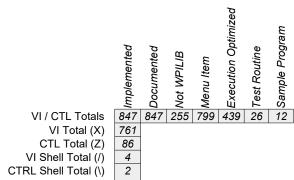
Revision 2.X 04/27/2022 – Added computer vision utility

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...



Doc completed Pct 100.00% Optimization Pct 51.83%

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

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
LINEAR FILTER	Χ	X		X	1			LinearFilter_BackwardFiniteDifference.vi		
	Χ	Χ		X	SI			LinearFilter_Calculate.vi		
	Χ	Χ	Χ	X	X			LinearFilter_CutoffFrequency.vi		
	Χ	Χ	Χ	X	- 1		X	LinearFilter_Execute.vi		Labview style helper
	Χ	Χ		No	1			LinearFilter_Factorial.vi		AN INTERNAL ROUTINE
	Χ	Χ		X	Χ			LinearFilter_HighPass.vi		
	Χ	Χ	Χ	X	X			LinearFilter_HighPassBW1.vi		
	Χ	Χ	Χ	X	X			LinearFilter_HighPassBW2.vi		
	Χ	Χ	Χ	X	X			LinearFilter_LowPassBW1.vi		
	Χ	Χ	Χ	X	Χ			LinearFilter_LowPassBW2.vi		
	Χ	Χ		X	X			LinearFilter_MovingAverage.vi		
	Χ	X		X	- 1			LinearFilter_New.vi		
	Χ	Χ		X	SI			LinearFilter_Reset.vi		
	Χ	Χ	Χ	X	SI			LinearFilter_ResetToValue.vi		
	Χ	Χ		X	X			LinearFilter_SinglePoleIIR.vi		
	Χ	Χ	Χ	X	X			LinearFilter_TimeConst.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optir	Test Routine	Sample Prograi	VI Name	Function Prototype	Notes
<b>MEDIAN FILTER</b>	X	X		Χ	Χ			MedianFilter_Calculate.vi		
	X	X	X	Χ	- 1			MedianFilter_Execute.vi		Labview style helper
	X	X		X	SI			MedianFilter_New.vi		
	X	X		X	SI			MedianFilter_Reset.vi		
	X	X	X	Χ	SI			MedianFilter_ResetToValue.vi		

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– vi impiementation	LIST								-	
mputer vision utility					g					
					Execution Optimized		6			
					ţi		ä	VI Name		
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	ent.	ınte	7	ы	n	uti	ď			
	Implemented	X Documented	Not WPILIB	Menu Item	αţį	Test Routine	)e			
	ble	noc	× 1	эп	ec	st	μź			
_		Ğ	_ ≥		Ж		Sa	VI Name	Function Prototype	Notes
<b>SLEW RATE FILTER</b>	X			X	- 1			SlewRateLimiter_Calculate.vi		
	Χ	X	X	X	SI			SlewRateLimiter_Close.vi		
	Χ	X	X	X	- 1			SlewRateLimiter_Execute.vi		Labview style helper
	Χ	X	X	X	SI			SlewRateLimiter_GetRate.vi		
	Χ	X		X	- 1			SlewRateLimiter_New.vi		
	Χ	X		X				SlewRateLimiter_NewInitialZero.vi		
	Χ	Χ		X	- 1			SlewRateLimiter_Reset.vi		
	Χ	X		X	SI			SlewRateLimiter_SetRate.vi		
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	_	_			Execution Optimized		<u>ī</u>	VI Name		
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	eu	en	7	ten	Ö	ont	ď			
	em	Ę	Ž	n	Ωt,	Ř	g			
	Implemented	Documented	Not WPILIB	Menu Item	ě	Test Routine	an	VII Niema	Formation Doubleton -	Niskaa
T=D		Q	_ <	<u> </u>	Ш	<u> </u>	S	VI Name		Notes
TIMER		X	Χ				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Timer_Close.vi		releases semaphore
-	X	X	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	X			Х	Timer_Get.vi		
	X	X	X	X				Timer_GetAndReset.vi		
	X	X	X	No				Timer_GetInternal.vi		Internal (private) only
	X	Χ	ļ.,	X				Timer_HasPeriodPassed.vi		
	Χ	X	Χ					Timer_HasPeriodPassedOnce.vi		
	X	X		X				Timer_New.vi		
	X	X	L.,	X			X	Timer_Reset.vi		
	X	X	X					Timer_ResetInternal		Internal (private) only
	Χ	Χ		X				Timer_Start.vi		
	X	X	ļ.,	X			X	Timer_Stop.vi		
	X	Χ	X	No				Timer_StopInternal.vi		Internal (private) only
					Ø					
					Że					
					Execution Optimized		Program			
	ō	Ø			bt	a)	grë			
	ηte	πe	19	3	2	ţi	2			
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	ě	ű	3	7	ρςn	it F	du			
	Implemented	Documented	Not WPILIB	Menu Item	Ä	Test Routine	Sample	VI Name	Function Prototype	Notes
DIG SEQ LOGIC	$\overline{X}$	X	$\overline{X}$	$\overline{X}$				DigSeqLogic_On_Delay.vi		
D.0 014 100.0	X	X	X					DigSeqLogic_Off_Delay.vi		
	X	X	X	X				DigSeqLogic_One_Shot.vi		
	X	X	X	X				DigSeqLogic_SR_Flip_Flop.vi		
			<del>  ^</del>	+^				DigocqLogic_Ort_r lip_r lop.vi		
					Ø					
					İΖΘ		_			
					ij		an			
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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
DEBOUNCER		X		X				Debouncer New.vi		<del></del>
JEDOONOLK	X	X		X				Debouncer Calculate.vi		
	X	X	X	X				Debouncer_Execute.vi		
	X	X	\ \ \	No				Debouncer_Reset.vi		
	X	X		No				Debouncer_HasElapsed.vi		
	^			110				ровочноет_наэшарэсч.vi		
	_	_	_	_	_	_	_		<del></del>	· · · · · · · · · · · · · · · · · · ·

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CONTROLLER '=======

									•	
ARM FF	✓ Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine		VI Name ArmFF Calculate.vi	Function Prototype	Notes
,		X		X				ArmFF CalculateVelocityOnly.vi		
			Χ					ArmFF_Execute.vi		LabVIEW style single call
			Χ					ArmFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	Χ	X		X				ArmFF_MaxAchieveAccel.vi		
		Χ		X				ArmFF_MaxAchieveVelocity.vi		
		Χ		X				ArmFF_MinAchieveAccel.vi		
		Χ		X				ArmFF_MinAchieveVelocity.vi		
	X	X		X				ArmFF_New_ZeroGravity.vi		
	X	Χ		X				ArmFF_New.vi		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
BANG BANG	X	X		X	SI			BangBang_AtSetpoint.vi		
		X		X	SI			BangBang_Calculate_PV.vi		
	Χ	X		Χ	SI			BangBang_Calculate_SP_PV.vi		
		Χ	Χ	Χ	SI			BangBang_Execute.vi		
		Χ		X	SI			BangBang_GetAll.vi		
		X		X				BangBang_GetError.vi		
		X		X				BangBang_New.vi		
		X		X				BangBang_SetSetpoint.vi BangBang_SetTolerance.vi		
L	^	^		_ ^	31			Dangbang_SetTolerance.vi		
CONTROLLER UTIL	X Implemented	X Documented	Not WPILIB	X Menu Item		Test Routine	Sam	VI Name ControllerUtil_GetModulusError.vi		Notes This was short lived in WPILIB, but
										still useful here.
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototyne	Notes
ELEV FF		$\frac{Q}{X}$	_ <	_ <u>≥</u>   <i>X</i>	Ш	<u> </u>		VI Name ElevFF_Calculate.vi	Function Prototype	Notes
CLEV FF		X		X				ElevFF_Calculate.vi ElevFF_CalculateVelocityOnly.vi		
	^	^	Χ	^				ElevFF_Calculate velocity Only.vi ElevFF_Execute.vi		LabVIEW style single call
			X					ElevFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	Χ	Χ		Χ				ElevFF_MaxAchieveAccel.vi		
	Χ	X		X				ElevFF_MaxAchieveVelocity.vi		
		Χ		Χ				ElevFF_MinAchieveAccel.vi		
	X	X		X				ElevFF_MinAchieveVelocity.vi		
	Χ	Χ		Χ				ElevFF_New_ZeroAccel.vi		

nputer vision utility									
	Χ	X		X		E	ElevFF_New.vi		
	ρe	Þ	6		Optimized	utine Program			
	Implemented	X Documented	Not WPILIB	Menu Item	Execution (	ıst Ro ımple	// Nama	Function Dustature	Nata
HOL_DRV_CTRL	X	Q	<u> </u>	_ <b>≥</b>	Щ		/I Name HolDrvCtrl_AdvCalculate_Trajectory.vi	,	Notes Added 1/24/2022
HOL_DRV_CIRL	X	$\hat{x}$	$\hat{X}$	$\hat{X}$			HolDrvCtrl AdvCalculate.vi		Added 1/24/2022 Added 1/24/2022
	X	$\hat{x}$		X	SI		HolDrvCtrl AtReference.vi		Added 1/24/2022 Added 1/26/21
	X	X		X	1		HolDrvCtrl_Calculate_Trajectory.vi		Added 1/26/21
	Χ	Χ		Χ	- 1		HolDrvCtrl_Calculate.vi		Added 1/26/21
	Χ	Χ	Χ	Χ			HolDrvCtrl_Execute_Trajectory.vi		Added 1/24/2022
	Χ	Χ	Χ	Χ			HolDrvCtrl_Execute.vi		Future
	Χ	Χ		X	SI		HolDrvCtrl_New.vi		Added 1/26/21
	X	X	X	X	SI		HolDrvCtrl_PackExecuteSP.vi		A L L L 4/04/0000
	X	X	X	X			HolDrvCtrl_PackPID.vi HolDrvCtrl_PackProfPID.vi		Added 1/24/2022 Added 1/24/2022
	X	X		X	SI		HolDryCtrl SetEnabled.vi		Added 1/26/21
	X	$\hat{X}$		X	SI		HolDrvCtrl SetEnabled.vi		Added 1/26/21
					O1		IOIDIVOIII_OCTIOICIANOC.VI		Added 1/20/21
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program			
		Ğ	ž	Σ	Û		/I Name	Function Prototype	Notes
PID CONTROLLER		X	X	X			PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvCalculate_FF_Sp_Pv.vi		Advanced PID Advanced PID
	X	X	X	X			PIDController_AdvCalculate_FF_Sp_Fv.vi		Labview style helper. Advanced
	^	^	^	^		^	IDController_AdvExecute.vi		PID
	Χ	Χ		Χ	SI		PIDController_AtSetpoint.vi		
	Χ	Χ		Χ			PIDController_Calculate_PV.vi		
	Χ	Χ		X			PIDController_Calculate_SP_PV.vi		
	X	X		X	SI		PIDController_DisableContinousInput.vi		
	X	X	Χ	X	SI	XF	PIDController_EnableContinousInput.vi PIDController_Execute.vi		Labyiou atula balbar
	Χ	Χ	Χ	Χ			PIDController_execute.vi		Labview style helper OBSOLETE – Removed
	Χ	Χ		Χ	SI		PIDController GetPeriod.vi		OBSOLL I E - Itemoved
	X			X	SI		PIDController GetPID.vi		
	Χ	X		X	SI	F	PIDController GetPositionError.vi		
	Χ	Χ		Χ	SI		PIDController_GetSetpoint.vi		
	Χ	Χ		X	SI		PIDController_GetVelocityError.vi		
	X	X		X	SI		PIDController_IsContinuousInputEnabled.vi		
	X	X		X	1		PIDController_New.vi		
	X	X	X	X	I SI		PIDController_NewPeriod.vi PIDController Pack AdvLimits.vi		
	X	X		X	SI		PIDController Pack AdvTuning.vi		
	$\hat{x}$	X	$\hat{X}$	X	SI		PIDController Pack ErrorTolerance.vi		
	X	X	X	X	SI		PIDController_Pack_InputLimits.vi		
	Χ	X	Χ	Χ	SI	F	PIDController_Pack_Tuning.vi		
	X	X		Χ	SI	F	PIDController_Reset.vi		
		Χ		X	SI		PIDController_SetD.vi		
	X	X	X	X	SI		PIDController_SetDerivativeFilter.vi		Advanced PID
	X	X	X	No		F	PIDController_SetFeedForward_OBSOLETE_DELETE.vi		Advanced PID, Obsolete – DELETE
		X	X				PIDController_SetFFGain_OBSOLETE_DELETE.vi		Advanced PID, Obsolete – DELETE
	Χ	Χ		X	SI	F	PIDController_SetI.vi		
						F	PIDController_SetInputRange.vi		OBSOLETE - Removed
	X			X	SI		PIDController_SetIntegratorRange.vi		
	X	X	X	X	SI		PIDController_SetOutputLimits.vi		Advanced PID
	Χ	Χ		X	SI	F	PIDController_SetP.vi		

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Y	Y	Y	Y	21	PIDController SetPeriod.vi	
		_^_		01	i ibcontroller_sett endt.vi	
X	X		X	SI	PIDController_SetPID.vi	
X	X	X	X	SI	PIDController_SetPIDF.vi	Advanced PID
X	X		X	SI	PIDController_SetSetpoint.vi	
X	X		X	SI	PIDController_SetTolerance.vi	
X	X		X	SI	PIDController SetTolerancePandV.vi	

mplemented		Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes
PROFILED PID CONTROLLER X		$\overline{X}$		X	SI		ProfiledPIDController AtGoal.vi	71	
X		X		X	SI		ProfiledPIDController AtSetpoint.vi		
X		X		X			ProfiledPIDController Calculate Meas Goal.vi		
X		X		X			ProfiledPIDController Calculate Meas StateGoal TrapCnsrt.vi		
X		X		X			ProfiledPIDController Calculate Meas StateGoal.vi		
X		X		X			ProfiledPIDController Calculate Meas.vi		
X		X		X	SI		ProfiledPIDController DisableContInput.vi		
X		X		X	SI		ProfiledPIDController EnableContInput.vi		
X	1	X	Χ	X	1		ProfiledPIDController_Execute.vi		Single call LabVIEW style function.
X		X		X	SI		ProfiledPIDController_GetGoal.vi		
X		X		X	SI		ProfiledPIDController_GetPeriod.vi		
X		X	Χ	X	SI		ProfiledPIDController_GetPID.vi		WPILIB has separate getters.
X		X		X	SI		ProfiledPIDController_GetPositionError.vi		
X		X		X	SI		ProfiledPIDController_GetSetpoint.vi		
X		X		X	SI		ProfiledPIDController_GetVelocityError.vi		
X		X		X	1		ProfiledPIDController_New.vi		
X		X		X	1		ProfiledPIDController_NewPeriod.vi		
X		X		X	SI		ProfiledPIDController_Reset_PosOnly.vi		
X		X		X	SI		ProfiledPIDController_Reset_PosVel.vi		
X		X		X	SI		ProfiledPIDController_Reset.vi		
X		Χ		X	SI		ProfiledPIDController_SetConstraints.vi		
X		X		X	SI		ProfiledPIDController_SetGoal_PosOnly.vi		
X		X		X	SI		ProfiledPIDController_SetGoal.vi		
X		X		X	SI		ProfiledPIDController_SetIntegratorRange.vi		
X		X		X	SI		ProfiledPIDController_SetPID.vi		
X		X		X	SI		ProfiledPIDController_SetTolerance_PosOnly.vi		
X		X		X	SI		ProfiledPIDController_SetTolerance_PosVel.vi		
					pəz				

	mplemented	Oocumented	Not WPILIB	Menu Item	Execution Optimize	est Routine	Sample Program	Function Prototype	Notes
RAMSETE	X	X		<i>X</i>	SI		Ramsete AtReference.vi	AtReference	11000
	X	X		X	X		Ramsete Calculate Trajectory.vi	calculate trajectory	
	Χ	X		Χ	Χ		Ramsete Calculate.vi	calculate	
	Χ	X	X	Χ	Χ		Ramsete_Diff_DO_Eng.vi		
	Χ	Χ	X	Χ	Χ		Ramsete Diff DO SI.vi		
	Χ	X	X	Χ	I		Ramsete_Execute_ENG.vi	Use this one!!	
	X	X	X	X	SI		Ramsete_Execute_PackTuning_ENG.vi		
	X	X	X	X	SI		Ramsete_Execute_PackTuning.vi		
	Χ	Χ	Χ	Χ	Ι		Ramsete_Execute.vi		
	Χ	Χ		Χ	SI		Ramsete_New_B_Z.vi	new(b, zeta)	
	Χ	Χ		X	SI		Ramsete_New.vi	new	
	Χ	Χ		X	SI		Ramsete_SetEnabled.vi	SetEnabled	
	Χ	Χ		Χ	SI		Ramsete_SetTolerance.vi	SetTolerance	
	Χ	X		Χ	Χ		Ramsete SINC.vi	sinc	internal

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22 – Added computer vision utility					_				
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program  Band IV	function Prototype	Notes
SIMPLE MOTOR FEEDFORWARD	X	X	X	X	SI		SimpleMotorFF_Calculate_CalcAccel.vi	•	
	Χ	Χ		Х			SimpleMotorFF_Calculate_NextV_Dt.vi		
	Χ	Χ		X	SI		SimpleMotorFF_Calculate.vi p	ublic double calculate(double velocity, double acceleration)	
	Χ	Χ		X	SI		SimpleMotorFF_CalculateVelocityOnly.vi p	ublic double calculate(double velocity)	
	X	Χ		X	X			ublic double maxAchievableAcceleration(double maxVoltage, louble velocity)	
	Χ	Χ		X	X			ublic double maxAchievableVelocity(double maxVoltage, double cceleration)	
	X	Χ		X	X			ublic double minAchievableAcceleration(double maxVoltage, louble velocity)	
	X	Χ		X	X			ublic double minAchievableVelocity(double maxVoltage, double cceleration)	
	X	Χ		X	SI		SimpleMotorFF_New.vi p	ublic SimpleMotorFeedforward(double ks, double kv, double ka)	
							р	ublic SimpleMotorFeedforward(double ks, double kv)	

'======= GEOMETRY '========

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optir	Test Routine Sample Progra	VI Name	Function Prototype	Notes
POSE	X	X		X	SI		Pose_Equals.VI	boolean equals( other obj )	
	X	Χ		X	Χ		Pose_Exp.vi	pose2d exp( twist2d twist )	
	X	X		X	SI		Pose_getRotation.vi	rotation2d getRotation()	can also use cluster unpack
	X	X		X	SI		Pose_getTranslation.vi	translation2d getTranslation()	can also use cluster unpack
	X	X	X	X	SI		Pose_getXY.vi		
	X	X	X	X	SI		Pose_getXYAngle.vi		
	X	X		X	1		Pose_Interpolate.vi		
	X	X		X	X		Pose_Log.vi	twist2d log( pose2d end )	
	Χ	Χ		X	SI		Pose_Minus.vi	transform2d minus( pose2d other )	
	Χ	X		X	SI		Pose_New_TRRO.vi	pose2d new( translation2d, rotation2d )	
	X	X		X	SI		Pose_New.vi	pose2d new( double x, double y, rotation2d )	
	Χ	X		X	SI		Pose_Plus.vi	pose2d plus( transform2d other )	
	X	X		X	SI		Pose_RelativeTo.vi	pose2d relativeto( pose2d other )	
	X	X		X	SI		Pose_TransformBy.vi	pose2d transformby( transform2d other )	
								pose2d new( )	can use cluster constant

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
ROTATION	Χ	X		X	SI			Rotation_CreateAngle.vi	rotation2d new( double value )	
	Χ	Χ		Χ	SI			Rotation_CreateAngleDegrees.vi	rotation2d fromDegrees( double degrees )	convert to radians then create
	Χ	X		Χ	SI			Rotation_CreateXY.vi	rotation2d new( double x, double y )	
	Χ	X		X	SI			Rotation_Equals.vi	boolean equals( rotation2d other )	
	Χ	X	X	X	SI			Rotation_GetAngleCosSin.vi		New 1/26/21
	Χ	X		X	SI			Rotation_GetCos.VI	double getCos()	use cluster unpack
	X	X		X	SI			Rotation_GetDegrees.VI	double getDegrees()	use cluster unpack, then convert to degree
	Χ	Χ		Χ	SI			Rotation_GetRadians.VI	double getRadians()	use cluster unpack
	Χ	Χ		Χ	SI			Rotation GetSin.VI	double getSin()	use cluster unpack

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	X	X		Χ	SI		Rotation_GetTan.VI	double getTan()	can calculate
	Χ	X		Χ	SI		Rotation_Interpolate.vi		
	X	X		Χ	SI		Rotation_Minus.vi	rotation2d minus( rotation2d other )	
		X		Χ	SI		Rotation_Plus.vi	rotation2d plus( rotation2d other )	
		Χ		Χ	SI		Rotation_RotateBy.vi	rotation2d rotateby( rotation2d other )	
		Χ		Χ	SI		Rotation_Times.vi	rotation2d times( double scalar )	
	X	Χ		Χ	SI		Rotation_UnaryMinus.vi	rotation2d unaryminus( )	
								rotation2d new()	can use cluster constant
TRANSFORM	X X X X X X X X	X X X X X	X X	X X X X X X X X X X X X X X X X X X X	Signature   Continuition   Continu	Test Routine	VI Name  Transform_Create_PosePose.vi Transform_Create_TransRot.vi Transform_Equals.VI Transform_GetRotation.VI Transform_GetTranslation.VI Transform_GetXY.vi Transform_GetXY.vi Transform_GetXYAngle.vi Transform_Inverse.vi Transform_Plus.vi Transform_Times.vi	Function Prototype  transform2d new( pose2d, pose2d )  transform2d new( translation2d, rotation2d )  boolean equals( other transform2d )  rotation2d getRotation()  translation2d getTranslation()  transform inverse()  transform2d times( double scalar )  transform2d new( )	Notes  use cluster unpack use cluster unpack new  can use cluster constant
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Name NI Name		
TRANSLATION	X X X X X X X X X X X X X X X X X X X	X X X X X X		X X X X X X X X X X X X X X X X X X X	SI S	Tes	Translation_Create_DistAng.vi Translation_Create.vi Translation_Equals.vi Translation_GetDistance.vi Translation_GetNorm.VI Translation_GetX.VI Translation_GetXY.VI Translation_GetY.VI Translation_Interpolate.vi Translation_Interpolate.vi Translation_Plus.vi Translation_Plus.vi Translation_Times.vi Translation_Times.vi Translation_UnaryMinus.vi	Function Prototype  translation2d new( double x, double y )  boolean equals( translation other )  double getDistance( translation2d other )  double getNorm()  double getX()  double getY()  translation2d minus( translation2d other )  translation2d plus( translation2d other )  translation2d rotateBy( rotation2d other )  translation2d times( double scalar )  translation2d unaryminus( )	can use cluster unpack can use cluster unpack can use cluster unpack
TRANSLATION	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X	SI SI SI SI SI SI SI SI SI SI SI SI	Ze.	Translation_Create_DistAng.vi Translation_Create.vi Translation_Equals.vi Translation_GetDistance.vi Translation_GetNorm.VI Translation_GetX.VI Translation_GetXY.VI Translation_GetY.VI Translation_Interpolate.vi Translation_Minus.vi Translation_Plus.vi Translation_RotateBy.vi Translation_Times.vi	translation2d new( double x, double y ) boolean equals( translation other ) double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar ) translation2d unaryminus( ) translation2d new()	can use cluster unpack can use cluster unpack can use cluster unpack can use cluster unpack
TRANSLATION	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X	SI SI SI SI SI SI SI SI SI SI SI SI	Tex	Translation_Create_DistAng.vi Translation_Create.vi Translation_Equals.vi Translation_GetDistance.vi Translation_GetNorm.VI Translation_GetX.VI Translation_GetXY.VI Translation_GetY.VI Translation_Interpolate.vi Translation_Minus.vi Translation_Plus.vi Translation_RotateBy.vi Translation_Times.vi	translation2d new( double x, double y ) boolean equals( translation other ) double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar ) translation2d unaryminus( )	can use cluster unpack can use cluster unpack can use cluster unpack
TWIST	X X X X X X X X X X X X X X 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	SI SI SI SI SI SI SI SI SI SI SI SI	Test Routine Tes	Translation_Create_DistAng.vi Translation_Create.vi Translation_Equals.vi Translation_GetDistance.vi Translation_GetNorm.VI Translation_GetX.VI Translation_GetXY.VI Translation_GetY.VI Translation_Interpolate.vi Translation_Minus.vi Translation_Plus.vi Translation_RotateBy.vi Translation_Times.vi	translation2d new( double x, double y ) boolean equals( translation other ) double getDistance( translation2d other ) double getNorm() double getX()  double getY()  translation2d minus( translation2d other ) translation2d plus( translation2d other ) translation2d rotateBy( rotation2d other ) translation2d times( double scalar ) translation2d unaryminus( ) translation2d new()	can use cluster unpack can use cluster unpack can use cluster unpack can use cluster unpack

'======== KINEMATICS

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2.X 04/27/2022 – Added computer vision utility									
<del></del>	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program			
CHASSIS SPEEDS			_ ≥	Χ		Se 7e	VI Name ChassisSpeeds_FromFieldRelativeSpeeds.VI	Function Prototype chassisspeeds fromFieldRelativeSpeeds (double x, double y,	Notes
CHASSIS SPEEDS					SI			double angvel, rotation2d robotangle )	
	X		X		SI		ChassisSPeeds_GetXYOmega.vi ChassisSpeeds New.vi		
	X			X	SI		ChassisSpeeds_ivew.vi	chassisspeeds new ( double xvel, double yvel, double angvel ) chassisspeeds new ()	can use cluster constant
DIFFERENTIAL DRIVE KINEMATICS	X X Implemented	X		X X Menu Item		X X Test Routine	VI Name  DiffKinematics_New.vi  DiffKinematics_toChassisSpeed.vi  DiffKinematics_toWheelSpeed.vi	Function Prototype  diffDriveKine new( double trackWidth )  chassisSpeeds toChassisSpeeds( diffDrWheelSpeeds )  diffDriveWheelSpeed toWheelSpeeds( chassisSpeeds )	Notes
DIFFERENTIAL DRIVE ODOMETRY	X Implemented		X Not WPILIB	X Menu Item	X Execution Opt	Test Routine Sample Program	VI Name DiffOdometry_Execute.vi DiffOdometry_Update.vi	Function Prototype pose2d update( rotation2d gyro, double leftdist, double right dist	Notes   DONT NEED
	^	X		^	^		Uniodonietry Opaate.Vi	posezu update( rotationzu gyro, double leitdist, double right dist	. <sub>Дин</sub> согрогатеѕ ennanced re
							, <del>-</del> ·	IIII O I I I I I I I I I I I I I I I I	
								diffDrOdom new( rotation gyro, pose initial )	
							1- 1	diffDrOdom new( rotation gyro, pose initial ) diffDrOdom new( rotation gyro ) void resetPosition( pose2d, rotation2d )	incorporated into "update
								diffDrOdom new( rotation gyro )	incorporated into "update"
DIFFERENTIAL DRIVE WHEEL SPEEDS	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program		diffDrOdom new( rotation gyro ) void resetPosition( pose2d, rotation2d ) pose2d getPoseMeters()  Function Prototype diffDrWheelSpeeds new()	incorporated into "update"
DIFFERENTIAL DRIVE WHEEL SPEEDS	5	Documented		X Menu Item	Execution Optim	Test Routine Sample Program		diffDrOdom new( rotation gyro ) void resetPosition( pose2d, rotation2d ) pose2d getPoseMeters()  Function Prototype	
DIFFERENTIAL DRIVE WHEEL SPEEDS	X	X		X	Optimized × Execution Optim	tine Test	VI Name DiffWheel_Normalize.vi	diffDrOdom new( rotation gyro ) void resetPosition( pose2d, rotation2d ) pose2d getPoseMeters()  Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new( double leftVel, double rightVel ) void normalize( double maxVel )	Notes
	Implemented X	Documented		Menu Item	otimized X Execution Optim	Test Sam	VI Name  DiffWheel_Normalize.vi	diffDrOdom new( rotation gyro ) void resetPosition( pose2d, rotation2d ) pose2d getPoseMeters()  Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new( double leftVel, double rightVel )	
DIFFERENTIAL DRIVE WHEEL SPEEDS  MECANUM DRIVE KINEMATICS	X X Implemented	X X Documented	Not WPILIB	X Menu Item	X   Execution Optimized X   Execution Optimi	tine Test	VI Name  DiffWheel_Normalize.vi  VI Name  MecaKinematics_New.vi  MecaKinematics_SetInverseKinematics.vi	diffDrOdom new( rotation gyro ) void resetPosition( pose2d, rotation2d ) pose2d getPoseMeters()  Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new( double leftVel, double rightVel ) void normalize( double maxVel )	Notes
	X Implemented	X X X	Not WPILIB	X Wenu Item	Optimized × Execution Optim	tine Test	VI Name DiffWheel_Normalize.vi  VI Name MecaKinematics_New.vi	diffDrOdom new( rotation gyro ) void resetPosition( pose2d, rotation2d ) pose2d getPoseMeters()  Function Prototype diffDrWheelSpeeds new() diffDrWheelSpeeds new( double leftVel, double rightVel ) void normalize( double maxVel )	

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SwerveKinematics ToSwerveModuleStatesZeroCenter.VI

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public SwerveModuleState[]

wheelStates)

toSwerveModuleStates(ChassisSpeeds chassisSpeeds)
public SwerveDriveKinematics(Translation2d... wheelsMeters)

public ChassisSpeeds toChassisSpeeds(SwerveModuleState...

variable parameters (replace with

variable parameters (replace with

array and "4" calls)

array and "4" calls)

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program ≤	Name	Function Prototype	Notes
POSE WITH CURVATURE	X	Χ		X	SI		Pos	seWithCurve_New.vi	public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter)	
									public PoseWithCurvature()	can use cluster constant
									public Pose2d poseMeters	not needed, use cluster unpack

Added computer vision utility							I			
									public double curvatureRadPerMeter	not needed, use cluster unpack
QUINTIC HERMITE SPLINE	X   X   X   X   X   X   X   X   X   X	X Documented	Not WPILIB	X   X   X   X   X   X   X   X   X   X	Execution Optimized	Test Routine		VI Name QuinticHermiteSpline_getControlVectorFromArrays.vi QuinticHermiteSpline_makeHermiteBasis.vi QuinticHermiteSpline_New.vi	private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yFinalControlVector)	Notes  not needed, use cluster unpack
SPLINE (Abstract class)	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine		VI Name Spline_getPoint.vi	Function Prototype public PoseWithCurvature getPoint(double t) Spline(int degree)	Notes
									public static class ControlVector	
									public ControlVector(double[] x, double[] y)	implemented as data structure
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		VI Name	Function Prototype private static Spline.ControlVector getCubicControlVector(double	Notes
SPLINE HELPER	X	X		X	SI			SplineHelp_GetCubicCtrlVector.vi	scalar, Pose2d point)	
	X	X		X		X		SplineHelp_GetCubicCtrlVectorsFromWayPts.vi	public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints( Pose2d start, Translation2d[] interiorWaypoints, Pose2d end)	
	X		X					SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi		
	X	X						SplineHelp_GetCubicSpline_Calc1.vi		internal
	X	X		No				SplineHelp_GetCubicSpline_Calc2.vi		internal
	X X	X	X	X	SI	X		SplineHelp_GetCubicSpline_Calc3.vi SplineHelp_getCubicSplinesFromControlVectors.vi SplineHelp_GetQuinticCtrlVector.vi	public static CubicHermiteSpline[] getCubicSplinesFromControlVectors( Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end)	internal
	, X	X		X	ા			opimeneip_detQuinticotrivector.vi	private static Spline.ControlVector getQuinticControlVector(double scalar, Pose2d point)	
								SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi	public static List <spline.controlvector> getQuinticControlVectorsFromWaypoints( List<pose2d> waypoints )</pose2d></spline.controlvector>	REMOVED 2762
								SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi		REMOVED 2762
	X	X		X				SplineHelp_getQuinticSplinesFromControlVectors.vi	public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors( Spline.ControlVector[] controlVectors)	
	X		X					SplineHelp_GetQuinticSplinesFromWeightedWayPts.vi		New 2762
	X	X		X				SplineHelp_GetQuinticSplinesFromWayPts.vi		New 2762
	X	X		No				SplineHelp_ThomasAlgorithm.vi	private static void thomasAlgorithm(double[] a, double[] b, double[] c, double[] d, double[] solutionVector)	linternal

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FRC Label W Trajectory Library - Vi Implementation List Review 2 X 1007/2022 - Address convoirs even utility  SPLINE PARAMETERIZE   X   X   X   X   X   Spring-from 1, Spring 10, T1, VI   public stells Lack-Pose Will Curvalure > parameterizer Spline spring, with the convoirs of the conv										
### PARAMETERIZER   Facility   Fa	FRC LabVIEW Trajectory Library – VI Implementation	ı List	t							
SPLINE PARAMETERIZER X X X X X X S SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 2 Till Y SplineParam, Spl	Revision 2.X 04/27/2022 – Added computer vision utility					Ø				
SPLINE PARAMETERIZER X X X X X X S SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 2 Till Y SplineParam, Spl						ize		_		
SPLINE PARAMETERIZER X X X X X X S SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 2 Till Y SplineParam, Spl						tim				
SPLINE PARAMETERIZER X X X X X X S SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 2 Till Y SplineParam, Spl		eq	þ	m		Ö	96			
SPLINE PARAMETERIZER X X X X X X S SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 2 Till Y SplineParam, Spl		ent	inte	7	me	2	ili c			
SPLINE PARAMETERIZER X X X X X X S SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 2 Till Y SplineParam, Spl		Ж	ĬĬ.	Ş	#	utic	B -	<u> </u>		
SPLINE PARAMETERIZER X X X X X X S SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 1 Till SplineParam, Spline 1, 2 Till Y SplineParam, Spl		βle	700	0 <i>t</i> 1	en	xec	est		F B	
TRAJECTORY  TRAJEC				_ ž		Ĥ	<u> </u>			
### Spline Pears, Spline Value   Spline Va	SPLINE PARAMETERIZER	X	X		X			SplineParam_Spline_T0_T1.vi		,
SpineParam StackPush vi   Internal   Inter		X	$\perp_X$		X		X	SplineParam Spline.vi	public static List <posewithcurvature> parameterize(Spline spline)</posewithcurvature>	
Representation   Repr									- 1 (1 1 /	
TRAJECTORY  TRAJEC										
TRAJECTORY  TRAJEC			X	X	No					
TRAJECTORY  TRAJEC		<u> X</u>	X	X	No			SplineParam_StackPush.vi		internal
TRAJECTORY  TRAJEC	·									
TRAJECTORY_STATE X X X X X X X X X X X X X X X X X X X										
TRAJECTORY X X X X X X X T Trajectory Concentents with boolean equals (other obj.) FUTURE  X X X X X X X X X X X X X X X X X X X										
TRAJECTORY X X X X X X X T Trajectory Concentents with boolean equals (other obj.) FUTURE  X X X X X X X X X X X X X X X X X X X						ρe				
TRAJECTORY X X X X X X X T Trajectory Concentents with boolean equals (other obj.) FUTURE  X X X X X X X X X X X X X X X X X X X						nize		=		
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TRAJECTORY X X X X X X X T Trajectory Concentents with boolean equals (other obj.) FUTURE  X X X X X X X X X X X X X X X X X X X		len	Į,	Ž	μ	cnt	ď.			
TRAJECTORY X X X X X X X T Trajectory Concentents with boolean equals (other obj.) FUTURE  X X X X X X X X X X X X X X X X X X X		du	8	ζo	Je.	Ä	es	VI Name	Function Prototyne	Notes
Notes   Note	TRAJECTORY					4		-	T different foliotype	Notes
X	110.020.011								boolean equals( other obi )	FUTURE
X X X SI Trajectory_lerp_double_vi private static footble terp(double terpt/double						SI				
Trajectory_state   Function Prototype   Trajectory_state   Equals_vi   Trajectory_state   Equals_vi						SI				
Trajectory_lerp_Pose_vi									private static double lerp(double startValue, double endValue,	· · · · · · · · · · · · · · · · · · ·
X			ļ.,		١.,					
X		X	X		No	SI		Trajectory_lerp_Pose.vi		internal
X		X	X		X	SI		Trajectory New Empty.vi	double ()	
Trajectory RelativeTo, vi   public Trajectory relativeTo(Pose2d pose)									public Trajectory(final List <state> states)</state>	
Trajectory_Sample vi   Sample (double timeSeconds)   Sample in reverse order. Negate sample.										
TRAJECTORY_STATE    X   X   X   X   X   X   X   X   X		X								
Trajectory_TransformBy.vi   State interpolate (State end/Value, double i)   State (double timeSeconds, double   Notes   State (double timeSeconds, double   Notes										
TRAJECTORY_STATE    X   X   S		<u></u>	1							
TRAJECTORY_STATE		_X_	X		X			Trajectory_TransformBy.vi		
TRAJECTORY_STATE    X									public Pose2d getInitialPose()	can use cluster unpack, array index
TRAJECTORY_STATE    X										
TRAJECTORY_STATE    X						Ø				
TRAJECTORY_STATE    X						ijξ		_		
TRAJECTORY_STATE    X						tin				
TRAJECTORY_STATE         X         X         X         SI         TrajectoryState_Equals.vi         boolean equals( other obj )           X         X         X         X         X         SI         TrajectoryState_GetAll.vi           X         X         X         X         SI         TrajectoryState_GetPose.vi           X         X         X         X         X         SIate interpolate(State endValue, double i)           X         X         X         X         SI         TrajectoryState_New.vi         public State(double timeSeconds, double		te d	eq.	В	~	ŏ	ne			
X         X         X         X         SI         TrajectoryState_Equals.vi         boolean equals( other obj )           X		eni	ent	Ĭ	eu	0	r Cfi			
X         X         X         X         SI         TrajectoryState_Equals.vi         boolean equals( other obj )           X		em	Ĕ	Ŋ	u It	inti	g .			
X         X         X         X         SI         TrajectoryState_Equals.vi         boolean equals( other obj )           X		ydu	100	of	len	Xe.	est	VI Nama	Function Drotatune	Notes
X         X         X         X         SI         TrajectoryState_GetAll.vi           X         X         X         SI         TrajectoryState_GetPose.vi           X         X         X         X         X         State interpolate(State endValue, double i)           X         X         X         SI         TrajectoryState_New.vi         public State(double timeSeconds, double	TRAIFOTORY OTATE						F (	y vi iname		Notes
X     X     X     SI     TrajectoryState_GetPose.vi       X     X     X     X     State interpolate(State endValue, double i)       X     X     X     SI     TrajectoryState New.vi     public State(double timeSeconds, double	IRAJECTORY_STATE		X		X	01			poolean equals( other obj.)	
X     X     X     X     TrajectoryState_Interpolate.vi     State interpolate(State endValue, double i)       X     X     X     SI     TrajectoryState New.vi     public State(double timeSeconds, double					\ \ \ \ \ \ \ \	01		TrajectoryState GetPose vi		
X X X SI TrajectoryState New.vi public State(double timeSeconds, double						31			State internolate(State end\/alue_double i)	
velocityMetersPerSecond, double						SI				
			^		^	J,			velocityMetersPerSecond, double	

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State interpolate(State endValue, double i)
public State(double timeSeconds, double
velocityMetersPerSecond, double
accelerationMetersPerSecondSq, Pose2d poseMeters, double
curvatureRadPerMeter)
public State()

ed computer vision utility									<del>_</del>	
, , ,	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
TRAJECTORY CONFIG	X	X		X	SI			TrajectoryConfig_Create.vi	public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq)	
	Χ	X	X	X	SI			TrajectoryConfig setCentripetalAccel.vi		
•	Χ	Χ		X	SI			TrajectoryConfig_setKinematicsDiffDrive.vi	public TrajectoryConfig setKinematics(DifferentialDriveKinematics kinematics)	
	X	Χ		X	SI			TrajectoryConfig_setKinematicsMecanumfDrive.vi	public TrajectoryConfig setKinematics(MecanumDriveKinematics kinematics)	
	X	X		X	SI			TrajectoryConfig_setKinematicsSwerveDrive.vi	public TrajectoryConfig setKinematics(SwerveDriveKinematics kinematics)	
	Χ	X		X	SI			TrajectoryConfig_setReversed.vi	public TrajectoryConfig setReversed(boolean reversed)	
	Χ	X	X	X	SI			TrajectoryConfig_setVoltageDiffDrive.vi		
									public TrajectoryConfig addConstraint(TrajectoryConstraint constraint)	Implemented differently, can't duplicate.
									public TrajectoryConfig addConstraints(List extends<br TrajectoryConstraint> constraints)	Implemented differently, can't duplicate.
									public double getStartVelocity()	can use cluster unpack
									public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond)	
									public double getEndVelocity()	can use cluster unpack
•									public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond)	
									public double getMaxVelocity()	can use cluster unpack
									public double getMaxAcceleration()	can use cluster unpack
									public List <trajectoryconstraint> getConstraints()</trajectoryconstraint>	Implemented differently, can't duplicate.
									public boolean isReversed()	can use cluster unpack
									NOTE ADD OTHER "SET" ROUTINES FOR OTHER	·

CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC.

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program Program	Function Prototype	Notes
TRAJECTORY GENERATE		X		X			TrajectoryGenerate_Make_Cubic_CtrlVect.vi	public static Trajectory generateTrajectory( Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config )</translation2d>	
	X	X		X			TrajectoryGenerate_Make_Cubic.vi	public static Trajectory generateTrajectory( Pose2d start, List <translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config)</translation2d>	uses cubic splines
	Χ	Χ	Χ	X			TrajectoryGenerate Make Generic.vi	Helper to bring these all together	Use this one!!!
	Χ	Χ		Х			TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory( ControlVectorList controlVectors, TrajectoryConfig config)	uses quintic splines
	Χ	Χ	Χ	X			TrajectoryGenerate_Make_Quintic_Weighted.vi		New 2762
	Χ	Χ		X			TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(List <pose2d> waypoints, TrajectoryConfig config)</pose2d>	uses quintic splines
	X	Χ		X			TrajectoryGenerate_splinePointsFromSplines.vi	public static List <posewithcurvature> splinePointsFromSplines(Spline∏ splines)</posewithcurvature>	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Opti Test Routine	Sample Progra	VI Name	Function Prototype	Notes
TRAJECTORY GENERATE (Control Vector)							pı	oublic ControlVectorList(int initialCapacity)	may not need, just data
· · · · · · · · · · · · · · · · · · ·								· · · · · · · · · · · · · · · · · · ·	may not need, just data

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								public ControlVectorList(Collection extends<br Spline.ControlVector> collection)	may not need, just data
					Q				
					Optimized ne	2			
	75	_			ptin	yrar			
	Implemented	Documented	-IB	3		Program			
	me	me	Not WPILIB	Menu Item	Execution Test Routi	)e			
	əjdu	ocn	o to	len	xec est	Sample	N/I No.	From African December 19	NI-4
TRAJECTORY PARAMETERIZ				No	<u>H</u> F	Ŋ	VI Name TrajectoryParam_calcStuffFwd.vi	Function Prototype	Notes
MADESTONTTANAMETERIZ	X			No			TrajectoryParam_calcStuffRev.vi		
	X	X		No			TrajectoryParam_enforceAccel.vi	private static void enforceAccelerationLimits(boolean reverse,	This routines needs to be changed
	X	X	X	No			TrajectoryParam_enforceVelocity.vi	List <trajectoryconstraint> constraints, ConstrainedState state)</trajectoryconstraint>	when new constraints are added.  This routines needs to be changed
									when new constraints are added.
	X	X		X			TrajectoryParam_timeParam.vi	public static Trajectory timeParameterizeTrajectory( List <posewithcurvature> points.</posewithcurvature>	
								List <trajectoryconstraint> constraints, double</trajectoryconstraint>	
								startVelocityMetersPerSecond, double	
								endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double	
								maxAccelerationMetersPerSecondSq, boolean reversed )	
					pe				
					Optimized ne	Ŗ			
	g	ō	~		Optii e	Sample Program			
	ente	nte	1.18	E G		Pro			
	эшe	ıme	Ν	u Ite	utic Ro	a/a			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Op Test Routine	am	VI Name	Function Protetune	Notes
TRAJECTORY PARAMETERIZE CONSTRAINED STAT				_ <b>≥</b> 	<u> </u>	<u>S</u>	ConstrainedState_New.vi	Function Prototype  ConstrainedState(PoseWithCurvature pose, double	Notes
		'`						distanceMeters, double maxVelocityMetersPerSecond, double	
								minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)	
	X	X	X	X			ConstrainedState SetMaxAccel.vi	maxAccelerationivietersPerSecondSq)	
	X	X	X	X			ConstrainedState_SetMinAccel.vi		
	X	X	X	X			ConstrainedState_SetVelAccel.vi		
	X	X	X	X			ConstrainedState_SetVelocity.vi	ConstrainedState()	
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	nen	nen	PIL	lten	tion	Θ			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Op Test Routine	lдш	VI Name		
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TRAJECTORY UT				X	V		TrajectoryUtil_fromPathWeaverJSON.vi	public static Trajectory fromPathweaverJson(Path path)	
	X						TrajectoryUtil_MakeWeightedWayPoint_ENG.vi TrajectoryUtil_MakeWeightedWayPoint.vi		
	X			X			TrajectoryUtil_toPathWeaverJSON.vi	public static void toPathweaverJson(Trajectory trajectory, Path	
								path) public static Trajectory deserializeTrajectory(String json)	
								public static Trajectory deserialize Trajectory(String json) public static String serializeTrajectory(Trajectory trajectory)	
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	Implemented	Documented	Not WPILI	Menu Item	Execution Op Test Routine	San	VI Name	Function Prototype	Notes
TRAPEZOID PROFIL		X		X			TrapProfConstraint_New.vi		
	X	X		X			TrapProfile_Calculate.vi		
	X	X		No			TrapProfile_Direct.vi		Private, remove from menu

X	X	X	X		TrapProfile Execute.vi	
X	Х	X	X	SI	TrapProfile_Execute_AtGoal.vi	
X	X	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	X		TrapProfile_IsFinished.vi	
Χ	X	)	X		TrapProfile_New_DefInitial.vi	
X	X		X		TrapProfile_New.vi	
Χ	X	Λ.	lo		TrapProfile_ShouldFlipAcceleration.vi	Private, remove from menu
X	X		X		TrapProfile_TimeLeftUntil.vi	
X	X		X		TrapProfile_TotalTime.vi	
X	X		X		TrapProfState_Equals.vi	
X	X		X		TrapProfState_New.vi	

	Χ	X		X				rapProfState_Equals.vi		
	Χ	Χ		Χ				rapProfState_New.vi		
'======= TRAJECTORY CONSTRAINT										
CENTRIPETAL ACCELERATION CONSTRAINT	X   Implemented		Not WPILIB	X Menu Item	(S) Execution Optimized	Test Routine	(	poseMeters, double curvelocityMetersPerSeco CentripetalAccelConstraint_getMinMaxAccel.vi  CentripetalAccelConstraint New.vi  poseMeters, double curvelocityMetersPerSeco public MinMax getMinMaxAcceleration double curvatureRadPerCentripetalAccelConstraint New.vi  public CentripetalAccel	/elocityMetersPerSecond(Pose2d urvatureRadPerMeter, double ond)  nMetersPerSecondSq(Pose2d poseMeters, terMeter, double velocityMetersPerSecond)	Notes  Can use cluster pack for now
DIFF DRIVE KINEMATIC CONSTRAINT		X Documented	Not WPILIB	X Menu Item	الله Execution Optimized	Test Routine		/I Name Function Prototype DiffDriveKinematicsConstraint_getMaxVelocity.vi public double getMaxVelocity.vi poseMeters, double curvelocityMetersPerSeco DiffDriveKinematicsConstraint_getMinMaxAccel.vi public MinMax getMinMaxAcceleration double curvatureRadPerDiffDriveKinematicsConstraint_New.vi public DifferentialDriveFinematicsConstraint_New.vi	/elocityMetersPerSecond(Pose2d urvatureRadPerMeter, double ond) nMetersPerSecondSq(Pose2d poseMeters, erMeter, double velocityMetersPerSecond) eKinematicsConstraint(final atics kinematics, double	Notes
DIFF DRIVE VOLTAGE CONSTRAINT	X Implemented		Not WPILIB	X Menu Item	S Execution Optimized	Test Routine		poseMeters, double curvelocityMetersPerSeco  DiffDriveVoltageConstraint_getMinMaxAccel.vi  DiffDriveVoltageConstraint New.vi  poseMeters, double curvelocityMetersPerSeco public MinMax getMinMaxAcceleration double curvatureRadPe	/elocityMetersPerSecond(Pose2d urvatureRadPerMeter, double ond) nMetersPerSecondSq(Pose2d poseMeters, erMeter, double velocityMetersPerSecond)	Notes
	^	^		^	- Ji			DifferentialDriveVoltage	eConstraint(SimpleMotorFeedforward alDriveKinematics kinematics, double	

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Function Prototype

Notes

Menu Item

X	X	X	X		Util_Array_PoseWCurv_to_XY.vi	
X	X	Χ	X	SI	Util_CalcDist.vi	
X	X	Χ	X	SI	Util_GetLibraryVersion.vi	
X	X	Χ	Χ	SI	Util_GetLibUsage.vi	
Χ	X	Χ	Χ		Util_GetTime.vi	Once tested completely, this should be optimized!
X	X	Χ	No	N/A	Util_LibraryGlobals.vi	Global Variables – no block diag.
X	X	Χ	X		Util_Trajectory_Absolute_To_Relative.vi	
X	X	X	X		Util_Trajectory_ReadFile.vi	
X	X	X	X		Util_Trajectory_to_XY.vi	
X	X	X	No		Util_Trajectory_WriteFile_Config.vi	internal
X	X	Χ	No		Util_Trajectory_WriteFile_OneState.vi	internal
X	X	Χ	Χ		Util_Trajectory_WriteFile_PathFinder.vi	
X	X	X	No		Util_Trajectory_WriteFile_PathFinderConfig.vi	internal
X	X	X	X		Util_Trajectory_WriteFile_Pathweaver.vi	
X	X	Χ	No		Util_Trajectory_WriteFile_States.vi	internal
X	X	Χ	No		Util_Trajectory_WriteFile_WayPoints.vi	internal
X	X	Χ	Χ		Util_Trajectory_WriteFile.vi	
X	X	Χ	X		Util_TrajectoryState_Meters_To_Inches.vi	
X	X	Χ	X		Util_TrajState_to_DiffDrive_WheelPos.vi	
X	X	Χ	Χ		Util_Waypoint_Eng_To_SI.vi	
X	X	Χ	Χ		Util_Waypoint_To_CubicInput.vi	
X	X	Χ	Χ		Util_Waypoint_To_QuinticInput.vi	
X	X	Χ	Χ		Util_WeightedWaypiont_Eng_To_WeightedWaypoint	
X	X	X	No		Util_WeightedWayPoint_To_WeightedWayPoint.vi	Sorry about the confusing name

'======== CONVERSIONS

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
CONV	Χ	Χ	Χ	X	SI			Conv_AngleDegrees_Heading.vi		
	X	X	X	X	SI			Conv_AngleRadians_Heading.vi		
	Χ	Χ	Χ	X	SI			Conv_Centimeters_Meters.vi		
	Χ	Χ	X	X	SI			Conv_Deg_Radians.vi		
	Χ	Χ	X	X	SI			Conv_Feet_Meters.vi		
	Χ	Χ	X	X	SI			Conv_GyroDegrees_Heading.vi		
	Χ	Χ	X	X	SI			Conv_Heading_AngleRadians.vi		
	X	X	X	X	SI			Conv_Inches_Meters.vi		
	Χ	Χ	X	X	SI			Conv_Kilograms_Pounds.vi		
	Χ	X	X	X	SI			Conv_Meters_Feet.vi		
	Χ	Χ	X	X	SI			Conv_Meters_Inches.vi		
	Χ	Χ	Χ	X	SI			Conv_POSE_SI_Eng.vi		
	Χ	Χ	X	X	SI			Conv_Pounds_Kilograms.vi		
	Χ	Χ	X	Χ	SI			Conv_Radians_Deg.vi		
	X	X	X	X	SI			Conv_Yards_Meters.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	NI Name	Function Prototype	Notes
UNITS	Χ	Χ		X	SI		Units_DegreesToRadians.vi		
	X	Χ		Χ	SI		Units_FeetToMeters.vi		
	Χ	Χ		Χ	SI		Units_InchesToMeters.vi		
	Χ	Χ		X	SI		Units_MetersToFeet.vi		

Revision 2.X 04/27/2022 – Added computer vision utility

V	V	V	SI	Units MetersToInches.vi
_ ^	_ ^ _	_ ^	31	Office_ivideters for inches.vi
X	X	X	SI	Units_MillisecondsToSeconds.vi
X	X	X	SI	Units_RadiansPerSecondToRotationsPerMinute.vi
X	X	X	SI	Units_RadiansToDegrees.vi
X	X	X	SI	Units_RotationsPerMinuteToRadiansPerSecond.vi
X	X	X	SI	Units SecondsToMilliseconds.vi

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PATHFINDER UTIL

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

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'===== STATE SPACE MODEL

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimizea	Test Routine	Sample Program  amen  am		Function Prototype	Notes	Code Review	Test Program	Error Checking
DC MOTOR	X	X		X	SI			r_GetAndymark9015.vi					
	Χ	X		X	SI			r_GetAndymarkRs775_125.vi					
	Χ	X		X	SI			r_GetBag.vi					
	Χ	Χ		Χ	SI			r_GetBanebotsRs550.vi					
	Χ	X		X	SI			r_GetBanebotsRs775.vi					
	Χ	X		Χ	SI			r_GetCIM.vi					
	Χ	X		Χ	SI			r_GetCurrent.vi					
	Χ	Χ		Χ	SI			r_GetFalcon500.vi					
	Χ	X		Χ	SI			r_GetMiniCIM.vi					
	Χ	X		X	SI			r_GetNEO.vi					
	Χ	X		Χ	SI			r_GetNEO550.vi					
	Χ	X		Χ	SI			r_GetRomiBuiltIn.vi					
	Χ	X		Χ	SI			r_GetVex775Pro.vi					
	Χ	X		Χ	SI		DCMotor_						
	Χ	X		X	SI		DCMotor_	r_PickMotor.vi					

Execution Optii Test Routine Not WPILIB Menu Item Function Prototype Notes LinearSystemId\_CreateDriveTrainVelocitySystem.vi LINEAR SYSTEM ID X X Χ Update to use create matrix XX Χ LinearSystemId\_CreateElevatorSystem.vi Update to use create matrix XX Χ LinearSystemId\_CreateFlywheelSystem.vi Update to use create matrix XX Χ LinearSystemId\_CreateSingleJointedArmSystem.vi Update to use create matrix LinearSystemId\_IdentifyDriveTrainSystem.vi XX Χ Update to use create matrix

X	X	Х	LinearSystemId_IdentifyPositionSystem.vi	Update to use create matrix		
X	X	X	LinearSystemId_IdentifyVelocitySystem.vi	Update to use create matrix		1

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

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DIFFERENTIAL DRIVE POSE ESTIMATOR		X			DiffDrivePoseEst_AddVisionMeasurement.vi					
	XX	X			DiffDrivePoseEst_FillStateVector.vi					
	X X X X	X			DiffDrivePoseEst_GetEstimatedPosition.vi DiffDrivePoseEst Kalman F Callback.vi					
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$	$\frac{1}{x}$			DiffDrivePoseEst_Kalman_F_Caliback.vi					
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$	$\frac{1}{x}$			DiffDrivePoseEst New.vi					
	X X				DiffDrivePoseEst ResetPosition.vi					
	XX				DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi					
	XX	X			DiffDrivePoseEst_Update.vi					
	XX	X			DiffDrivePoseEst_UpdateWithTime.vi					
	XX	X			DiffDrivePoseEst_VisionCorrect_Callback.vi					
	XX	X			DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi					
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EVTENDED MAI MAN FU TED					ExtendedKalmanFilter_Correct_OnlyUY.vi	T unction i rototype	140103			
					Exteriordinarii iitor Correct Crinyo i .vi					
EXTENDED KALMAN FILTER							Just a shell, not functional!			
EXTENDED RALMAN FILTER	XX	X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter GetP Single.vi		Just a shell, not functional!			
EXTENDED RALMAN FILTER	X X X X X X	X X X					Just a shell, not functional!			
EXTENDED RALMAN FILTER	X   X   X   X   X   X   X   X   X   X	X X X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi		Just a shell, not functional!			
EXTENDED RALMAN FILTER	X   X   X   X   X   X   X   X   X   X	X X X X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi		Just a shell, not functional!			
EXTENDED RALMAN FILTER	X X X X X X X X X X X X	X X X X X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi		Just a shell, not functional!			
EXTENDED RALMAN FILTER	X X X X X X X X X X X X	X   X   X   X   X   X   X   X   X   X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi		Just a shell, not functional!			
EXTENDED RALMAN FILTER	X X X X X X X X X X X X X X X X	X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi		Just a shell, not functional!			
EXTENDED RALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Reset.vi ExtendedKalmanFilter_SetP.vi		Just a shell, not functional!			
EXTENDED RALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Reset.vi ExtendedKalmanFilter_SetP.vi ExtendedKalmanFilter_SetXHat_Single.vi		Just a shell, not functional!			
EXTENDED RALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Reset.vi ExtendedKalmanFilter_SetP.vi		Just a shell, not functional!			
EXTENDED RALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Reset.vi ExtendedKalmanFilter_SetP.vi ExtendedKalmanFilter_SetXHat_Single.vi		Just a shell, not functional!			
CATENDED RALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X			ExtendedKalmanFilter_Correct.vi ExtendedKalmanFilter_GetP_Single.vi ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter_GetXHat_Single.vi ExtendedKalmanFilter_GetXHat.vi ExtendedKalmanFilter_New.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Predict.vi ExtendedKalmanFilter_Reset.vi ExtendedKalmanFilter_SetP.vi ExtendedKalmanFilter_SetXHat_Single.vi		Just a shell, not functional!			
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EXTENDED RALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	tion Optimized	Routine	ExtendedKalmanFilter_Correct.vi  ExtendedKalmanFilter_GetP_Single.vi  ExtendedKalmanFilter_GetP.vi  ExtendedKalmanFilter_GetXHat_Single.vi  ExtendedKalmanFilter_GetXHat.vi  ExtendedKalmanFilter_New.vi  ExtendedKalmanFilter_Predict.vi  ExtendedKalmanFilter_Reset.vi  ExtendedKalmanFilter_SetP.vi  ExtendedKalmanFilter_SetXHat_Single.vi  ExtendedKalmanFilter_SetXHat_Vi		Just a shell, not functional!	Review	Program	Checking
EXTENDED RALMAN FILTER	X X X X X X X X X X X X X X X X X X X	X	tion Optimized	st Routine	ExtendedKalmanFilter_Correct.vi  ExtendedKalmanFilter_GetP_Single.vi  ExtendedKalmanFilter_GetP.vi  ExtendedKalmanFilter_GetXHat_Single.vi  ExtendedKalmanFilter_GetXHat.vi  ExtendedKalmanFilter_New.vi  ExtendedKalmanFilter_Predict.vi  ExtendedKalmanFilter_Reset.vi  ExtendedKalmanFilter_SetP.vi  ExtendedKalmanFilter_SetXHat_Single.vi  ExtendedKalmanFilter_SetXHat_vi			ode Review	st Program	ror Checking
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KALMAN FILTER	X   X   X   X   X   X   X   X   X   X	Not WPILIB	Execution Optimized	X Test Routine	ExtendedKalmanFilter_Correct.vi  ExtendedKalmanFilter_GetP_Single.vi  ExtendedKalmanFilter_GetP.vi  ExtendedKalmanFilter_GetXHat_Single.vi  ExtendedKalmanFilter_GetXHat.vi  ExtendedKalmanFilter_New.vi  ExtendedKalmanFilter_Predict.vi  ExtendedKalmanFilter_Reset.vi  ExtendedKalmanFilter_SetP.vi  ExtendedKalmanFilter_SetXHat_Single.vi  ExtendedKalmanFilter_SetXHat.vi	Function Prototype		Code Review	Test Program	_
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$\overline{X}$	X		X		LinearQuadraticRegulator_GetU_Single.vi					
X	X		X		LinearQuadraticRegulator GetU.vi					1
/	X		X X X X	X	LinearQuadraticRegulator_LatencyCompensate.vi		Routine exists, but it only has interger raise matrix to power.			
X	X		X X		LinearQuadraticRegulator_New_ELMS.vi LinearQuadraticRegulator_New_N.vi			+	<u> </u>	
X	X		٨		LinearQuadraticRegulator_New_N.vi LinearQuadraticRegulator_New_Raw.vi					
V	X		Y	X				+		
X Y	X		^ X	^	LinearQuadraticRegulator_New_SystemeLivis.vi			+		
X	$\frac{\lambda}{X}$		X X X		LinearQuadraticRegulator_Reset.vi			+		
					J					

nputer vision utility	Implemented	umen	NOI WFILIB	Menu Item	ecniic	est Routine	NI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM	Χ	X		X	l l		LinearSystem_CalculateX.vi					
	Χ	X		X	1		LinearSystem_CalculateY.vi					
	Χ	X			3/		LinearSystem_GetA.vi					
	Χ	X			3/		LinearSystem_GetAElement.vi					
	X	X			3/		LinearSystem_GetB.vi					
	X	X		$X \mid S$	3/		LinearSystem_GetBElement.vi					
	X	X			SI		LinearSystem_GetC.vi					
	X	X		$X \mid S$	3/		LinearSystem_GetCElement.vi					
	Χ	X		X = S	SI		LinearSystem_GetD.vi					
	X	X		X 3	3/		LinearSystem_GetDElement.vi					
	Χ	X		X 3	3/		LinearSystem_New.vi					
											·	
									·			

	Implemented	Documented	Not WPILIB	Menu Item	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM LOOP	Χ	X		X			LinearSystemLoop_ClampInput.vi					
	Χ	Χ		X			LinearSystemLoop_Correct.vi					
							LinearSystemLoop_GetClampFunction.vi					
		X		Χ			LinearSystemLoop_GetController.vi					
	Χ	X		X			LinearSystemLoop_GetError_Single.vi					
	Χ	Χ		Χ			LinearSystemLoop_GetError.vi					
	Χ	Χ		X			LinearSystemLoop_GetFeedForward.vi					
	Χ	Χ		X			LinearSystemLoop_GetNextR_Single.vi					
	Χ	Χ		Χ			LinearSystemLoop_GetNextR.vi					
	Χ	Χ		X			LinearSystemLoop_GetObserver.vi					
	Χ	Χ		Χ			LinearSystemLoop_GetU_Row.vi					
	Χ	Χ		X			LinearSystemLoop_GetU.vi					
	Χ	Χ		X			LinearSystemLoop_GetXHat_Single.vi					
	Χ	Χ		X			LinearSystemLoop_GetXHat.vi					
							LinearSystemLoop_New_BBB					
							LinearSystemLoop_New_LinearSystem_ClampFunc					
		Χ		X			LinearSystemLoop_New_LinearSystem_ClampVal.vi					
	Χ	Χ		X			LinearSystemLoop_New.vi					
	Χ	Χ		X			LinearSystemLoop_Predict.vi					
	Χ	Χ		X			LinearSystemLoop_Reset.vi					
							LinearSystemLoop_SetClampFunction.vi					
							LinearSystemLoop_SetNextR_Some.vi					
	Χ	X		X			LinearSystemLoop_SetNextR.vi					
							LinearSystemLoop_SetXHat_Single.vi					
							LinearSystemLoop_SetXHat.vi					

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

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Opt	Test Routine	Sample Programme	Function Prototype	Notes	Code Review	Test Program	Error Checkin
CALLBACK HELPER	X	X	X	X			CallbackHelp_MatrixMinus.vi					
	Χ	X	X	X			CallbackHelp_MatrixMult_CoerceSizeB.vi					
	X	X	X	X			CallbackHelp_MatrixMult.vi					
	X	X	X	X			CallbackHelp_MatrixPlus.vi					

	Implemented	Documented	Menu Item	Execution Optimiz	Test Routine	Sample Program Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
DISCRETIZATION	X	X	X		Χ	Discretization_DiscretizeA.vi					
	X	X	X		X	Discretization_DiscretizeAB.vi					
	X	X	X		X	Discretization_DiscretizeABTaylor.vi					
	X	X	X		X	Discretization_DiscretizeAQ.vi					
	X	X	X		X	Discretization_DiscretizeAQTaylor.vi					
	X	X	X			Discretization_DiscretizeR.vi					

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

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

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

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 04/27/2022 - Added computer vision utility Optin Test Routine Not WPILIB Menu Item Function Prototype VI Name Notes DC MOTOR SIM X X DCMotorSim\_getAngularPositionRad.vi Χ DCMotorSim\_getAngularPositionRotations.vi Χ X Χ DCMotorSim\_getAngularVelocityRadPerSec.vi Χ Χ Χ Χ X Χ DCMotorSim\_getAngularVelocityRPM.vi Χ X Χ DCMotorSim GetCurrentDrawAmps.vi Χ X Χ DCMotorSim New MOI.vi X  $X \mid X$ DCMotorSim New Plant.vi XX Χ DCMotorSim SetInputVoltage.vi X X DCMotorSim Update.vi X Routine Not WPILIB Menu Item VI Name Function Prototype Notes DIFFERENTIAL DRIVE TRAIN SIM X DiffDriveTrainSim\_ClampInput.vi Χ Χ Χ X DiffDriveTrainSim CreateKitbotSim EstMass.vi Χ X Χ DiffDriveTrainSim CreateKitbotSim EstMassMOI.vi X X Χ DiffDriveTrainSim CreateKitbotSim.vi  $X \mid X$ Χ DiffDriveTrainSim GetCurrentDrawAmps.vi X Χ Χ DiffDriveTrainSim\_GetCurrentGearing.vi X X DiffDriveTrainSim GetDynamics.vi X XX Χ DiffDriveTrainSim GetHeading.vi XX Χ DiffDriveTrainSim GetLeftCurrentDrawAmps.vi XX DiffDriveTrainSim\_GetLeftPositionMeters.vi Χ XX Χ DiffDriveTrainSim\_GetLeftVelocityMetersPerSecond.vi XX Χ DiffDriveTrainSim\_GetOutput\_Single.vi XX Χ DiffDriveTrainSim GetPose.vi XX Χ DiffDriveTrainSim GetRightCurrentDrawAmps.vi XX Χ DiffDriveTrainSim\_GetRightPositionMeters.vi XX Χ DiffDriveTrainSim\_GetRightVelocityMetersPerSecond.vi XX X DiffDriveTrainSim GetState Single.vi  $X \mid X$ Χ DiffDriveTrainSim GetState.vi DiffDriveTrainSim KitBotWheelSize.vi  $X \mid X$ Χ DiffDriveTrainSim New Mass MOI.vi  $X \mid X$ Χ  $X \mid X$ X DiffDriveTrainSim New.vi XX X DiffDriveTrainSim SetCurrentGearing.vi XX Χ DiffDriveTrainSim\_SetInputs.vi XX Χ DiffDriveTrainSim SetPose.vi X XΧ DiffDriveTrainSim\_SetState.vi Χ DiffDriveTrainSim\_ToughBoxMiniGearRatio.vi Χ Χ X DiffDriveTrainSim\_ToughBoxMiniMotor.vi Χ X X DiffDriveTrainSim Update.vi X X Routine Not WPILIB Menu Item VI Name Function Prototype Notes ELEVATOR SIM X X ElevatorSim\_GetCurrentDraw.vi Χ

ElevatorSim\_GetPositionMeters.vi

ElevatorSim GetVelocityMetersPerSecond.vi

 $X \mid X$ 

XX

Χ

04/27/2022 – Added computer vision utility	XX	X			ElevatorSim HasHitLowerLimit.vi					
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\frac{\lambda}{X}$			ElevatorSim_HasHitUpperLimit.vi					
					ElevatorSim_New_LinSys_NoNoise.vi					
					ElevatorSim_New_LinSys.vi					
					ElevatorSim_New_NoNoise.vi					
	XX	X			ElevatorSim_New.vi					
		X No			ElevatorSim_RKF45_Func.vi					
	X X X X	X			ElevatorSim_SetInputVoltage.vi ElevatorSim_SetState.vi					
		X X			ElevatorSim_Update.vi		Needed because this doesn't			
	^   ^	^   ^			Lievatoroim_opuate.vi		extend.			
	XX	X			ElevatorSim_UpdateX.vi					
	XX	X			ElevatorSim_WouldHitLowerLimit.vi					
	XX	X			ElevatorSim_WouldHitUpperLimit.vi					
	Implemented Documented	Not WPILIB Menu Item	Execution Optimize	Test Routine Sample Program	VI Name			Code Review	Test Program	
			<u> </u>	N N	VI Name	Function Prototype	Notes	<u>ŏ</u>	<u> </u>	
FLYWHEEL S	X X	X			FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetAngularVelocityRPM.vi					
	XX	$\frac{\lambda}{X}$			FlyWheelSim_GetCurrentDrawAmps					
	^ ^	^			FlyWheelSim_New_LinSys		Future			
					FlyWheelSim_New_LinSys_MOI_NoNoise		Future			
					FlyWheelSim_New_LinSys_NoNoise		Future			
	XX	X			FlyWheelSim_New_MOI.vi					
	XX	X			FlyWheelSim_SetInput.vi					
	XX	X			FlyWheelSim_SetState.vi					
	XX	X								
	X X	^	pe		FlyWheelSim_Update.vi					
			Optimized	tine				view	yram	
			Optimized	Routine le Program				Review	rogram	
			Optimized	t Rout nple P				de Review	st Program	
	Implemented Documented		Optimized	t Rout nple P	VI Name	Function Prototype	Notes	Code Review	Test Program	
LINEAR SYSTEM S	Implemented Documented		Execution Optimized	t Rout nple P	VI Name LinearSystemSim_ClampInput.vi	Function Prototype		<u>e</u>	Test Program	
LINEAR SYSTEM S	X Implemented X Documented	Not WPILIB  X Menu Item	Execution Optimized	t Rout nple P	VI Name LinearSystemSim_ClampInput.vi LinearSystemSim_GetCurrentDrawAmps.vi	Function Prototype	Notes  DONT IMPLEMENT	<u>e</u>	Test Program	
LINEAR SYSTEM S	MIS   MIS   MIS   X   X   X   MIS   X   X   X   Documented	Not WPILIB X X Menu Item	Execution Optimized	t Rout nple P	VI Name  LinearSystemSim_ClampInput.vi  LinearSystemSim_GetCurrentDrawAmps.vi  LinearSystemSim_GetOutput_Single.vi	Function Prototype		<u>e</u>	Test Program	
LINEAR SYSTEM S	MISS X X Implemented X X X Documented	Not WPILIB X X Menu Item	Execution Optimized	t Rout nple P	VI Name  LinearSystemSim_ClampInput.vi  LinearSystemSim_GetCurrentDrawAmps.vi  LinearSystemSim_GetOutput_Single.vi  LinearSystemSim_GetOutput.vi	Function Prototype		<u>e</u>	Test Program	
LINEAR SYSTEM S	MIS   MIS   MIS   X   X   X   MIS   X   X   X   Documented	Not WPILIB X X Menu Item	Execution Optimized	t Rout nple P	VI Name  LinearSystemSim_ClampInput.vi  LinearSystemSim_GetCurrentDrawAmps.vi  LinearSystemSim_GetOutput_Single.vi  LinearSystemSim_GetOutput.vi  LinearSystemSim_GetOutput.vi	Function Prototype		<u>e</u>	Test Program	
LINEAR SYSTEM S	Mis X X X N X X X X X X X X X X X X X X X X X X X	Not WPILIB X X Menu Item	Execution Optimized	t Rout nple P	VI Name  LinearSystemSim_ClampInput.vi  LinearSystemSim_GetCurrentDrawAmps.vi  LinearSystemSim_GetOutput_Single.vi  LinearSystemSim_GetOutput.vi  LinearSystemSim_New  LinearSystemSim_New  LinearSystemSim_New_NoNoise.vi	Function Prototype	DONT IMPLEMENT	<u>e</u>	Test Program	
LINEAR SYSTEM S	Mis X X Missemented X X X X X X X X X X X X X X X X X X X	Not WPILIB X X Menu Item	Execution Optimized	t Rout nple P	VI Name  LinearSystemSim_ClampInput.vi  LinearSystemSim_GetCurrentDrawAmps.vi  LinearSystemSim_GetOutput_Single.vi  LinearSystemSim_GetOutput.vi  LinearSystemSim_New  LinearSystemSim_New_NoNoise.vi  LinearSystemSim_New_NoNoise.vi  LinearSystemSim_SetInput_Array.vi	Function Prototype		<u>e</u>	Test Program	
LINEAR SYSTEM S	Missing 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	Execution Optimized	t Rout nple P	VI Name LinearSystemSim_ClampInput.vi LinearSystemSim_GetCurrentDrawAmps.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_GetOutput.vi LinearSystemSim_New LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput.vi	Function Prototype	DONT IMPLEMENT	<u>e</u>	Test Program	
LINEAR SYSTEM S	Missing the state of the state	X Wenu Item	Execution Optimized	t Rout nple P	VI Name LinearSystemSim_ClampInput.vi LinearSystemSim_GetCurrentDrawAmps.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_GetOutput.vi LinearSystemSim_New LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput.vi LinearSystemSim_SetInput.vi	Function Prototype	DONT IMPLEMENT	<u>e</u>	Test Program	
LINEAR SYSTEM S	Missing X X X X X X X X X X X X X X X X X X X	X Wenu Item	Execution Optimized	t Rout nple P	VI Name LinearSystemSim_ClampInput.vi LinearSystemSim_GetCurrentDrawAmps.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_GetOutput.vi LinearSystemSim_New LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput.vi LinearSystemSim_SetInput.vi LinearSystemSim_Setstate.vi LinearSystemSim_Update.vi	Function Prototype	DONT IMPLEMENT	<u>e</u>	Test Program	
LINEAR SYSTEM S	MIS	Not WPILIB  X X X X X X X X X X X X X X X X X X	Execution Optimized	t Rout nple P	VI Name LinearSystemSim_ClampInput.vi LinearSystemSim_GetCurrentDrawAmps.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_GetOutput.vi LinearSystemSim_New LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput.vi LinearSystemSim_Setstate.vi LinearSystemSim_Update.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi	Function Prototype	DONT IMPLEMENT	<u>e</u>	Test Program	
LINEAR SYSTEM S	Missing 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	Execution Optimized	t Rout nple P	VI Name LinearSystemSim_ClampInput.vi LinearSystemSim_GetCurrentDrawAmps.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_GetOutput.vi LinearSystemSim_New LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput.vi LinearSystemSim_SetInput.vi LinearSystemSim_Setstate.vi LinearSystemSim_Update.vi	Function Prototype	DONT IMPLEMENT	<u>e</u>	Test Program	
LINEAR SYSTEM S	MISS X X X X X X X X X X X X X X X X X X	X Not X X X X X X X X X X X X X X X X X X X	Optimized Execution Optimized	utine Test Rout Sample P	VI Name  LinearSystemSim_ClampInput.vi LinearSystemSim_GetCurrentDrawAmps.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_GetOutput.vi LinearSystemSim_New LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput_vi LinearSystemSim_Setstate.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi LinearSystemSim_UpdateY.vi	Function Prototype	DONT IMPLEMENT	Code	Test	
LINEAR SYSTEM S	MISS X X X X X X X X X X X X X X X X X X	X Not X X X X X X X X X X X X X X X X X X X	Optimized Execution Optimized	utine Test Rout Sample P	VI Name  LinearSystemSim_ClampInput.vi LinearSystemSim_GetCurrentDrawAmps.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_GetOutput.vi LinearSystemSim_New LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput_vi LinearSystemSim_Setstate.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi LinearSystemSim_UpdateY.vi	Function Prototype	DONT IMPLEMENT	Review	Program	
LINEAR SYSTEM S	MISS X X X X X X X X X X X X X X X X X X	X Not X X X X X X X X X X X X X X X X X X X	Optimized Execution Optimized	utine Test Rout Sample P	VI Name  LinearSystemSim_ClampInput.vi LinearSystemSim_GetCurrentDrawAmps.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_GetOutput.vi LinearSystemSim_New LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput_vi LinearSystemSim_Setstate.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi LinearSystemSim_UpdateY.vi		Doesn't use clamp ?	Review	Program	
LINEAR SYSTEM S	Implemented  X X X X X X X X X X X X X X X X X X X	Not Wenu Item	Execution Optimized Execution Optimized	utine Test Rout Sample P	VI Name LinearSystemSim_ClampInput.vi LinearSystemSim_GetCurrentDrawAmps.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_GetOutput.vi LinearSystemSim_New LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput.vi LinearSystemSim_Setstate.vi LinearSystemSim_Update.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi	Function Prototype  Function Prototype	DONT IMPLEMENT	Code	Test	

X	X	Χ		SngJntArmSim_GetVelocityRadsPerSec.vi
X	X	Χ		SngJntArmSim_HasHitLowerLimit.vi
X	X	X		SngJntArmSim_HasHitUpperLimit.vi
X	X	X		SngJntArmSim_New.vi
X	X	No		SngJntArmSim_Rkf45_Func.vi
X	X	X		SngJntArmSim_SetInputVoltage.vi
X	X	X		SngJntArmSim_SetState.vi
X	X	X		SngJntArmSim_Update.vi
X	X	X		SngJntArmSim_UpdateX.vi
X	X	X		SngJntArmSim_WouldHitLowerLimit.vi
X	X	X		SngJntArmSim_WouldHitUpperLimit.vi

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

> | X | Menu Item | Secution Optin Function Prototype Notes MAT BUILDER X X MatBuilder\_Create.vi MatBuilder\_Fill.vi

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiza	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX	Χ	X		Χ	SI			Matrix_AssignBlock.vi					
	Χ	X		X	SI			Matrix_Block.vi					
								Matrix_ChangeBoundsUnchecked.vi					
	Χ	X		Χ	SI			Matrix_Create.vi					
								Matrix_Det.vi					
	Χ	X		Χ	SI			Matrix_Diag.vi					
								Matrix_Div_Scalar.vi		labview has function			
								Matrix_ElementPower.vi					
	Χ	X		Χ	SI			Matrix_ElementSum.vi					
								Matrix_ElementTimes.vi					
								Matrix_Equals.vi					
	Χ	X		Χ	1			Matrix_Exp.vi					
	Χ	X		Χ	SI			Matrix_ExtractColumnVector.vi					
	Χ	X		Χ	SI			Matrix_ExtractFrom.vi					
								Matrix_ExtractMatrix.vi					
	Χ	X		Χ	SI			Matrix_ExtractRowVector.vi					
	Χ	Χ		Χ	SI			Matrix_Fill.vi					
								Matrix_Get.vi		labview has function			
	Χ	X		Χ	1			Matrix_Ident.vi		WPILIB calls this EYE			
								Matrix_Inv.vi					
	Χ	X		Χ	SI			Matrix_IsEqual.vi					
								Matrix_IsIdentical.vi					
	Χ	X		Χ	1			Matrix_LLTDecompose.vi					
								Matrix_Max.vi					
								Matrix_MaxAbs.vi					
ļ								Matrix_Mean.vi					
								Matrix_MinInternal.vi					
								Matrix_Minus_Matrix.vi					
								Matrix_Minus_Scalar.vi					
	X	X		Χ	1			Matrix_NormF.vi					

				land the state of		T	1
				Matrix_NormIndP1.vi			
				Matrix_Plus_Matrix.vi			
				Matrix_Plus_Scalar.vi			
X	X	X	1	Matrix_Pow.vi	THIS NEEDS WORK!!!!		
X	X	X	SI	Matrix_SetColumn.vi			
Χ	X	X	SI	Matrix_SetRow.vi	THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT SHOULD BE INCLUDED HERE FOR ISOLATION.		
				Matrix_Solve.vi			
				Matrix_Times_Matrix.vi			
				Matrix_Times_Scalar.vi			
				Matrix_Trace.vi			
X	X	X	SI	Matrix_Transpose.vi			

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
SIMPLE MATRIX	X	X		X .	SI		SimpleMatrix_ExtractMatrix.vi		NOTE Matrix also has an ExtractMatrix with different calling parameters YUK.			

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX HELPER	X	X	X	X	SI		MatrixHelper_CooerceSize.vi					
	Χ	X	Χ	Χ	SI		MatrixHelper_MultCooerceBSize.vi					
	X	X	X	Χ	SI		MatrixHelper_Zero.vi					

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

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MATH

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22 – Added computer vision utility				~							
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	g	<i>\\ \</i>		Opti	Φ	gra			>	Ē	Checking
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	Implementea	Documented Not WPILIB	Menu Item	Execution	Test Routine	Sample Program			Code Review	Test Program	'or
		8	Ø	Ex	<u> 1</u> e		Function Prototype	Notes	ပိ	<u> 1</u> e	Error
ANGLE STATISTICS			X	X		AngleStats_AngleAdd_CallbackHelp.vi					
	X	X	X	1	X	AngleStats_AngleAdd.vi					
	X	XX	X	X		AngleStats_AngleMean_CallbackHelp.vi					
	X	X	X	1	X	AngleStats_AngleMean.vi					
		XX	X	X		AngleStats_AngleResidual_CallbackHelp.vi					
	X	X	X	1	Χ	AngleStats_AngleResidual.vi					
				_							
				ze a							
				mi		<u>g</u>					_
	Ø	77		Opti	a)	Program			\$	E	Checking
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	Je l	Jet PIL	Įŧ	tio!	70	Ø			٩	õ	Z)
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	Implementec	Documentec Not WPILIB	Menu Item	Execution	Test Routine	S VI Name	Function Prototype	Notes	Code Review	Test Program	Error
MATH UTILITY		$\frac{1}{X}$	$\overline{X}$		Т	MathUtil_AngleModulus.vi		110100			
MATTIOTIETT		$\frac{x}{x}$	$\frac{\lambda}{X}$			MathUtil_ApplyDeadband.vi					
	X	X	X	SI		MathUtil_Clamp_Int.vi					
		$\frac{X}{X}$	$\frac{1}{X}$			MathUtil_Clamp.vi					
		$\hat{X}$	$\frac{\lambda}{X}$			MathUtil_InputModulus.vi					
	X	X	$\frac{1}{X}$			MathUtil_Interpolate.vi					
		^	\ \ \ \	- Oi							
				.17							
	olemented	cumented t WPILIB	nu Item	ecution Optimiz	st Routine	mple Program			de Review	st Program	or Checking
	Implemented	Documented Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
MERWE SCALED SIGMA POINTS	_	X Documented Not WPILIB	X	- Execution		VI Name  MerweScSigPts_ComputeWeights.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
MERWE SCALED SIGMA POINTS	X	X X	X	S - Execution		VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
MERWE SCALED SIGMA POINTS	X X X	X X X	X	S S Execution		VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
MERWE SCALED SIGMA POINTS	X X X	X X X	X X X	S S P Execution		VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts GetWc.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
MERWE SCALED SIGMA POINTS	X X X	X X X	X X X X	S S P Execution		VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts_GetWc.vi  MerweScSigPts_GetWm_Single.vi	Function Prototype	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 X X X X	X X X X X	S S S S S S S S S S S S S S S S S S S		VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts_GetWc.vi  MerweScSigPts_GetWm_Single.vi  MerweScSigPts_GetWm_Single.vi	Function Prototype	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 X X X X X	X X X X X X	10   10   10   10   10   10   10   10		VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts_GetWc.vi  MerweScSigPts_GetWm_Single.vi  MerweScSigPts_GetWm.vi  MerweScSigPts_GetWm.vi  MerweScSigPts_New_Default.vi	Function Prototype	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 X X X X X X	X X X X X X X			VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts_GetWc.vi  MerweScSigPts_GetWm_Single.vi  MerweScSigPts_GetWm.vi  MerweScSigPts_New_Default.vi  MerweScSigPts_New.vi	Function Prototype	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 X X X X X	X X X X X X			VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts_GetWc.vi  MerweScSigPts_GetWm_Single.vi  MerweScSigPts_GetWm.vi  MerweScSigPts_GetWm.vi  MerweScSigPts_New_Default.vi	Function Prototype	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 X X X X X X	X X X X X X X			VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts_GetWc.vi  MerweScSigPts_GetWm_Single.vi  MerweScSigPts_GetWm.vi  MerweScSigPts_New_Default.vi  MerweScSigPts_New.vi	Function Prototype	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	X	Optimized Execution		WerweScSigPts_ComputeWeights.vi MerweScSigPts_GetNumSigmas.vi MerweScSigPts_GetWc_Single.vi MerweScSigPts_GetWc.vi MerweScSigPts_GetWm_Single.vi MerweScSigPts_GetWm.vi MerweScSigPts_New_Default.vi MerweScSigPts_New.vi MerweScSigPts_SigmaPoints.vi		Notes			Checking
	Implemented X X X X X X X X X X X X X X X X X X X	Not WPILIB	Menu Item	Execution Optimized \overline{\omega} \o		WerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts_GetWc_vi  MerweScSigPts_GetWm_Single.vi  MerweScSigPts_GetWm.vi  MerweScSigPts_New_Default.vi  MerweScSigPts_New.vi  MerweScSigPts_SigmaPoints.vi	Function Prototype	Notes	Code Review	Test Program	Error
	Implemented X X X X X X X X X X X X X X X X X X X	X	X	Execution Optimized \overline{\omega} \o		WerweScSigPts_ComputeWeights.vi MerweScSigPts_GetNumSigmas.vi MerweScSigPts_GetWc_Single.vi MerweScSigPts_GetWc.vi MerweScSigPts_GetWm_Single.vi MerweScSigPts_GetWm.vi MerweScSigPts_New_Default.vi MerweScSigPts_New.vi MerweScSigPts_SigmaPoints.vi	Function Prototype	Notes NOT USED. Should this be used			Checking
	X   X   X   X   X   X   X   X   X   X	X Documented X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	- Execution Optimized 9 9 9 9 9 - Execution		VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts_GetWc_vi  MerweScSigPts_GetWm_Single.vi  MerweScSigPts_GetWm.vi  MerweScSigPts_New_Default.vi  MerweScSigPts_New.vi  MerweScSigPts_SigmaPoints.vi	Function Prototype	Notes			Checking
	X   X   X   X   X   X   X   X   X   X	X Documented X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	- Execution Optimized 9 9 9 9 9 - Execution		VI Name  MerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts_GetWc_vi  MerweScSigPts_GetWm_Single.vi  MerweScSigPts_GetWm.vi  MerweScSigPts_New_Default.vi  MerweScSigPts_New.vi  MerweScSigPts_SigmaPoints.vi  ### Work	Function Prototype	Notes NOT USED. Should this be used			Checking
	X   X   X   X   X   X   X   X   X   X	X Documented X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	- Execution Optimized 9 9 9 9 9 - Execution		VI Name   MerweScSigPts_ComputeWeights.vi	Function Prototype	Notes NOT USED. Should this be used			Checking
	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	- Execution Optimized 9 9 9 9 9 - Execution		WerweScSigPts_ComputeWeights.vi MerweScSigPts_GetNumSigmas.vi MerweScSigPts_GetWc_Single.vi MerweScSigPts_GetWc_vi MerweScSigPts_GetWm_Single.vi MerweScSigPts_GetWm.vi MerweScSigPts_New_Default.vi MerweScSigPts_New.vi MerweScSigPts_SigmaPoints.vi  ### Word	Function Prototype	Notes NOT USED. Should this be used			Checking
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	- Execution Optimized 9 9 9 9 9 - Execution	Test Routine	VI Name   MerweScSigPts_ComputeWeights.vi   MerweScSigPts_GetNumSigmas.vi   MerweScSigPts_GetWc_Single.vi   MerweScSigPts_GetWc.vi   MerweScSigPts_GetWm_Single.vi   MerweScSigPts_GetWm.vi   MerweScSigPts_GetWm.vi   MerweScSigPts_New_Default.vi   MerweScSigPts_New.vi   MerweScSigPts_SigmaPoints.vi   MerweScSigPts_SigmaPoints.vi   MerweScSigPts_SigmaPoints.vi   MerweScSigPts_SigmaPoints.vi   MerweScSigPts_SigmaPoints.vi   MerweScSigPts_SigmaPoints.vi   MerweScSigPts_SigmaPoints.vi   MumIntegrate_Func_Ax_Bu_K.vi   NumIntegrate_Rk4_Dbl_X_U.vi   NumIntegrate_Rk4_Dbl_X.vi   NumIntegrate_Rk4_Mat_X_U.vi   NumIntegrate_Rk4_Mat_X_U.vi   NumIntegrate_Rk4_Mat_X_U.vi   NumIntegrate_Rk4_Mat_X.vi   NumIntegrate_Rk4_Mat_X.vi	Function Prototype	Notes NOT USED. Should this be used			Checking
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Test Routine	WerweScSigPts_ComputeWeights.vi MerweScSigPts_GetNumSigmas.vi MerweScSigPts_GetWc_Single.vi MerweScSigPts_GetWc_Vi MerweScSigPts_GetWm_Single.vi MerweScSigPts_GetWm.vi MerweScSigPts_New_Default.vi MerweScSigPts_New.vi MerweScSigPts_SigmaPoints.vi  WerweScSigPts_SigmaPoints.vi  ### VI Name    NumIntegrate_Func_Ax_Bu_K.vi   NumIntegrate_Rk4_Dbl_X_U.vi   NumIntegrate_Rk4_Mat_X_U.vi   NumIntegrate_Rk4_Mat_X_U.vi   NumIntegrate_Rk4_Mat_X.vi   NumIntegrate_Rk4_Mat_X.vi   NumIntegrate_Rk4_Mat_X.vi   NumIntegrate_Rk4_Mat_X.vi   NumIntegrate_Rkdp_Func_A.vi	Function Prototype	Notes NOT USED. Should this be used			Checking
		X Documented X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X No	9 9 9 9 9 9 1 Execution Optimized	Test Routine	WerweScSigPts_ComputeWeights.vi MerweScSigPts_GetNumSigmas.vi MerweScSigPts_GetWc_Single.vi MerweScSigPts_GetWm_Single.vi MerweScSigPts_GetWm_Vi MerweScSigPts_GetWm.vi MerweScSigPts_New_Default.vi MerweScSigPts_New.vi MerweScSigPts_SigmaPoints.vi  WerweScSigPts_SigmaPoints.vi	Function Prototype	Notes NOT USED. Should this be used			Checking
		X Documented X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X No N	20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Test Routine	WerweScSigPts_ComputeWeights.vi  MerweScSigPts_GetNumSigmas.vi  MerweScSigPts_GetWc_Single.vi  MerweScSigPts_GetWc_Vi  MerweScSigPts_GetWm_Single.vi  MerweScSigPts_GetWm.vi  MerweScSigPts_New_Default.vi  MerweScSigPts_New.vi  MerweScSigPts_SigmaPoints.vi  ### WorweScSigPts_SigmaPoints.vi  ### WorweScSigPts_Sigm	Function Prototype	Notes NOT USED. Should this be used			Checking

22 – Added computer vision utility								T				
	Χ	X		No	1		Numintegrate_Rkdp_Impl.vi					
	Χ	Χ		X			NumIntegrate_RKDP_Mat_X_U.vi		New replacement for RKF45			
	Χ	X		No	SI		NumIntegrate_Rkf45_Func_A.vi					
	X	X		No	SI		NumIntegrate_Rkf45_Func_B1.vi					
	X	X		No	SI		NumIntegrate_Rkf45_Func_B1B2.vi					
	Χ	X		No	SI		NumIntegrate_Rkf45_Func_B2.vi					
							NumIntegrate_RKf45_Func_Bs.vi		Removed. Replaced with newer functions.			
							NumIntegrate_RKf45_Func_Ch.vi		Removed. Replaced with newer			
							Null		functions.			
							NumIntegrate RKf45 Func Ct.vi		Removed. Replaced with newer			
									functions.			
	Χ	Χ			1		NumIntegrate_Rkf45_Impl.vi					
	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			
							NumIntegrate_RKf45_New.vi		Removed. Never used.			
	X	Χ	X	X	SI		NumIntegrate_Trap_Dbl.vi					
	X	X	X	Χ	1		NumIntegrate_Trap_Mat.vi					
RUNGE KUTTA TIME VARYING	X Implemented	X Documented	Not WPILIB	S Menu Item	Execution Optim	Sample Program	VI Name RungeKuttaTimeVarying_RK4_Mat_T_Y.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
NUMERICAL JACOBIAN	X X Implemented		Not WPILIB	X Menu Item		lest Koutine Sample Program	VI Name NumJacobian_U.vi NumJacobian_X.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
RICCATI	X	X X X X X X X X	Not WPILIB	X Wenu Item		X X lest Routine Sample Program	VI Name Riccati_Check_Detectable.vi Riccati_Check_Stabilizable.vi Riccati_DARE_Iterate.vi Riccati_DARE_N.vi Riccati_DARE.vi Riccati_Input_Check.vi	Function Prototype	Notes Routine exists, it is just a shell Not really done !!!	Code Review	Test Program	Error Checking

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

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2 – Added computer vision utility					Þ							
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
COMPUTER VISION UTILITIES	X	Χ					CompVisionUtil_CalculateDistanceToTarget.vi					
	X	Χ					CompVisionUtil_EstimateCameraToTarget.vi					
	X	Χ					CompVisionUtil_EstimateFieldToCamera.vi					
	X	Χ					CompVisionUtil_EstimateFieldToRobot.vi					
	X	X					CompVisionUtil_EstimateFieldToRobot_Alt.vi					

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optii Test Routine	Sample Progra	VI Name	Function Prototype	Notes
TypeDef	Ζ	Χ	X	X	N/A		ARM_FF.CTL		
	Ζ	Χ	X		N/A		BANG_BANG.CTL		
	١		X		N/A		BICon-Matrix_FUNC_TYPE.CTL		NOT USED. Should this be deleted or abandoned???
	Ζ	Χ			N/A		CALLBACK_FUNC_TYPE.CTL		
	Ζ	Χ	Χ	Χ	N/A		CHASSIS_SPEEDS.CTL		
	Ζ		X				CONTRAINED_STATE.CTL		
	Ζ	Χ			N/A		DCMOTOR_TYPES_ENUM.CTL		
	Ζ	Χ		Χ	N/A		DCMOTOR.CTL		
	Ζ	Χ			N/A		DCMOTOR_SIM.CTL		
	Ζ	Χ	X	X	N/A		DEBOUNCER_TYPE_ENUM.Ctl		
	Ζ	Χ	Χ		N/A		DEBOUNCER.CTL		
	Ζ	Χ			N/A		DIFF_DRIVE_KINEMATICS.CTL		
	Ζ	Χ		X	N/A		DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl		
	Ζ	Χ			N/A		DiFF_DRIVE_POSE_EST.ctl		
	Ζ	Χ			N/A		DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl		
	Ζ		Χ		N/A		DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl		
	Ζ	Χ			N/A		DIFF_DRIVE_TRAIN_SIM_STATE_ENUM.CTL		
	Ζ				N/A		DIFF_DRIVE_TRAIN_SIM.ctl		
	Ζ		Χ				DISPLAY_WAYPOINT.ctl		Was UTIL_WAYPOINT.VI
	Ζ	Χ	X	Χ	NA		DISPLAY_WEIGHTED_WAYPOINT.ctl		New V1.5. was UTIL_WEIGHTED_WAYPOINIT.VI
	Ζ	Χ	X	Χ	N/A		ELEV FF.CTL		
	Ζ	Χ	X	Χ	N/A		ELEVATOR SIM.CTL		
	Ζ	Χ	X	X	N/A		EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL		
	Ζ		X				ExTENDED_KALMAN_FILTER.CTL		
	Ζ	Χ			N/A		FLYWHEEL_SIM.ctl		
	Ζ	Χ			N/A		HOLONOMIC_DRV_CTRL.CTL		New 1/26/21
	Z	Χ			N/A		KALMAN_FILTER_LATENCY_COMP_FUNC_GROUP.CTL		
	Z		X	X	N/A		KALMAN_FILTER_LATENCY_COMP.CTL		
	Ζ	Χ	X	Χ	N/A		KALMAN_FILTER.ctl		
	Ζ	Χ			N/A		LINEAR_FILTER.CTL		
	Ζ	Χ	Χ	Χ	N/A		LINEAR_PLANT_INV_FF.ctl		
	Ζ	Χ			N/A		LINEAR_QUADRATIC_REGULATOR.ctl		
	Ζ	Χ	X	Χ	N/A		LINEAR_SYSTEM_LOOP.ctl		
	Z	X		X	N/A		LINEAR_SYSTEM_SIM.ctl		
	Z	Χ	X	Χ	N/A		LINEAR_SYSTEM.ctl		
	Z	Χ	X	X	N/A		MECA_DRIVE_KINEMATICS.CTL		
	Ζ				N/A		MECA_DRIVE_ODOMETRY.CTL		
	Ζ	X	Χ	X	N/A		MECA_WHEEL_SPEEDS.CTL		

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Z	X	X	X	N/A	MEDIAN_FILTER.CTL	
Z	Χ	Χ	X	N/A	MERWE_SCALED_SIGMA_PTS.ctl	
Z	X	Χ	X	N/A	OBSERVER SNAP LIST ITEM.CTL	
Z	Χ	Χ	Χ	N/A	OBSERVER SNAPSHOT.CTL	
Z	Χ	Χ		N/A	PARAM STACK ITEM.CTL	
Z	X	X		N/A	PARAM STACK.CTL	
Z	X	X		N/A	PID ADV LIMITS.CTL	
Z	X	X		N/A	PID ADV TUNING.CTL	
Z	X	X	X	N/A	PID CONTROLLER.CTL	
Z	X	X	X	N/A	PID_ERROR_TOLERANCE.CTL	
Z	$\hat{x}$	X		N/A	PID INPUT LIMITS.CTL	
Z	X	X	X	N/A	PID TUNING.CTL	
Z	$\hat{x}$	X		N/A	POSE2D.CTL	
Z	$\hat{x}$	X		N/A	POSEwCURVATURE.CTL	
Z	$\hat{x}$	X	X	N/A	PROFILED PID CONTROLLER.CTL	
	$\hat{X}$	$\hat{x}$	$\hat{X}$	N/A	RAMSETE EXE TUNING.CTL	
<u>Z</u>	X			N/A	RAMSETE_EXE_TONING.CTL  RAMSETE.CTL	
Z	X	X			ROTATION2D.CTL	
Z	X	X		N/A N/A	SIMPLE MOTOR FF.CTL	
Z	X	X		N/A	SINGLE_JOINT_ARM_SIM.CTL	
Z	X	X		N/A	SLEW_RATE_LIMITER.CTL	
Z	Χ	X	Χ	N/A	SPLINE_CTRL_VECTOR.CTL	
Z	X	X	X	N/A	SPLINE.CTL	
Z	Χ	Χ		N/A	SWERVE_DRIVE_KINEMATICS.CTL	
Ζ	Χ	Χ		N/A	SWERVE_DRIVE_MODULE_STATE.CTL	
Ζ	Χ	Χ		N/A	SWERVE_DRIVE_ODOMETRY.CTL	
Ζ	Χ	Χ		N/A	SWERVE_DRIVE_POSE_EST.CTL	
Z	Χ	X		N/A	TIMER.CTL	
Z	Χ	X		N/A	TRAJ_CONFIG.CTL	
Ζ	Χ	X		N/A	TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL	
Ζ	Χ	Χ		N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_KINEMATICS.CTL	
Z	Χ	Χ	Χ	N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_VOLTAGE.CTL	
1		Χ		N/A	TRAJ_CONSTRAINT_JERK.CTL	Routine exists, it is just a shell
Z	X	X	X	N/A	TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL	
Z	X	Χ		N/A	TRAJ_CONSTRAINT_MINMAX.CTL	
Ζ	Χ	Χ		N/A	TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	
Ζ	Χ	Χ			TRAJ_STATE.CTL	
Ζ	Χ	Χ		N/A	TRAJECTORY_SPLINE_TYPE_ENUM.CTL	
Ζ	Х	Χ		N/A	TRAJECTORY.CTL	
Ζ		Χ	Χ	N/A	TRANSFORM2D.CTL	
Ζ	X	X		N/A	TRANSLATION2D.CTL	
Ζ	X	Χ		N/A	TRAPEZOID PROFILE CONSTRAINT.CTL	
Ζ	X	X		N/A	TRAPEZOID PROFILE STATE.CTL	
Z	X	X		N/A	TRAPEZOID PROFILE.CTL	
Ζ	X	X		N/A	TWIST2D.CTL	
Z	X	X		N/A	UNSCENTED KALMAN CORRECT FUNC GROUP.CTL	
Z	X	X	X	N/A	UNSCENTED_KALMAN_FILTER.ctl	
Z	X	X		N/A	UNSCENTED KALMAN NEW FUNC GROUP.CTL	
Z		X		N/A	UTIL PATHFINDER CONFIG.CTL	
N/A		N/A		N/A	WAYPOINTS.CTL	Delete – obsolete
Z		X	Χ		WEIGHTED WAYPOINT.CTL	New V1.5
N/A		N/A	^	N/A	X Y HEADINGS.CTL	Delete – obsolete
1 4/ / 7		14//1		7 4/ / 1	/	

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