franslation2d_Create.vi  Franslation2d_Div.vi  Franslation2d_Equals.vi  Franslation2d_GetAngle.vi  Franslation2d_GetDistance.vi  Franslation2d_GetNorm.VI  Franslation2d_GetX.VI  Franslation2d_GetXY.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm()	can use cluster unpack	Code Review	Test Program	
RANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	ର ଜଣ ଜଣ ଜଣ Execution Optimized	Test Routine	Sample Program	VI Name  Franslation2d_Create_DistAng.vi  Franslation2d_Create.vi  Franslation2d_Div.vi  Franslation2d_Equals.vi  Franslation2d_GetAngle.vi  Franslation2d_GetDistance.vi  Franslation2d_GetNorm.VI  Franslation2d_GetX.VI  Franslation2d_GetX.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI  Franslation2d_Interpolate.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()	can use cluster unpack can use cluster unpack	Code Review	Test Program	
RANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	ଓ ଓ ଓ ଓ ହେଉପ୍ଥେଗ Optimized	Test Routine	Sample Program	VI Name  Franslation2d_Create_DistAng.vi  Franslation2d_Create.vi  Franslation2d_Div.vi  Franslation2d_Equals.vi  Franslation2d_GetAngle.vi  Franslation2d_GetDistance.vi  Franslation2d_GetNorm.VI  Franslation2d_GetX.VI  Franslation2d_GetX.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI  Franslation2d_Interpolate.vi  Franslation2d_Minus.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other )	can use cluster unpack can use cluster unpack	Code Review	Test Program	
RANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	ID     ID       ID	Test Routine	Sample Program	VI Name  Franslation2d_Create_DistAng.vi  Franslation2d_Create.vi  Franslation2d_Div.vi  Franslation2d_Equals.vi  Franslation2d_GetAngle.vi  Franslation2d_GetDistance.vi  Franslation2d_GetNorm.VI  Franslation2d_GetX.VI  Franslation2d_GetX.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI  Franslation2d_Minus.vi  Franslation2d_Minus.vi  Franslation2d_Plus.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other )	can use cluster unpack can use cluster unpack	Code Review	Test Program	
RANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X		Test Routine	Sample Program	VI Name  Franslation2d_Create_DistAng.vi  Franslation2d_Create.vi  Franslation2d_Div.vi  Franslation2d_Equals.vi  Franslation2d_GetAngle.vi  Franslation2d_GetDistance.vi  Franslation2d_GetNorm.VI  Franslation2d_GetX.VI  Franslation2d_GetX.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI  Franslation2d_GetY.VI  Franslation2d_Interpolate.vi  Franslation2d_Minus.vi	translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other )	can use cluster unpack can use cluster unpack	Code Review	Test Program	

ChassisSpeeds FromFieldRelativeChassisSpeeds.VI

ChassisSpeeds FromFieldRelativeSpeeds.VI

ChassisSPeeds GetXYOmega.vi

ChassisSpeeds\_New.vi

Function Prototype

chassisspeeds new ()

double angvel, rotation2d robotangle)

chassisspeeds fromFieldRelativeSpeeds( double x, double y,

chassisspeeds new ( double xvel, double yvel, double angvel )

Notes

can use cluster constant

CHASSIS SPEEDS X

X

X SI

X SI

X SI

X X X X SI

V Math Library – VI Implementation L	ist											
07/2023 – Added edge detect, bool cmd, di	um sequ	encer, c	double	solenoi	id pulse	•						
DIFFERENTIAL DRIVE KINEMATIC	X	X X Documented	) )	EX X X X X X X X X X X X X X X X X X X	X		/I Name DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi DiffKinematics_ToTwist2d.vi DiffKinematics_toWheelSpeed.vi	Function Prototype  diffDriveKine new( double trackWidth )  chassisSpeeds toChassisSpeeds( diffDrWheelSpeeds )  diffDriveWheelSpeed toWheelSpeeds( chassisSpeeds )	Notes	Code Review	Test Program	Error Checking
				Þ								
DIFFERENTIAL DRIVE ODOMETRY	X		X Not WPILIB Meni Item		1		/I Name DiffOdometry_Execute.vi DiffOdometry_Update.vi	Function Prototype pose2d update( rotation2d gyro, double leftdist, double right dist	Notes  DONT NEED ) Incorporates enhanced reset	Code Review	Test Program	Error Checking
								diffDrOdom new( rotation gyro, pose initial )				
								diffDrOdom new( rotation gyro ) void resetPosition( pose2d, rotation2d )	incorporated into "update"			
								pose2d getPoseMeters()				
DIFFERENTIAL DRIVE ODOMETRY 2	X X X		) )		'		/I Name DiffDrvOdom2_Execute.vi DiffDrvOdom2_GetPose.vi DiffDrvOdom2_New.vi DiffDrvOdom2_Reset.vi DiffDrvOdom2_Update.vi	Function Prototype	Notes  Replacement for orig diff drive odom	Code Reviev	Test Prog	Error Che
	75			ptimized		yram				>	u	bu,
	Implemented	Documented	Not WPILIB	Execution Op	st Routi	Sample Prog	/I Name	Function Prototype	Notes	Code Reviev	Test Prograi	Error Check
DIFFERENTIAL DRIVE WHEEL SPEED	S	-		+				diffDrWheelSpeeds new() diffDrWheelSpeeds new( double leftVel, double rightVel )				
	X	$\overline{X}$	<b>X</b>	( X			DiffWheel Normalize.vi	void normalize( double maxVel )				
MEGANUM DRIVE KINEMATIO		X X Documented	NOT WPILIB	Execu	76		/I Name MecaKinematics_New.vi MecaKinematics SetInverseKinematics.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
MECANUM DRIVE KINEMATIC	$\mid X \mid$								<del> </del>			
MECANUM DRIVE KINEMATIC	X	X	\ \ \ \	( X			MecaKinematics_ToChassisSpeeds.vi					
MECANUM DRIVE KINEMATIC	X	X X	) )	( X			MecaKinematics_ToTwist2d.vi					
MECANUM DRIVE KINEMATIC	X X X	X	) )	( X ( X								

Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse Function Prototype MECANUM DRIVE MOTOR VOLTAGE nothing done Function Prototype Notes MECANUM DRIVE ODOMETRY X X X MecaOdometry Execute.vi X X X X SI MecaOdometry\_GetKinematics.vi X SI X I MecaOdometry\_GetPose.vi MecaOdometry\_New.vi XX XI MecaOdometry NewDefaultPose.vi  $X \mid X$ X SI MecaOdometry Reset.VI XI MecaOdometry\_Update.vi MecaOdometry\_UpdateWithTime.vi Removed. Function Prototype Notes MECANUM DRIVE WHEEL POSITION X X MecaWheelPos Get.vi X SI XX X SI MecaWheelPos New.vi MecaWheelPos Sub.vi  $X \mid X$ X SI Function Prototype VI Name Notes MECANUM DRIVE WHEEL SPEEDS X MecaWheel New.Vi public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond) MecaWheel GetAll.vi X X X X SI MecaWheel Normalize.vi public void normalize(double . attainableMaxSpeedMetersPerSecond) Function Prototype SWERVE DRIVE KINEMATICS X X X X SwerveKinematics New4.VI For 4 module drives SwerveKinematics NewX.VI  $X \mid X \mid X \mid X$ uses array as input SwerveKinematics\_NormalizeWheelSpeeds.vi public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) X X X X X X X X SwerveKinematics\_ToChassisSpeeds4.VI For 4 module drives SwerveKinematics\_ToChassisSpeedsX.VI uses array as input SwerveKinematics ToSwerveModuleStates.VI public SwerveModuleState[] XX X toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) SwerveKinematics\_ToSwerveModuleStatesZeroCenter.VI  $X \mid X$ Χ public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds) XX X SwerveKinematics\_ToTwist2d4.VI

	Ē	Po	8	Me	Ě	je 1	♥ VI Name	Function Prototype	Notes	ပိ	je Je	En
SWERVE DRIVE MODULE POSITIONS	Χ	X		X	SI		SwerveModulePosition_CompareTo.vi					
	Χ	X		Χ	SI		SwerveModulePosition_Equals.vi					
	Χ	X		Χ	SI		SwerveModulePosition_Get.vi					
	Χ	Χ		Χ	SI		SwerveModulePosition_New.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Namp Nogram	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE MODULE STATE	Χ	X		X	SI		SwerveModuleState_CompareTo.vi	public int compareTo(SwerveModuleState o)				
	Χ	X		X	SI		SwerveModuleState_Equal.vi					
	Χ	X		X	SI		SwerveModuleState_Get.vi					
	X	X		X	SI		SwerveModuleState_New.vi	public SwerveModuleState(double speedMetersPerSecond, Rotation2d angle)				
	X	X		X	SI		SwerveModuleState_Optimize.vi	public SwerveModuleState optimize( SwerveModuleState desired Rotation2d angle )	1,			

SPLINE '======== Function Prototype Notes **CUBIC HERMITE SPLINE** protected SimpleMatrix getCoefficients() not needed, use cluster unpack CubicHermiteSpline getControlVectorFromArrays.vi private SimpleMatrix getControlVectorFromArrays( double[] initialVector, double[] finalVector)
private SimpleMatrix makeHermiteBasis()

CubicHermiteSpline makeHermiteBasis.vi

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Cocumented   Coc	VI Name PoseWithCurve_New.vi	public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter) public PoseWithCurvature() public Pose2d poseMeters	Notes Oode Review	Test Program	
Company   Comp		public Pose2d poseMeters	can use cluster constant	7e	1
Company   Comp		mulation deviate as uncertains D = -1D = -1A - 4 - 4 - 4	not needed, use cluster unpack		
Companies   Comp		public double curvatureRadPerMeter	not needed, use cluster unpack		
X	VI Name   QuinticHermiteSpline_getControlVectorFromArrays.vi	private SimpleMatrix getControlVectorFromArrays(double[]	Notes O	Test Program	C
SPLINE (Abstract class)         X         X         X         X           A SPLINE HELPER         X	QuinticHermiteSpline_makeHermiteBasis.vi QuinticHermiteSpline_New.vi	initialVector, double[] finalVector)  private SimpleMatrix makeHermiteBasis()  public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] vFinalControlVector)			
SPLINE (Abstract class)		double[] yFinalControlVector) protected SimpleMatrix getCoefficients()	not needed, use cluster unpack		
SPLINE HELPER   X	VI Name Spline_getPoint.vi	Function Prototype  public PoseWithCurvature getPoint(double t)  Spline(int degree)  public static class ControlVector	Notes O	Test Program	
SPLINE HELPER   X			implemented as data structure		_
X	VI Name SplineHelp_GetCubicCtrlVector.vi	Function Prototype private static Spline.ControlVector getCubicControlVector(double	Notes Oode Review	Test Program	;
X		scalar, Pose2d point)  public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints( Pose2d start,			
X	SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi	getcubiccontrol vectors From waypoints ( Pose2d start, Translation2d[] interior Waypoints, Pose2d end )			_
X   X   No	SplineHelp GetCubicSpline Calc1.vi		internal		
X X X X	SplineHelp_GetCubicSpline_Calc2.vi		internal		
	SplineHelp_GetCubicSpline_Calc3.vi		internal		
	SplineHelp_getCubicSplinesFromControlVectors.vi SplineHelp_GetQuinticCtrlVector.vi	public static CubicHermiteSpline[] getCubicSplinesFromControlVectors( Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end) private static Spline.ControlVector getQuinticControlVector(double scalar, Pose2d point)	9		
	SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi		REMOVED 2762		-
	SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi		REMOVED 2762		
	SplineHelp_getQuinticSplinesFromControlVectors.vi	public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors( Spline.ControlVector[] controlVectors)			_
	SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi		New 2762 New 2762		

TrajectoryConfig\_AddConstraint.vi

Function Prototype

constraint)

public TrajectoryConfig addConstraint(TrajectoryConstraint

Implemented differently, can't

duplicate.

TRAJECTORY CONFIG X

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Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

um se	quence	er, dou	ble sol	enoid pulse				
X	X		X		TrajectoryConfig_AddConstraints.vi	public TrajectoryConfig addConstraints(List extends<br TrajectoryConstraint> constraints)	Implemented differently, can't duplicate.	
X	X		Х	SI	TrajectoryConfig_Create.vi	public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq)		
X	X		X		TrajectoryConfig_GetCentripetalAccel.vi	, and the second		
X	X	X	Х		TrajectoryConfig_GetConstraints.vi	public List <trajectoryconstraint> getConstraints()</trajectoryconstraint>	Implemented differently, can't duplicate.	
X	X		X		TrajectoryConfig_GetEndVelocity.vi	public double getEndVelocity()	can use cluster unpack	
X	X		Χ		TrajectoryConfig_GetKinematicsDiffDrive.vi			
X	X		Χ		TrajectoryConfig_GetKinematicsMecanumfDrive.vi			
X	X		Χ		TrajectoryConfig_GetKinematicsSwerveDrive.vi			
X	X	X	Χ		TrajectoryConfig_GetMaxVelAccel.vi			
X	X		Χ		TrajectoryConfig_GetStartVelocity.vi	public double getStartVelocity()	can use cluster unpack	
X	X		Χ		TrajectoryConfig_GetVoltageDiffDrive.vi			
X	X		Χ		TrajectoryConfig_IsReversed.vi	public boolean isReversed()	can use cluster unpack	
X	X	X	Χ	SI	TrajectoryConfig_setCentripetalAccel.vi			
X	X		X		TrajectoryConfig_SetEndVelocity.vi	public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond)		
X	X		X	SI	TrajectoryConfig_setKinematicsDiffDrive.vi	public TrajectoryConfig setKinematics(DifferentialDriveKinematics kinematics)		
X	X		Х	SI	TrajectoryConfig_setKinematicsMecanumfDrive.vi	public TrajectoryConfig setKinematics(MecanumDriveKinematics kinematics)		
X	X		Х	SI	TrajectoryConfig_setKinematicsSwerveDrive.vi	public TrajectoryConfig setKinematics(SwerveDriveKinematics kinematics)		
X	X		Χ	SI	TrajectoryConfig_setReversed.vi	public TrajectoryConfig setReversed(boolean reversed)		
X	X		Х		TrajectoryConfig_SetStartVelocity.vi	public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond)		
X	X	Χ	Χ	SI	TrajectoryConfig_setVoltageDiffDrive.vi			
						public double getMaxVelocity()	Created function to return both	
						public double getMaxAcceleration()	Created function to return both	
						NOTE ADD OTHER "CET" DOLITINES FOR OTHER		

NOTE ADD OTHER "SET" ROUTINES FOR OTHER CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC.

							SPECIFIC AND NOT GENERIC.				
	Implemented	Documented	Not WPILIB	Meny Item		Execution Optimized Test Routine Sample Program awa IA	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRAJECTORY GENERATE	Χ	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	X		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			
	Χ	X	X	X		TrajectoryGenerate Make Generic.vi	TrajectoryConfig config ) Helper to bring these all together	Use this one!!!			
	Χ	X		X	(	TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory( ControlVectorList controlVectors, TrajectoryConfig config)	uses quintic splines			
	Х	X	X	X		TrajectoryGenerate Make Quintic Weighted.vi		New 2762			
	Χ	X		X	(	TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(List <pose2d> waypoints, TrajectoryConfig config)</pose2d>	uses quintic splines			
	Χ	X		X		TrajectoryGenerate_splinePointsFromSplines.vi	public static List <posewithcurvature> splinePointsFromSplines(Spline[] splines)</posewithcurvature>				
	Implemented	Documented	Not WPILIB	Menu Item	Execution Ontimized	Execution Optimized Test Routine Sample Program away IA	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRAJECTORY GENERATE (Control Vector)							public ControlVectorList(int initialCapacity)	may not need, just data			
							public ControlVectorList()	may not need, just data			
							public ControlVectorList(Collection extends Spline.ControlVector collection)	may not need, just data			

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abVIEW Math Library – VI Implementation L 3.08 11/07/2023 – Added edge detect, bool cmd, d		uencer,	double	solenoio	l pulse		<del></del>				
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	nelc	Document	Not WPILI	wend nen Execution	st st				de I	st P	0.70
	[mg				Test	VI Name	Function Prototype	Notes	Š		Ē.
TRAJECTORY PARAMETERIZ				lo		TrajectoryParam_calcStuffFwd.vi					
	X	X	X N	lo lo		TrajectoryParam_calcStuffRev.vi TrajectoryParam_enforceAccel.vi	private static void enforceAccelerationLimits(boolean reverse,	This routines needs to be changed			
	^	^	'			TrajectoryParam_emorceAccel.vi	List <trajectoryconstraint> constraints, ConstrainedState state)</trajectoryconstraint>	when new constraints are added.			
	Χ	X	XΛ	lo		TrajectoryParam_enforceVelocity.vi		This routines needs to be changed			
	Y	X		<		TrajectoryParam_timeParam.vi	public static Trajectory	when new constraints are added.			
	^	^	1	`		Trajectoryr aram_timer aram.vi	timeParameterizeTrajectory( List <posewithcurvature> points.</posewithcurvature>				
							List <trajectoryconstraint> constraints, double startVelocityMetersPerSecond, double</trajectoryconstraint>				
							endVelocityMetersPerSecond, double				
							maxVelocityMetersPerSecond, double				
							maxAccelerationMetersPerSecondSq, boolean reversed )			1	
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	du	Оос	Not	Exe	Tesi	VI Name	Function Prototype	Notes	Cod	Tes	Errc
ECTORY PARAMETERIZE CONSTRAINED STAT	E X	$\overline{X}$		<u> </u>		ConstrainedState_New.vi	ConstrainedState(PoseWithCurvature pose, double		<del>-</del>		
							distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double				
							minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)				
	X	X	X	(		ConstrainedState_SetMaxAccel.vi					
	X	X	XX	<u> </u>		ConstrainedState_SetMinAccel.vi  ConstrainedState_SetVelAccel.vi					
		X				ConstrainedState_SetVelAccet.vi  ConstrainedState_SetVelocity.vi					
		,					ConstrainedState()				
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TRA IEGTORY		Ĭ	_	_	- 1 <sub>e</sub>		Function Prototype	Notes	ŭ		Ē
TRAJECTORY UT	IL X	X	x ,	( X		TrajectoryUtil fromPathWeaverJSON.vi TrajectoryUtil MakeWeightedWayPoint ENG.vi	public static Trajectory fromPathweaverJson(Path path)				
	$\frac{\lambda}{X}$	X	$\hat{X}$	$\frac{1}{X}$		TrajectoryUtil_MakeWeightedWayPoint.vi					
	X	X		<del>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </del>		TrajectoryUtil_toPathWeaverJSON.vi	public static void toPathweaverJson(Trajectory trajectory, Path				
							path) public static Trajectory deserializeTrajectory(String json)				
							public static Trajectory desenance Trajectory(String json)  public static String serializeTrajectory(Trajectory trajectory)				
							pasio state string serialize frajectory (frajectory trajectory)			1	1
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	ient	ent	WPILIB		Routine						
	len	ипх	Š į	Execution	יל אַל מי						
	dul	Docum	Not W	Exe	Test	VI Name	Function Prototype	Notes			
TRAPEZOID PROFIL	E X	X	7	<b>(</b>		TrapProfConstraint_New.vi					
	X	X		<b>(</b>		TrapProfile_Calculate.vi		D: (			
		X		lo (		TrapProfile_Direct.vi TrapProfile_Execute.vi		Private, remove from menu			
	X		$\begin{array}{c c} X & Z \\ \hline X & Z \end{array}$	K SI		TrapProfile_Execute.vi TrapProfile_Execute_AtGoal.vi					
	X	X		<b>(</b>		TrapProfile_IsFinished.vi					
	X	X	7	<b>(</b>		TrapProfile_New_DefInitial.vi					
	X	X		<b>(</b>		TrapProfile_New.vi		D: 4			
	X	X		lo K		TrapProfile_ShouldFlipAcceleration.vi TrapProfile_TimeLeftUntil.vi		Private, remove from menu			
				ζ		TrapProfile_TimeLeπUntil.VI   TrapProfile_TotalTime.vi					
	X	X	1 .								
	X	X		ζ		TrapProfState_Equals.vi					

WPILib LabVIEW Math Library – VI Implementation List
Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

== Y CONSTRAINT ==								
	mplemented	Documented	Not WPILIB	Menu Item	Execution Optimized	35	mple Program	
CENTRIPETAL ACCELERATION CONSTRAINT	_	<u>X</u>	_ ≥	X	Ě		VI Name  CentripetalAccelConstraint_getMaxVelocity.vi	Function Prototype Notes
	,	,					gounday voice, you	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double yelocityMetersPerSecond)
	X	Х		Х			CentripetalAccelConstraint_getMinMaxAccel.vi	velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)
	X	X		X	SI		CentripetalAccelConstraint_New.vi	public CentripetalAccelerationConstraint(double Can use cluster pack for now
								maxCentripetalAccelerationMetersPerSecondSq)
	mplemented	cumented	Not WPILIB	Menu Item	Execution Optimize	& .	mple Program	
DIFE DOINE KINEMATIC CONCEDAINT	$\overline{}$	<u>0</u>	_ ≥		_ <u>ŭ</u> _	Test	VI Name	Function Prototype Notes
DIFF DRIVE KINEMATIC CONSTRAINT	X	Χ		X			DiffDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)
	X	X		X			DiffDriveKinematicsConstraint_getMinMaxAccel.v	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)
	X	X		X	SI		DiffDriveKinematicsConstraint_New.vi	public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond)
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype Notes
DIFF DRIVE VOLTAGE CONSTRAINT	_=_	X Documented	Not WPILIB	X Menu Item	Optim	Test Routine	VI Name  DiffDriveVoltageConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double
DIFF DRIVE VOLTAGE CONSTRAINT	_=_	Do	Not WPILIB		Optim	Test Routine		public double getMaxVelocityMetersPerSecond(Pose2d
DIFF DRIVE VOLTAGE CONSTRAINT	X	X	Not WPILIB	X	Optim	Test Routine	DiffDriveVoltageConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSg(Pose2d poseMeters.
	Implemented X X	Documented X X Do	Not WPILIB	Menu Item X	Execution Optim	St Routine Test	DiffDriveVoltageConstraint_getMaxVelocity.vi  DiffDriveVoltageConstraint_getMinMaxAccel.vi  DiffDriveVoltageConstraint_New.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)  public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)  public  public  DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double
DIFF DRIVE VOLTAGE CONSTRAINT	X   X   X   X   X   X	X Documented X	МРІГІВ	X Wenu Item	Optimized 92 Execution Optim	Routine	DiffDriveVoltageConstraint_getMaxVelocity.vi  DiffDriveVoltageConstraint_getMinMaxAccel.vi  DiffDriveVoltageConstraint_New.vi  VI Name  EllipRegionConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)  public DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)
	Implemented X X	X X Documented X X	МРІГІВ	Menu Item X	Optimized 92 Execution Optim	Routine	DiffDriveVoltageConstraint_getMaxVelocity.vi  DiffDriveVoltageConstraint_getMinMaxAccel.vi  DiffDriveVoltageConstraint_New.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)  public DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)

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ERVE DRIVE KINEMATICS CONSTRAINT	X	<i>X X X</i>	X	SI		SwerveDriveKinematicsConstraint_getMaxVelocity.vi  SwerveDriveKinematicsConstraint_getMinMaxAccel.vi  SwerveDriveKinematicsConstraint_New.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)  Newpublic SwerveDriveKinematicsConstraint(final SwerveDriveKinematics kinematics, double maxSpeedMetersPerSecond)	Can use cluster pack for now
EDVE DRIVE KINEMATIOS CONOTONIO	< Implemented	C Documented Not WPILIB		Execution Optimized	Test Routine Sample Program	VI Name		Notes
RECTANGULAR REGION CONSTRAINT	X X X X	X X	X X X X			RectRegionConstraint_getRectRegion.vi RectRegionConstraint_getMinMaxAccel.vi RectRegionConstraint_lsPoseInRegion.vi RectRegionConstraint_New.vi		
	Implemented	Documented Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	VI Name	Function Prototype	Notes
JM DRIVE KINEMATICS CONSTRAINT	X X X	Χ	X X X	SI		MecaDriveKinematicsConstraint_getMaxVelocity.vi MecaDriveKinematicsConstraint_getMinMaxAccel.vi MecaDriveKinematicsConstraint_New.vi		
	Implemented	Documented Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	VI Name	Function Prototype	Notes
MAX VELOCITY CONSTRAINT	X X X	Χ	X X X	SI SI		MaxVelocityConstraint_getMaxVelocity.vi MaxVelocityConstraint_getMinMaxAccel.vi MaxVelocityConstraint_New.vi		
	mplemented	Documented  Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	VI Name	Function Prototype	Notes
	/	X		SI		JerkConstraint_getMinMaxAccel.vi JerkConstraint_New.vi	Routine exists, it is just a shell Routine exists, it is just a shell	FUTURE FUTURE
JERK CONSTRAINT	> Implemented	Documented  X Not WPILIB		Execution Opt	Test Routine Sample Progra	JerkConstraint_getMaxVelocity.vi	Routine exists, it is just a shell	Notes FUTURE

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WPILib LabVIEW Math Library – VI Implementation List

Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

TRAJECTORY CONSTRAINT X X X X X

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Γ	X	Χ	Χ	X		TrajConstraint_GetMaxVelocity.vi
	X	Χ	Χ	X		TrajConstraint_GetMinMaxAccel.vi
	X	Χ	Χ	Χ		TrajConstraint_GetType.vi

TRAJECTORY CONSTRAINT (Min Max)

Implemen	Document	Not WPILI	Menu Iten	Execution	Test Rout	Sample Pl	VI Name	Function Prototype	Notes
X	X		X	SI			Constraint_MinMax_New.vi	Constraint_MinMax_New	
X	Χ		Χ	SI			Constraint_MinMax_NewMinMax.VI	Constraint_MinMax_New	

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UTILITY '========

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

JAVA / C++ WPILIB EQUIVALENT

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimizec	Test Routine	Sample Program	VI Name	Function Prototype	Notes
UTIL		$\overline{X}$	X	X	SI			Util ApproxEqual.vi		
	Х	Χ	X	X				Util Array PoseWCurv to XY.vi		
Ī	Χ	Χ	Х	Χ	SI			Util CalcDist.vi		
İ	X	X	X	X	SI			Util GetLibraryVersion.vi		
Ī	Χ	Χ	Χ	Χ	SI			Util GetLibUsage.vi		
	Χ	X	Х	Х				Util_GetTime.vi		Once tested completely, this should be optimized!
Ī	Χ	X	X	No	1			Util GetTime U32.vi		20 op2001
	Χ	Χ	Χ	No	1			Util GetTime U64.vi		
Ī	Χ	Χ	Χ	No	N/A			Util LibraryGlobals.vi		Global Variables – no block diag.
	Χ	Χ	Χ	Χ				Util Trajectory Absolute To Relative.vi		
	Χ	Χ	Χ	Χ				Util_Trajectory_ReadFile.vi		
	Χ	Χ	Χ	Χ				Util_Trajectory_to_XY.vi		
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_Config.vi		internal
	Χ	X	Χ	No				Util_Trajectory_WriteFile_OneState.vi		internal
[	Χ	Χ	Χ	Χ				Util_Trajectory_WriteFile_PathFinder.vi		
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_PathFinderConfig.vi		internal
	Χ	Χ	Χ	Χ				Util_Trajectory_WriteFile_Pathweaver.vi		
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_States.vi		internal
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_WayPoints.vi		internal
	Χ	Χ	X	Χ				Util_Trajectory_WriteFile.vi		
	Χ	Χ	Χ	Χ				Util_TrajectoryState_Meters_To_Inches.vi		
	Χ	Χ	Χ	Χ				Util_TrajState_to_DiffDrive_WheelPos.vi		
	Χ	Χ	Χ	Χ				Util_DispWaypoint_Eng_To_SI.vi		
	Χ	Χ	Χ	X				Util_DispWaypoint_To_CubicInput.vi		
ļ	Χ	X	Χ	X				Util_DispWaypoint_To_QuinticInput.vi		
	Χ	Χ	Χ	X				Util_DispWeightedWaypiont_Eng_To_WeightedWaypoint		
L	Χ	X	X	No				Util_DispWeightedWayPoint_To_WeightedWayPoint.vi		Sorry about the confusing name

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CONVERSIONS

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

JAVA / C++ WPILIB EQUIVALENT

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

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WPILib LabVIEW Math Library – VI Implementation List Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse X X X X SI Conv Centimeters Meters.vi X X X X SI Conv\_Deg\_Radians.vi X X X X SI X X X X X SI X X X X X SI Conv\_Deg\_Rotations.vi Conv Feet Meters.vi Conv\_GyroDegrees\_Heading.vi X X X X SI Conv Heading AngleRadians.vi Conv Inches Meters.vi X X X X SI X X X X SI X X X X SI Conv Kilograms Pounds.vi Conv Meters Feet.vi X X X X SI Conv Meters Inches.vi X X X X SI Conv Pose2d SI Eng.vi X X X X SI Conv\_Pounds\_Kilograms.vi X X X X SI X X X X SI Conv Radians Deg.vi Conv Radians Rotations.vi Conv Rotations Deg.vi Conv\_Rotations\_Radians.vi X X X X SI Conv Yards Meters.vi VI Name Function Prototype Notes UNITS X X X SI X SI Units DegreesToRadians.vi XX Units DegreesToRotations.vi XX X SI Units FeetToMeters.vi Units InchesToMeters.vi XX X SI Units MetersToFeet.vi X SI SI Units MetersToInches.vi XX X SI Units\_MillisecondsToSeconds.vi XX X SI Units RadiansPerSecondToRotationsPerMinute.vi Units\_RadiansToDegrees.vi XX X SI XX X SI Units RadiansToRotations.vi X X X X X SI X SI Units RotationsPerMinuteToRadiansPerSecond.vi Units\_RotationsToDegrees.vi XX X SI Units RotationsToRadians.vi X SI Units\_SecondsToMilliseconds.vi XX '======== PATHFINDER UTIL '----THESE ROUTINES ARE SPECIFIC TO LABVIEW. THEY DO NOT HAVE A JAVA / C++ WPILIB EQUIVALENT VI Name Function Prototype Notes PathfinderUtil Continuous Heading Difference.vi PathfinderUtil\_OptimizeTrajectoryStates.vi X X X X PathfinderUtil\_ToTrajectory.vi PathfinderUtil\_ToTrajectoryStates.vi '======== STATE SPACE MODEL '=========

Function Prototype

Notes

DC MOTOR X X

X SI X SI DCMotor\_GetAndymark9015.vi

DCMotor GetAndymarkAM2235A.vi

WPILib LabVIEW Math Library – VI Implementation List Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum

drum seq	uence	r, doubl	le sol	enoid	ulse			
X	X		Χ	SI		GetAndymarkAM3493.vi		
X	X		Χ	SI		GetAndymarkRs775_125.vi		
X	X		Χ	SI	DCMotor_C			
X	X		Χ	SI		GetBanebotsRs550.vi		
X	Χ		Χ	SI	DCMotor_C	GetBanebotsRs775.vi		
X	Χ		Χ	SI	DCMotor_C	GetCIM.vi		
X	X		X	SI	DCMotor_C	GetCurrent.vi		
X	Χ		Χ	SI	DCMotor_C	GetFalcon500.vi		
X	Χ		Χ	SI	DCMotor_C	GetMiniCIM.vi		
X	Χ		Χ	SI		GetNEO.vi		
X	X		Χ	SI	DCMotor_0	GetNEO550.vi		
X	X		X	SI	DCMotor_C	GetRomiBuiltIn.vi		
X	Χ		Χ	SI		GetSpeed.vi		
X	X		Χ	SI		GetTorque.vi		
X	X		Χ	SI	DCMotor_C	GetVex775Pro.vi		
X	X		Χ	SI	DCMotor_N	New.vi		
X	X		Χ	SI	DCMotor_F	PickMotor.vi PickMotor.vi		
X	Χ		Χ	SI	DCMotor_V	WithReduction.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Sample Program NI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM ID	X	X		X			LinearSystemId_CreateDCMotorSystem.vi					
	X	Χ		Χ			LinearSystemId_CreateDriveTrainVelocitySystem.vi		Update to use create matrix			
	X	Χ		Χ			LinearSystemId_CreateElevatorSystem.vi		Update to use create matrix			
	X	Χ		Χ			LinearSystemId_CreateFlywheelSystem.vi		Update to use create matrix			
	X	X		X			LinearSystemId_CreateSingleJointedArmSystem.vi		Update to use create matrix			
	X	Χ	Χ	Χ	SI		LinearSystemId_DCMotor_Pack_Model_Params.vi					
	X	X	Χ	X	SI		LinearSystemId_DiffDrv_ID_Pack_Model_Params.vi					
	X	Χ	X	Χ	SI		LinearSystemId_DiffDrv_Pack_Model_Params.vi					
	X	Χ	X	Χ	SI		LinearSystemId_Elevator_Pack_Model_Params.vi					
	X	Χ	X	Χ	SI		LinearSystemId_FlyWheel_Pack_Model_Params.vi					
	X	X		X			LinearSystemId_IdentifyDriveTrainSystem.vi		Update to use create matrix			
	X	Χ		Χ			LinearSystemId_IdentifyPositionSystem.vi		Update to use create matrix			
	Χ	X		Χ			LinearSystemId_IdentifyVelocitySystem.vi		Update to use create matrix			
	X	X	Χ	Χ	SI		LinearSystemId_SngJntArm_Pack_Model_Params.vi					

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STATE SPACE ESTIMATION

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DIFFERENTIAL DRIVE POSE ESTIMATOR	$\overline{X}$	$\overline{X}$		$\overline{x}$	7	-		DiffDrivePoseEst_AddVisionMeasurement.vi	- and an analysis	1,191,00			7
	Χ	X		X				DiffDrivePoseEst_FillStateVector.vi					
	Χ	X		X				DiffDrivePoseEst_GetEstimatedPosition.vi					
	Χ	Χ		X				DiffDrivePoseEst_Kalman_F_Callback.vi					
	Χ	X		X				DiffDrivePoseEst_Kalman_H_Callback.vi					
	Χ	X		X				DiffDrivePoseEst_New.vi					
	Χ	X		X				DiffDrivePoseEst_ResetPosition.vi					
	Χ	X		X				DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi					
	Χ	X		X				DiffDrivePoseEst_Update.vi					
	Χ	X		X				DiffDrivePoseEst_UpdateWithTime.vi					
	Χ	X		X				DiffDrivePoseEst_VisionCorrect_Callback.vi					
	X	X		X				DiffDrivePoseEst VisionCorrect Kalman H Callback.vi				ļ	

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FFERENTIAL DRIVE POSE ESTIMATOR	22 X	X	_≥	_ <u>≥</u>   <i>X</i>	<u> </u>	<u> </u>	70 VI Name DiffDrivePoseEst2 AddVisionMeasurement.vi	Function Prototype	Notes	<u></u>		Щ
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	X	Χ	Χ	X			DiffDrivePoseEst2_Execute.vi					
	X	X			SI		DiffDrivePoseEst2_GetEstimatedPosition.vi					
	X	X	X	No No		+	DiffDrivePoseEst2_InterpRecord_ExtractFromVar.vi DiffDrivePoseEst2_InterpRecord_Interp.vi					
	X	X		No	SI		DiffDrivePoseEst2_InterpRecord_New.vi					
	X	X		X			DiffDrivePoseEst2_New.vi					
			X	X	SI	_	DiffDrivePoseEst2_Pack_Config.vi					
	X	X	<u> </u>		SI SI		DiffDrivePoseEst2_ResetPosition.vi DiffDrivePoseEst2_SetVisionMeasurementStdDevs.vi					
	X	X	+	X	51		DiffDrivePoseEst2_SetvisionMeasurementStdDevs.vi DiffDrivePoseEst2_Update.vi					
	X			X			DiffDrivePoseEst2_UpdateWithTime.vi					
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EXTENDED KALMAN FILT	FR X		_<	_ <b>≥</b>   <i>X</i>	Ш		ExtendedKalmanFilter Correct OnlyUY.vi	Function Prototype	Notes	- 6		Щ
EXTENSES NACINANTIES				X			ExtendedKalmanFilter_Correct.vi		Just a shell, not functional!			
	X	X		X			ExtendedKalmanFilter_GetP_Single.vi					
		X	<u> </u>	X			ExtendedKalmanFilter_GetP.vi					
	X	X	<del>                                     </del>	X		-	ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter GetXHat.vi					
	X	X		X			ExtendedKalmanFilter New.vi					
	X	X		X			ExtendedKalmanFilter_Predict.vi					
		X	<u> </u>	X			ExtendedKalmanFilter_Reset.vi					
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KALMAN FILT	X permented X X X X	X Documented	Not	X Wenu Item	Execution	Test	VI Name  KalmanFilter_Correct.vi  KalmanFilter_GetK  KalmanFilter_GetK_Single.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
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MECANUM DRIVE POSE ESTIMATOR			$\longrightarrow$					MecaDrivePoseEst_AddVisionMeasurement_StdDev.vi					
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SWERVE DRIVE POSE ESTIMATOR	Implemented   X   X   X	X X X Documented	Not WPILIB	Menu Item		Test Routine	Sample Program	MecaDrivePoseEst2_Update.vi MecaDrivePoseEst2_UpdateWithTime.vi  VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR	X X X	X X X X	Not WPILIB	X X X X X		Test Routine	Sample Program	MecaDrivePoseEst2_Update.vi MecaDrivePoseEst2_UpdateWithTime.vi  VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
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SWERVE DRIVE POSE ESTIMATOR	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		Test Routine	Sample Program	MecaDrivePoseEst2_Update.vi MecaDrivePoseEst2_UpdateWithTime.vi  VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
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SWERVE DRIVE POSE ESTIMATOR	X X X X X X X X X X X X X X 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		Test Routine	Sample Program	MecaDrivePoseEst2_Update.vi MecaDrivePoseEst2_UpdateWithTime.vi  VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi SwerveDrivePoseEst_New.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR	X X X X X X X X X X X X X X 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		Test Routine	Sample Program	MecaDrivePoseEst2_Update.vi MecaDrivePoseEst2_UpdateWithTime.vi  VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_ResetPosition.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
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SWERVE DRIVE POSE ESTIMATOR	X X X X X X X X X X X X X X 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		Test Routine	Sample Program	MecaDrivePoseEst2_Update.vi MecaDrivePoseEst2_UpdateWithTime.vi  VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_ResetPosition.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR	X X X X X X X X X X X X X X 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		Test Routine	Sample Program	MecaDrivePoseEst2_Update.vi MecaDrivePoseEst2_UpdateWithTime.vi  VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi SwerveDrivePoseEst_Update.vi SwerveDrivePoseEst_Update.vi SwerveDrivePoseEst_UpdateWithTime.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
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Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse Function Prototype SWERVE DRIVE POSE ESTIMATOR 2 X X X SwerveDrivePoseEst2 AddVisionMeasurement.vi X X X No SI SwerveDrivePoseEst2 BufferDuration.vi SwerveDrivePoseEst2 Execute.vi  $X \mid X \mid X \mid X$ SwerveDrivePoseEst2\_GetEstimatedPosition.vi X SI X X X No SI SwerveDrivePoseEst2 InterpRecord ExtractFromVar.vi SwerveDrivePoseEst2 InterpRecord Interp.vi No XX No SI SwerveDrivePoseEst2\_InterpRecord\_New.vi SwerveDrivePoseEst2 New.vi  $X \mid X \mid$ X X X X X SI SwerveDrivePoseEst2 Pack Config.vi SwerveDrivePoseEst2 ResetPosition.vi X SI X SI XX SwerveDrivePoseEst2 SetVisionMeasurementStdDevs.vi SwerveDrivePoseEst2 Update.vi  $X \mid X$ X SwerveDrivePoseEst2\_UpdateWithTime.vi X  $X \mid X$ VI Name Function Prototype Notes UNSCENTED KALMAN FILTER X X UnscentedKalmanFilter Correct FuncGroup.vi XX Х UnscentedKalmanFilter\_Correct\_OnlyUY.vi XX Χ UnscentedKalmanFilter Correct OnlyUYR.vi UnscentedKalmanFilter\_Correct.vi  $X \mid X$ X UnscentedKalmanFilter\_GetP\_Single.vi XX X Χ UnscentedKalmanFilter GetP.vi X UnscentedKalmanFilter GetXHat Single.vi XX Х UnscentedKalmanFilter GetXHat.vi XX X UnscentedKalmanFilter New Default.vi UnscentedKalmanFilter\_New\_FuncGroup.vi  $X \mid X$ Χ X UnscentedKalmanFilter New.vi UnscentedKalmanFilter\_Predict.vi XX Χ UnscentedKalmanFilter Reset.vi XX Χ UnscentedKalmanFilter SetP.vi UnscentedKalmanFilter\_SetXHat\_Single.vi  $X \mid X$ Χ  $X \mid X$ Χ UnscentedKalmanFilter SetXHat.vi UnscentedKalmanFilter Transform.vi '======== STATE SPACE CONTROL '======== VI Name Function Prototype Notes CONTROL AFFINE PLANT INVERSION FEEDFORWARD Menu Item Function Prototype Notes Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse DIFFERENTIAL DRIVE ACCELERATION LIMITER X X DiffDrvAccelLimit Calculate.vi X  $X \mid X \mid$ Χ DiffDrvAccelLimit New.vi VI Name Function Prototype Notes IMPLICIT MODEL FOLLOWER X ImplModelFollow Calculate.vi Χ X X ImplModelFollow GetU.vi XX Χ ImplModelFollow GetU Single.vi XX Χ Χ ImplModelFollow\_New.vi ImplModelFollow New Plant.vi  $X \mid X$ Χ X ImplModelFollow Reset.vi X Function Prototype LINEAR PLANT INVERSION FEEDFORWARD X X LinearPIntInvFF Calculate NextR.vi XX Χ LinearPIntInvFF Calculate.vi LinearPIntInvFF\_GetR\_Single.vi XX Χ XX LinearPIntInvFF GetR.vi Χ XX X LinearPIntInvFF GetUff Single.vi LinearPIntInvFF\_GetUff.vi Χ XX Χ LinearPIntInvFF New Plant.vi LinearPIntInvFF New.vi  $X \mid X$ Χ LinearPIntInvFF Reset Initial.vi XX Χ LinearPIntInvFF Reset Zero.vi XX Function Prototype Notes  $\overline{X}$ LINEAR QUADRATIC REGULATOR X X LinearQuadraticRegulator\_Calculate\_NextR.vi XX Χ LinearQuadraticRegulator Calculate.vi LinearQuadraticRegulator\_GetK\_Single.vi NOT ORIGINAL. XX Χ X X X X X LinearQuadraticRegulator GetK.vi X Χ LinearQuadraticRegulator\_GetR\_Single.vi XX X LinearQuadraticRegulator GetR.vi XX Χ LinearQuadraticRegulator GetU Single.vi LinearQuadraticRegulator\_GetU.vi  $X \mid X$ X LinearQuadraticRegulator LatencyCompensate.vi Routine exists, but it only has nterger raise matrix to power. XX Χ LinearQuadraticRegulator\_New\_ELMS.vi X LinearQuadraticRegulator New N.vi LinearQuadraticRegulator New Raw.vi XX X Χ LinearQuadraticRegulator\_New\_SystemELMS.vi XX Χ LinearQuadraticRegulator New.vi LinearQuadraticRegulator Reset.vi Χ  $X \mid X$ Function Prototype Notes VI Name LINEAR SYSTEM X X LinearSystem\_CalculateX.vi LinearSystem\_CalculateY.vi XX X

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	X	X		Χ		Χ	LTVUnicycleCtrl_Calculate.vi					
	X	X	X	Χ			LTVUnicycleCtrl_Execute.vi					
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	X   X   X   X   X   X   X   X   X   X		StateSpaceUtil_IsDetectable.vi StateSpaceUtil_IsStabalizable.vi		, , , , , , , , , , , , , , , , , , , ,			
	X   X   X   X   X   X   X   X   X   X		StateSpaceUtil_MakeCostMatrix.vi StateSpaceUtil_MakeCovarianceMatrix.vi					

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	x /	(	X			FlyWheelSim_Update.vi				
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WPILib LabVIEW Math Library – VI Implementation List Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse XX LinearSystemSim\_GetOutput.vi XX X LinearSystemSim\_New LinearSystemSim New NoNoise.vi LinearSystemSim SetInput Array.vi Doesn't use clamp? X LinearSystemSim\_SetInput\_Single.vi XX X LinearSystemSim SetInput.vi LinearSystemSim Setstate.vi  $X \mid X$ X LinearSystemSim\_Update.vi Χ  $X \mid X$ No LinearSystemSim UpdateX.vi XX X X X No LinearSystemSim\_UpdateY.vi Menu Item Function Prototype Notes  $\frac{1}{X}$ SINGLE JOINT ARM SIM X X SngJntArmSim\_EsitmateMOI.vi SngJntArmSim\_Execute.vi X X X X XX SngJntArmSim GetAngleRads.vi Χ XX SngJntArmSim\_GetCurrentDraw.vi Χ X X X X X SngJntArmSim\_GetVelocityRadsPerSec.vi SngJntArmSim\_HasHitLowerLimit.vi XX X SngJntArmSim HasHitUpperLimit.vi SngJntArmSim\_New.vi XX Χ SngJntArmSim\_Pack\_Simulation\_Params.vi X X X X SI XX SngJntArmSim Rkf45 Func.vi No SngJntArmSim SetInputVoltage.vi XX Χ SngJntArmSim\_SetState.vi XX Χ SngJntArmSim Update.vi XX Χ SngJntArmSim\_UpdateX.vi SngJntArmSim\_WouldHitLowerLimit.vi XX Χ X SngJntArmSim\_WouldHitUpperLimit.vi '======= MATRIX UTILITIES '======== VI Name Function Prototype Notes MAT BUILDER X X Χ SI MatBuilder Create.vi  $X \mid X$ X SI MatBuilder Fill.vi Function Prototype Notes MATRIX Matrix AssignBlock.vi XX X SI X SI Matrix Block.vi Matrix\_ChangeBoundsUnchecked.vi XX X SI Matrix Create.vi Matrix Det.vi X SI Matrix\_Diag.vi XX Matrix Div Scalar.vi labview has function Matrix\_ElementPower.vi XX X SI Matrix ElementSum.vi

> Matrix\_ElementTimes.vi Matrix\_Equals.vi

Matrix Exp.vi

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XI

WPILib LabVIEW Math Library – VI Implementation List Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse Matrix ExtractColumnVector.vi XX X SI XX X SI Matrix\_ExtractFrom.vi Matrix ExtractMatrix.vi X SI Matrix ExtractRowVector.vi XX X SI Matrix Fill.vi Matrix Get.vi labview has function XX Matrix\_Ident.vi WPILIB calls this EYE X I Matrix Inv.vi X SI Matrix\_IsEqual.vi Matrix Isldentical.vi Matrix LLTDecompose.vi  $X \mid X$ X I Matrix\_Max.vi Matrix MaxAbs.vi Matrix Mean.vi Matrix MinInternal.vi Matrix Minus Matrix.vi Matrix\_Minus\_Scalar.vi Χ Matrix NormF.vi Matrix NormIndP1.vi Matrix Plus Matrix.vi Matrix Plus Scalar.vi XX Matrix Pow.vi HIS NEEDS WORK!!!! X X Matrix SetColumn.vi SI XX THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT Matrix\_SetRow.vi SHOULD BE INCLUDED HERE FOR ISOLATION. Matrix Solve.vi Matrix Times Matrix.vi Matrix Times Scalar.vi Matrix\_Trace.vi XX X SI Matrix Transpose.vi Matrix WithinTolerance.vi VI Name Function Prototype Notes SIMPLE MATRIX X X SimpleMatrix ExtractMatrix.vi NOTE Matrix also has an ExtractMatrix with different calling parameters.... YUK. VI Name Function Prototype Notes 
 X
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 MatrixHelper CooerceSize.vi MatrixHelper MultCooerceBSize.vi X X X X SI MatrixHelper Zero.vi Test Routine X Menu Item VI Name Function Prototype Notes VECTOR BUILDER X X SI VecBuilder 1x1Fill.vi X X X X X SI X SI VecBuilder 2x1Fill.vi VecBuilder 3x1Fill.vi XX X SI VecBuilder 4x1Fill.vi

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VecBuilder 5x1Fill.vi

VecBuilder\_6x1Fill.vi

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Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse VecBuilder 7x1Fill.vi XX X SI XX X SI VecBuilder\_8x1Fill.vi VecBuilder\_9x1Fill.vi VecBuilder 10x1Fill.vi X X X X SI VecBuilder\_ArrayBy1Fill.vi Function Prototype VI Name Notes VECTOR X X X SI Vector Dot.vi Vector\_Norm.vi  $X \mid X$ X Si '======== MATH '======== Function Prototype Notes AngleStats\_AngleAdd\_CallbackHelp.vi
AngleStats\_AngleAdd.vi ANGLE STATISTICS X X X X X AngleStats\_AngleMean\_CallbackHelp.vi AngleStats\_AngleMean.vi X X X X X XX XIIX AngleStats\_AngleResidual\_CallbackHelp.vi  $X \mid X \mid X \mid X \mid X$ AngleStats AngleResidual.vi Function Prototype Notes MATH UTILITY X X X SI MathUtil\_AngleModulus.vi XX X SI MathUtil\_ApplyDeadband.vi MathUtil Clamp Int.vi XX X SI MathUtil\_Clamp.vi XX X SI X SI X Si XX MathUtil\_InputModulus.vi MathUtil\_Interpolate.vi Function Prototype Notes MerweScSigPts\_ComputeWeights.vi MERWE SCALED SIGMA POINTS  $X \cup X$ XI MerweScSigPts\_GetNumSigmas.vi MerweScSigPts\_GetWc\_Single.vi MerweScSigPts\_GetWc.vi  $X \mid X$ X SI XX X SI X SI X SI XX MerweScSigPts\_GetWm\_Single.vi X SI XX MerweScSigPts GetWm.vi MerweScSigPts\_New\_Default.vi  $X \mid X$ X I XI MerweScSigPts\_New.vi XX MerweScSigPts\_SigmaPoints.vi XX Χ

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NUMERICAL INTEGRATION		X	Not	_ <u>¥</u>   <i>X</i>			Sa	VI Name NumIntegrate_Func_Ax_Bu_K.vi	Function Prototype	Notes  NOT USED. Should this be used	ප		_
NOMERICAL INTEGRATION										or abandoned???			$\perp$
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				1,10				NumIntegrate_RKf45_Func_Bs.vi		Removed. Replaced with newer			
								NumIntegrate_RKf45_Func_Ch.vi		functions.  Removed. Replaced with newer			+
			$\vdash$					NumIntegrate_RKf45_Func_Ct.vi		functions.  Removed. Replaced with newer			+
	X	X		Ma	1			NumIntegrate Rkf45 Impl.vi		functions.			_
	X	X		X				NumIntegrate_Rkf45_Mat_X_U.vi		Note that this Feinberg method has			+
										been changed and a Dormand Price method has been implemented TODO			
	_			X	21			NumIntegrate_RKf45_New.vi NumIntegrate_Trap_Dbl.vi		Removed. Never used.			_
	X	X	X	X	1			NumIntegrate_Trap_bb.vi					+
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RICCATI	Χ	Χ		X				Riccati_Check_Detectable.vi		Routine exists, it is just a shell			₩
	Υ	Y		Y				Riccati Check Stabilizable vi		Not really done III			
	X	X		X				Riccati_Check_Stabilizable.vi Riccati_DARE_Choose.vi		Not really done !!! Intended to allow DARE method testing.			+

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Revision 3.08 11/07/2023 – Added edge detect, b	oool cmd, drum	seque	encer,	double	e soler	oid pul	se		_				
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FIEL	D DISPLAY	X	X	X X	X			FieldDisp_Element_Disp.vi FieldDisp_Element_Prepare.vi					
		$\hat{x}$		X			^	FieldDisp_Element_Rotate.vi					
		Χ			no			FieldDisp_Element_Rotate_Init.vi					
		X	<u> </u>	X X	no Y		Y	FieldDisp Field Crop_and_Scale.vi FieldDisp Field Disp.vi					
		$\hat{X}$	$\hat{x}$	$\hat{X}$	$\hat{x}$			FieldDisp_Field_Selector_Prepare.vi					
		Χ		X	no			FieldDisp_Get_Field_Info.vi					
		X		X				FieldDisp_Open_Field_Info_File.vi					
	_	X		X I	no no			FieldDisp_Read_Field_Pic.vi FieldDisp_Read_Image_File.vi					
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'====== COMMUNICATIONS '=======						Q							
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NET	WORK UDP	X	X			SI		NetworkUDP_Close.vi NetworkUDP Receive.vi					
		X	$\frac{\lambda}{X}$	$\frac{\lambda}{X}$		1		NetworkUDP_Send.vi					
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	TypeDef	Z	<i>Z</i> .	X	XI	V/A	- 0)	AprilTag.ctl	i anosori i rototypo	110.00	5	7	F
		Z	Z .	X	XI	V/A		AprilTagFieldLayout,ctl					
	-	Z Z	$\frac{Z}{z}$	$\frac{X}{Y}$	X	V/A	+-	AprilTagFieldLayoutOriginPosition_ENUM.ctl AprilTagFields ENUM.ctl					
	-	Z	7	$\frac{x}{x}$	$\frac{X}{X}$	V/A V/A		AprilTagPoseEstimate.ctl					
		Z	Z .	X	XI	V/A		ARM_FF.CTL					
		Ζ		X	X I	V/A		BANG_BANG.CTL					
		1		X	X	V/A		BICon-Matrix_FUNC_TYPE.CTL		NOT USED. Should this be deleted or abandoned???			
	T T	Z	Z	X	X	V/A		CALLBACK_FUNC_TYPE.CTL		doloted of abalidoffed: ::			
		Z	Z .	X	XI	V/A		CHASSIS_SPEEDS.CTL					
	-	Z Z	$\frac{Z}{z}$	$\frac{X}{Y}$	X	V/A	+	CONTRAINED_STATE.CTL COORDINATE_AXIS.CTL					
		Z	$\frac{z}{z}$	$\frac{\wedge}{X}$	$\frac{\lambda}{X}$	V/A	+	COORDINATE_AXIS.CTL COORDINATE_SYSTEM.CTL		+			
		Z	Z	X	X	V/A		DCMOTOR_SIM.CTL					
		/		/		/		DCMOTOR_SIM_MODEL_PARAMS.CTL		OBSOLETE – Removed			
	-	Z Z	<u>Z</u>	$\frac{2}{X}$	$\frac{x}{x}$	V/A	+	DCMOTOR_SIM_SIMULATION_PARAMS.CTL DCMOTOR TYPES ENUM.CTL					
		Z	Z .	X	XI	V/A	+	DCMOTOR.CTL					
		Ζ	Ζ	X	X I	V/A		DEBOUNCER_TYPE_ENUM.Ctl					
	-	Z	$\frac{Z}{z}$	$\frac{X}{Y}$	XI	V/A	+	DEBOUNCER.CTL DIFF_DRIVE_ACCEL_LIMIT.CTL		-			
	-	Z Z	$\frac{2}{Z}$	$\frac{\wedge}{X}$	$\frac{\lambda}{X}$	V/A	+	DIFF_DRIVE_ACCEL_LIMIT.CTL DIFF_DRIVE_KINEMATICS.CTL					
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Irum seq	uence	r. dou	ble sol	enoid r	se	
Z	Z	X	X		DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl	
Z	Z	X	X		DIFF DRIVE ODOM2.ctl	
Z	Z	Χ	X		DIFF DRIVE Pose EST.ctl	
Z	Ζ	Χ	Χ	N/A	DIFF DRIVE POSE EST2.ctl	
Z	Ζ	Χ	Χ	N/A	DIFF DRIVE POSE EST2 CONFIG.CTL	
Z	Ζ	X	No	N/A	DIFF DRIVE POSE EST2 INTERP RECORD.CTL	
Z	Ζ	Χ	Χ	N/A	DIFF DRIVE ToughBoxMini GearChoice ENUM.ctl	
Z	Ζ	X	X	N/A	DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl	
Z		Ζ	X	N/A	DIFF DRIVE SIM MODEL PARAMS	
Z		Ζ	Χ	N/A	DIFF_DRIVE_SIM_SIMULATION_PARAMS.CTL	
Z	Ζ	Χ	Χ	N/A	DIFF_DRIVE_TRAIN_SIM_STATE_ENUM.CTL	
Z	Ζ	Χ	Χ	N/A	DIFF DRIVE TRAIN SIM.cti	
Z	Ζ	Χ	Χ	NA	DISPLAY_WAYPOINT.ctl	Was UTIL_WAYPOINT.VI
Z	Ζ	Χ	X	NA	DISPLAY_WEIGHTED_WAYPOINT.ctl	New V1.5. was
						UTIL_WEIGHTED_WAYPOINIT.VI
7		V		NA	Drum Saguanga Stata ENIIM vi	
Z		X		NA NA	DrumSequence_State_ENUM.vi DrumSequence_Step_ENUM.vi	
Z	7	X	V	N/A	ELEV_FF.CTL	
	Z	X	X	N/A	ELEV_FF.CTL  ELEVATOR SIM.CTL	
Z	Z	Z	X		ELEVATOR_SIM.CTL  ELEVATOR SIM SIMULATION PARAMS.CTL	
Z	Z	X	X		EXTENDED KALMAN CORRECT FUNC GROUP.CTL	
		Z	X		EXTENDED KALMAN FILTER.CTL	
Z		Z	X		FieldDisp ElementPicture.ctl	
Z		Z	^	N/A	FieldDisp_FieldElement.ctl	
Z		Z		N/A	FieldDisp_Field_Info.ctl	
Z	Z	X	X		FLYWHEEL_SIM.ctl	
Z	Z	$\overline{z}$	X	N/A	FLYWHEEL SIM SIMULATION PARAMS.CTL	
Z	Z	X	X	N/A	FUNCTION GENERATOR MATRIX.ctl	
Z	Z	X	X	N/A	FUNCTION GENERATOR.ctl	
Z	Z	X	X	N/A	HOLONOMIC DRV CTRL.CTL	New 1/26/21
Z	Z	X	X		KALMAN FILTER LATENCY COMP FUNC GROUP.CTL	11CW 1720/21
Z	Z	X	X	N/A	KALMAN FILTER LATENCY COMP.CTL	
Z	Z	X	X	N/A	KALMAN FILTER.ctl	
Z	Z	X	X	N/A	LINEAR FILTER.CTL	
Z	Z	X	X	N/A	LINEAR PLANT INV FF.ctl	
Z	Z	X	X		LINEAR QUADRATIC REGULATOR.ctl	
Z	Z	Z	X	N/A	LINEAR SYSTEM ID DCMOTOR MODEL.CTL	
Z		Z	X	N/A	LINEAR SYSTEM ID ELEVATOR MODEL.CTL	
Z		Z	X	N/A	LINEAR SYSTEM ID FLYWHEEL MODEL.CTL	
Z		Z	X	N/A	LINEAR_SYSTEM_ID_SINGLE_JOINT_ARM_MODEL.CTL	
Z	Z	X	X	N/A	LINEAR SYSTEM LOOP.ctl	
Z	Z	Z	X		LINEAR SYSTEM LOOP CTRL PARAMS.CTL	
Z	Z	Z	X	N/A	LINEAR SYSTEM LOOP DCMOTOR CTRL PARAMS.CL	
Z	Z	Z	X	N/A	LINEAR SYSTEM LOOP DIFF DRV CTRL PARAMS.CTL	
Z	Z	Z	X		LINEAR_SYSTEM_LOOP_ELEVATOR_CTRL_PARAMS.CTL	
Z	Z	Z		N/A	LINEAR_SYSTEM_LOOP_FLYWHEEL_CTRL_PARAMS.CTL	
Z	Z	Z		N/A	LINEAR SYSTEM LOOP SNGJNTARM CTRL PARAMS.CTL	
Z	Z	X		N/A	LINEAR SYSTEM SIM.cti	
Z	Z	X	X		LINEAR SYSTEM.ctl	
Z	Z	Z	X		LTV_DIFF_DRIVE_CTRL_CONTROL_PARAMS.CTL	
Z	Z	Z		N/A	LTV_DIFF_DRIVE_CTRL_MODEL_PARAMS.CTL	
Z	Ζ	Χ	X		LTV_DIFF_DRIVE_CTRL_STATE_ENUM.ctl	
Z	Z	Z		N/A	LTV_DIFF_DRIVE_CTRL_TOLERANCE.CTL	
Z	Z	X	X	N/A	LTV_DIFF_DRIVE_CTRL.ctl	
Z	Z	Z	X	N/A	LTV_UNICYCLE_CONTROLLER_MODEL_PARAMS.CTL	
Z	Z	X	X		LTV_UNICYCLE_CONTROLLER_STATE_ENUM.ctl	
Z	Z	Z	X	N/A	LTV_UNICYCLE_CONTROLLER_TOLERANCE.CTL	
Z	Z	Χ		N/A	LTV_UNICYCLE_CONTROLLER.CTL	
Z	Z	Χ	Χ	N/A	MECA_DRIVE_KINEMATICS.CTL	
Z	Z	X	X		MECA_DRIVE_ODOMETRY.CTL	
Z	Z	X	X		MECA_DRIVE_POSE_EST.CTL	
Z	Z	X	X		MECA_DRIVE_POSE_EST2.ctl	
Z	Z	X	X		MECA_DRIVE_POSE_EST2_CONFIG.CTL	
Z		Χ	Χ	N/A	MECA_DRIVE_POSE_EST2_INTERP_RECORD.CTL	
Z	Ζ	Χ	X	N/A	MECA_WHEEL_POSITIONS.CTL	
Z	Z	Χ	Χ	N/A	MECA_WHEEL_SPEEDS.CTL	
Z	Ζ	Χ	Χ		MEDIAN_FILTER.CTL	
Z	Ζ	Χ		N/A	MERWE_SCALED_SIGMA_PTS.ctl	
Z	Z	Χ		N/A	OBSERVER_SNAP_LIST_ITEM.CTL	
		X	X	N/A	OBSERVER SNAPSHOT.CTL	
Z	Z	X	X		PARAM STACK ITEM.CTL	

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um sequencer, double solenoid pulse							
Z	Z	X	X	N/A		PARAM STACK.CTL	
Z	Ζ	Χ		N/A		PID ADV LIMITS.CTL	
Z	Z	X		N/A		PID ADV TUNING.CTL	
						PID CONTROLLER.CTL	
Z	Z	X	X	N/A			
Z	Ζ	Χ	X	N/A		PID_ERROR_TOLERANCE.CTL	
Z	Ζ	Χ	X	N/A		PID_INPUT_LIMITS.CTL	
Z	Z	X	X	N/A		PID_TUNING.CTL PID_TUNING.CTL	
Z	Ζ	X	X	N/A		POSE2D.CTL	
Z	Ζ	X	X	N/A		POSE3D.CTL	
Z	Z	X	X	N/A		POSEWCURVATURE.CTL	
Z	Z	X	X	N/A		PROFILED PID CONTROLLER.CTL	
Z	Ζ	Χ	Χ	N/A		QUATERNION.CTL QUATERNION.CTL	
Z	Ζ	Χ		N/A		RAMSETE_EXE_TUNING.CTL	
Z	Z	X	X	N/A		RAMSETE.CTL	
Z	Z	X	X	N/A		ROTATION2D.CTL	
Z	Ζ	Χ	Χ	N/A		ROTATION3D.CTL	
Z	Ζ	Ζ	X	N/A		SIMPLE MOTOR FF KA TUNE PARAMS.CTL	
Z	Z	X	X	N/A		SIMPLE MOTOR FF.CTL	
Z	Z	X	X	N/A		SINGLE_JOINT_ARM_SIM.CTL	
Z	Ζ	Χ	X	N/A		SINGLE_JOINT_ARM_SIM_SIMULATION_PARAMS.CTL	
Z	Ζ	Χ	X	N/A		SLEW_RATE_LIMITER.CTL	
Z	Ζ	Χ	X	N/A		SPLINE_CTRL_VECTOR.CTL	
Z	Ζ	Χ	Х	N/A		SPLINE.CTL	
Z	Ζ	Χ	Х	N/A		SWERVE DRIVE KINEMATICS.CTL	
Z	Z	X		N/A		SWERVE DRIVE MODULE POSITION.CTL	
Z	Z	X	X	N/A		SWERVE_DRIVE_MODULE_STATE.CTL	
Z	Z	X	X	N/A		SWERVE_DRIVE_ODOMETRY.CTL	
Z	Ζ	Χ	X	N/A		SWERVE_DRIVE_Pose_EST.CTL	
Z		X	Χ	N/A		SWERVE_DRIVE_POSE_EST2.ctl	
	Z	X	X	N/A		SWERVE_DRIVE_POSE_EST2_CONFIG.CTL	
Z		X	No	N/A		SWERVE DRIVE POSE EST2 INTERP RECORD.CTL	
Z	Ζ	Χ	Х	N/A		TIME INTERPOLATABLE BOOLEAN.CTL	
Z	Z	X	X	N/A		TIME INTERPOLATABLE DOUBLE.CTL	
Z	Z	X	X	N/A		TIME_INTERNOLATABLE_POSE2D.CTL	
			_	N/A		TIME_INTERN OLATABLE_T 03E20.0TE	
Z	Z	X	X				
Z	Z	Z	X	N/A		TIME_INTERPOLATABLE_VARIANT.CTL	
Z	Ζ	Χ	X	N/A		TIMER.CTL	
Z	Z	X	X	N/A		TRAJ_CONFIG.CTL	
Z	Z	X	X	N/A		TRAJ CONSTRAINT CENTRIPETAL ACCEL.CTL	
Z	Ζ	Χ	Χ	N/A		TRAJ CONSTRAINT DIIF DRIVE KINEMATICS.CTL	
Z	Ζ	Χ	Х	N/A		TRAJ CONSTRAINT DIIF DRIVE VOLTAGE.CTL	
Z	Z	X	X	N/A		TRAJ CONSTRAINT ELLIP REGION.CTL	
		X		N/A		TRAJ CONSTRAINT JERK.CTL	Pouting exists, it is just a shall
1	-						Routine exists, it is just a shell
Z	Z	Χ		N/A		TRAJ_CONSTRAINT_MAX_VELOCITY.CTL	
Z	Z	Χ	Χ	N/A		TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL	
Z	Ζ	Χ	X	N/A		TRAJ_CONSTRAINT_MINMAX.CTL	
Z	Ζ	Χ	X	N/A		TRAJ_CONSTRAINT_RECT_REGION.CTL	
Z	Ζ	Χ	Χ	N/A		TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	
Z	Ζ	Χ		N/A		TRAJ STATE.CTL	
Z	Z	X		N/A		TRAJECTORY SPLINE TYPE ENUM.CTL	
Z	Z	X		N/A		TRAJECTORY.CTL	+
							+
Z	Z	X	X	N/A		TRANSFORM2D.CTL	
Z	Ζ	Χ	X	N/A	1	TRANSFORM3D.CTL	
Z	Ζ	Χ	X	N/A		TRANSLATION2D.CTL	
Z	Ζ	Χ	X	N/A		TRANSLATION3D.CTL	
Z	Ζ	Χ	Χ	N/A		TRAPEZOID_PROFILE_CONSTRAINT.CTL	
Z	Ζ	Χ		N/A		TRAPEZOID PROFILE STATE.CTL	
Z	Z	X	X	N/A		TRAPEZOID PROFILE.CTL	
Z	Z	$\overline{X}$	X	N/A		TWIST2D.CTL	+
					1		
Z	Z	X	X	N/A	1	TWIST3D.CTL	
Z	Ζ	Χ	X	N/A		UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL	
Z	Ζ	Χ		N/A		UNSCENTED_KALMAN_FILTER.ctl	
Z	Ζ	Χ	Χ	N/A		UNSCENTED_KALMAN_NEW_FUNC_GROUP.CTL	
Z	Ζ	Χ		N/A		UTIL PATHFINDER CONFIG.CTL	
N/A		N/A		N/A		WAYPOINTS.CTL WAYPOINTS.CTL	Delete – obsolete
Z	Z	X	Y	NA		WEIGHTED WAYPOINT.CTL	New V1.5
N/A		N/A		N/A		X_Y_HEADINGS.CTL	Delete – obsolete
	7			N/A			Delete - obsolete
Z	Ζ	Χ	_ <u>^</u>	IWA	1	X_Y_PAIR.CTL	

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