Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample.

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

VI / CTL Totals
VI Total (X)
CTL Total (Z)
VI Shell Total (/)
VTRL Shell Total (())

2

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

Doc completed Pct 84.36% Optimization Pct 41.13%

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

'===== BASE

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									•	
LINEAR FILTER∫	Implemented	X Documented	Not WPILIB	X Menu Item	ত Execution Optimized	Test Routine	Sample Program	VI Name LinearFilter Calculate.vi	Function Prototype	Notes
LINEAR FILTER	X	X	X		X			LinearFilter_CutoffFrequency.vi		
-	X	X	X	X	1		Х	LinearFilter Execute.vi		Labview style helper
	X	\hat{X}		X	X			LinearFilter_HighPass.vi		Labriew Style Helper
	X	X	Χ		X			LinearFilter HighPassBW1.vi		
	X	X	X	X	X			LinearFilter HighPassBW2.vi		
	Χ	X	X		Х			LinearFilter_LowPassBW1.vi		
	Χ	X	Χ	X	Χ			LinearFilter_LowPassBW2.vi		
	Χ	X		X	Χ			LinearFilter_MovingAverage.vi		
	Χ	Χ		X	1			LinearFilter_New.vi		
	Χ	Χ		Χ	SI			LinearFilter_Reset.vi		
	Χ	Χ	Χ		SI			LinearFilter_ResetToValue.vi		
	Χ	Χ		X	Χ			LinearFilter_SinglePoleIIR.vi		
	X	X	X	X	X			LinearFilter_TimeConst.vi		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
MEDIAN FILTER		X		X	X		, 	MedianFilter Calculate.vi	. a.ioaoii i ioacijpo	11000
	X	X	X		1		X	MedianFilter_Execute.vi		Labview style helper
	X	X		X	SI			MedianFilter New.vi		,,
	Χ	X		X	SI			MedianFilter_Reset.vi		
	Χ	X	Χ	X	SI			MedianFilter_ResetToValue.vi		

Revision 2.X	11/12/2021 – State Space Items – (This list is still missing one VI) Added additional columns for test and sample.
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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	VI Name	Function Prototype	Notes
SLEW RATE FILTER	X	X		X	1			SlewRateLimiter_Calculate.vi		
	X	X	X	X	SI			SlewRateLimiter_Close.vi		
	X	X	X	X	1		X	SlewRateLimiter_Execute.vi		Labview style helper
	X	X	X	X	SI			SlewRateLimiter_GetRate.vi		
	X	X		X	1			SlewRateLimiter_New.vi		
	X	X		X	1			SlewRateLimiter_NewInitialZero.vi		
	X	X		X	1			SlewRateLimiter_Reset.vi		
	X	X		X	SI			SlewRateLimiter_SetRate.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	VI Name	Function Prototype	Notes
TIMER		X	Χ	X				Timer_Close.vi		releases semaphore
	Χ	X		X			Χ	Timer_Get.vi		
	Χ	X	X	X				Timer_GetAndReset.vi		
	Χ	X	X	No				Timer_GetInternal.vi		Internal (private) only
	X	X		X			X	Timer_HasPeriodPassed.vi		
	X	X	X	X			Χ	Timer_HasPeriodPassedOnce.vi		
	Χ	X		X				Timer_New.vi		
	X	X		X			X	Timer_Reset.vi		
	X	X	X	No				Timer_ResetInternal		Internal (private) only
	Χ	X		X				Timer_Start.vi		
	X	X		X			X	Timer_Stop.vi		
	Χ	X	X	No				Timer_StopInternal.vi		Internal (private) only

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

ADM CC	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
ARM FF		X		Χ				ArmFF_Calculate.vi		
	X	X		X				ArmFF_CalculateVelocityOnly.vi		
			X					ArmFF_Execute.vi		LabVIEW style single call
			X					ArmFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	X	Χ		Χ				ArmFF_MaxAchieveAccel.vi		
	X	Χ		X				ArmFF_MaxAchieveVelocity.vi		
	X	Χ		X				ArmFF_MinAchieveAccel.vi		
	X	Χ		X				ArmFF_MinAchieveVelocity.vi		
	X	Χ		X				ArmFF_New.vi		
	X	X		X				ArmFF New ZeroGravitv.vi		

ibrary – VI Implementatio	n Lis	st						_	
te Space Items – (This list is	still m	nissin	g one	VI)) Added ا	additi	ional columns for test and sample.		
					mize	8	•		
	þ	þ	m		Optimiz	Sample Program			
	Implementea	Documented	Not WPILIB	em	Execution Op Test Routine	Pro			
	lem	ŭn	Ŋ	Menu Item	Execution Test Routi	e/ac			
	dul	000	Not	Mer	Exe	San	VI Name	Function Prototype	Notes
CONTROLLER UTIL	. X			X	SI	Τ.	ControllerUtil_GetModulusError.vi	71	This was short lived in WPILIB, but
									still useful here.
					þ				
					Execution Optimizea Test Routine	8			
	þ	g	~)pti	Sample Program			
	Implementea	Documented	Not WPILIB	Menu Item	Execution Op Test Routine	Ą	-		
	lem,	ŭ	Μ	iu It	cutii t Ro	e/ac			
	ďш,	ဝို	Vot	Mer	Exe	San	VI Name	Function Prototype	Notes
ELEV FF	X	X		X			ElevFF_Calculate.vi	71	
	X	Χ	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	X			ElevFF_CalculateVelocityOnly.vi		Lab VIETAV at da air ala anti
			X			+	ElevFF_Execute.vi ElevFF ExecuteVelocityOnly.vi		LabVIEW style single call LabVIEW style single call
	X	X	^	X			ElevFF MaxAchieveAccel.vi		East IEW style single sail
	Χ			X			ElevFF_MaxAchieveVelocity.vi		
	X	X		X			ElevFF_MinAchieveAccel.vi ElevFF_MinAchieveVelocity.vi		
	X	X		X			ElevFF New.vi		
	X	X		X			ElevFF_New_ZeroAccel.vi		
					ď				
					iize	_			
	7	~			Optimiz ine	rar			
	nte	ntec	riB	Ë	n O Itine	Pro			
	эше	ıme	Μ	ı Ite	utio	a/e			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Op Test Routine	Sample Program	VI Name	Function Prototype	Notes
HOL_DRV_CTRL	. X	X		X	<u> </u>		HolDrvCtrl AtReference.vi	1 unction 1 rototype	Added 1/26/21
	X	X		X			HolDrvCtrl_Calculate.vi		Added 1/26/21
	X	X		Χ			HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute.vi		Added 1/26/21
			X			+	HolDrvCtrl_Execute_Vi HolDrvCtrl_Execute_Trajectory.vi		Future Future
	Χ	Х		X			HolDrvCtrl_New.vi		Added 1/26/21
	X	X		X			HolDrvCtrl_SetEnabled.vi		Added 1/26/21
	X	X		X			HolDrvCtrl_SetTolerance.vi		Added 1/26/21
					pə				
					Optimize	2			
	þ	þ	~		Opti e	Program			
	ente	ente	ILIE	em		P			
	lem	ŭ	Ŋ	iu It	cuti t Ro	e/ac	2		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Op Test Routine	Sample	VI Name	Function Prototype	Notes
PID CONTROLLER	X	X	X	X			PIDController_AdvCalculate_FF_Sp_Pv.vi		Advanced PID
	X	X	X	X			PIDController_AdvCalculate_FF_Sp_Pv_Per.vi		Advanced PID
	X	X	X	X		X	PIDController_AdvExecute.vi		Labview style helper. Advanced PID
	X	X		X			PIDController_AtSetpoint.vi		
	X	X		X		4	PIDController_Calculate_PV.vi		
	X	X		X		+	PIDController Calculate SP PV.vi PIDController DisableContinousInput.vi		
	$\frac{\lambda}{X}$	X		X		+	PIDController_EnableContinuousInput.vi		
	Χ	Χ	Χ	Χ		Х	PIDController_Execute.vi		Labview style helper
							PIDController GetContinuousError.vi		OBSOLETE – Removed
	~	Χ		Χ			PIDController GetPeriod.vi		OBSOLLTE - Removed

s still m	issing	one \	VI)) Add	ed additional columns for test and sample.	
X	X		X		PIDController_GetPID.vi	
X	X		X		PIDController_GetPositionError.vi	
X	X		Χ		PIDController_GetSetpoint.vi	
X	X		Χ		PIDController_GetVelocityError.vi	
X	X		X		PIDController_IsContinuousInputEnabled.vi	
X	X		X		PIDController_New.vi	
X	Χ		X		PIDController_NewPeriod.vi	
Χ		Χ	X	SI	PIDController_Pack_AdvLimits.vi	
Χ		Χ	X	SI	PIDController_Pack_AdvTuning.vi	
X		Χ	X	SI	PIDController_Pack_ErrorTolerance.vi	
X		Χ	X	SI	PIDController_Pack_InputLimits.vi	
X		Χ	Χ	SI	PIDController_Pack_Tuning.vi	
X	X		Χ		PIDController_Reset.vi	
X	Χ		X		PIDController_SetD.vi	
X	X	X	Χ		PIDController_SetDerivativeFilter.vi	Advanced PID
X	X	X	No		PIDController_SetFeedForward.vi	Advanced PID, Obsolete –
						DELETE
X	X	X	No		PIDController_SetFFGain.vi	Advanced PID, Obsolete – DELETE
X	X		Х		PIDController Setl.vi	<u> </u>
					PIDController SetInputRange.vi	OBSOLETE – Removed
Х	Х		Х		PIDController_SetIntegratorRange.vi	OBOCETE TROMOVED
X	X	X	X		PIDController_SetOutputLimits.vi	Advanced PID
X	X		X		PIDController SetP.vi	/ tavarious i ib
X	X	X	X		PIDController SetPeriod.vi	
X	X		X		PIDController SetPID.vi	
X	X	X	X		PIDController SetPIDF.vi	Advanced PID
X	X		X		PIDController_SetSetpoint.vi	, availou i ib
X	X		X		PIDController SetTolerance.vi	
X	X		X		PIDController SetTolerancePandV.vi	
					IDOOHIONG_Octrolerancer and v. vi	

PROFILED PID CONTROLLER		Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name Function Prototype	Notes
X	PROFILED PID CONTROLLER	X	Χ		Χ				ProfiledPIDController_AtGoal.vi	
X										
X X X ProfiledPIDController_Calculate_Meas_StateGoal.vi X X X ProfiledPIDController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_DisableController_										
X										
X X X ProfiledPIDController_DisableContInput.vi X X X X ProfiledPIDController_EnableContInput.vi X X X X ProfiledPIDController_GetGoal vi X X X X ProfiledPIDController_GetPeriod.vi X X X X ProfiledPIDController_GetPoint.vi X X X X ProfiledPIDController_GetVelocityError.vi X X X X ProfiledPIDController_GetVelocityError.vi X X X X ProfiledPIDController_New.vi X X X X ProfiledPIDController_Reset.vi X X X X ProfiledPIDController_Reset.vi X X X X ProfiledPIDController_Reset.vi X X X X ProfiledPIDController_Reset.poonly.vi X X X X ProfiledPIDController_Reset.poonly.vi X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetConstraints.vi X X X ProfiledPIDController_SetGoal.vi X X X ProfiledPIDController_SetGoal.posOnly.vi X X X ProfiledPIDController_SetGoal.posOnly.vi										
X X X X ProfiledPIDController_GetGoal.vi X X X X ProfiledPIDController_GetPeriod.vi X X X X ProfiledPIDController_GetSetpoint.vi X X X X ProfiledPIDController_GetVelocityError.vi X X X X ProfiledPIDController_New vi X X X X ProfiledPIDController_New Vi X X X X ProfiledPIDController_Reset.vi X X X X ProfiledPIDController_Reset.posOnly.vi X X X X ProfiledPIDController_Reset_PosOnly.vi X X X X ProfiledPIDController_SetCoal.vi X X X X ProfiledPIDController_SetCoal.vi X X X X ProfiledPIDController_SetGoal.vi		-								
X X X X ProfiledPIDController GetGoal.vi X X X X ProfiledPIDController GetPiD.vi X X X X ProfiledPIDController GetPiD.vi X X X X ProfiledPIDController GetPiD.vi X X X X ProfiledPIDController GetPositionError.vi X X X X ProfiledPIDController GetSetpoint.vi X X X X ProfiledPIDController GetVelocityError.vi X X X X ProfiledPIDController GetVelocityError.vi X X X X ProfiledPIDController New.vi X X X X ProfiledPIDController NewPeriod.vi X X X X ProfiledPIDController Reset.vi X X X X ProfiledPIDController Reset.vi X X X X ProfiledPIDController Reset.vi X X X X ProfiledPIDController Reset.posVel.vi X X X X ProfiledPIDController Reset PosConly.vi X X X X ProfiledPIDController Reset PosConly.vi X X X X ProfiledPIDController SetConstraints.vi X X X X ProfiledPIDController SetGoal.vi X X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal PosConly.vi X X X ProfiledPIDController SetGoal PosConly.vi X X X ProfiledPIDController SetGoal PosConly.vi										
X X X X X X X X X X X X X X X X X X X X X X X X X X X X Y Y ProfiledPIDController GetSetpoint.vi X X X X X X ProfiledPIDController GetVelocityError.vi X X X X X Y ProfiledPIDController New.vi Y Y Y Y Y Y ProfiledPIDController New.vi Y Y Y Y Y Y ProfiledPIDController New.vi Y Y Y Y Y ProfiledPIDController New.vi Y Y Y Y Y ProfiledPIDController New.vi Y Y Y Y Y Y ProfiledPIDController Reset PosOnly.vi Y Y Y Y Y ProfiledPIDController SetConstraints.vi Y Y Y Y ProfiledPIDController SetGoal.vi Y Y Y Y ProfiledPIDController SetIntegratorRange.vi Y Y Y Y										
X X X X WPILIB has separate getters. X X X X X WPILIB has separate getters. X X X X X ProfiledPIDController GetSetpoint.vi X X X X ProfiledPIDController GetVelocityError.vi X X X X ProfiledPIDController New.vi X X X ProfiledPIDController New.vi X X X ProfiledPIDController Reset.vi X X X ProfiledPIDController Reset.posOnly.vi X X X ProfiledPIDController Reset.posVel.vi X X X ProfiledPIDController SetConstraints.vi X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal.PosOnly.vi X X X ProfiledPIDController SetGoal.PosOnly.vi										
X X X ProfiledPIDController_GetSetpoint.vi X X X X ProfiledPIDController_GetVelocityError.vi X X X X ProfiledPIDController_New.vi X X X ProfiledPIDController_NewPeriod.vi X X X ProfiledPIDController_Reset.vi X X X ProfiledPIDController_Reset_PosOnly.vi X X X ProfiledPIDController_Reset_PosVel.vi X X X ProfiledPIDController_SetGoal.vi X X X ProfiledPIDController_SetGoal.vi X X X ProfiledPIDController_SetGoal.posOnly.vi X X X ProfiledPIDController_SetGoal.posOnly.vi X X X X ProfiledPIDController_SetGoal.posOnly.vi										
X X X ProfiledPIDController_GetSetpoint.vi X X X X ProfiledPIDController_New.vi X X X X ProfiledPIDController_NewPeriod.vi X X X X ProfiledPIDController_Reset.vi X X X ProfiledPIDController_Reset_PosOnly.vi X X X ProfiledPIDController_Reset_PosVel.vi X X X ProfiledPIDController_SetConstraints.vi X X X ProfiledPIDController_SetGoal.vi X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X ProfiledPIDController_SetGoal_PosOnly.vi				X						WPILIB has separate getters.
X X X ProfiledPIDController GetVelocityError.vi X X X X ProfiledPIDController New.vi X X X X ProfiledPIDController Reset.vi X X X X ProfiledPIDController Reset PosOnly.vi X X X X ProfiledPIDController Reset PosVel.vi X X X ProfiledPIDController SetConstraints.vi X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal PosOnly.vi X X X ProfiledPIDController SetIntegratorRange.vi										
X X X ProfiledPIDController New.vi X X X X ProfiledPIDController Reset.vi X X X ProfiledPIDController Reset PosOnly.vi X X X ProfiledPIDController Reset PosVel.vi X X X ProfiledPIDController SetConstraints.vi X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal PosOnly.vi X X X ProfiledPIDController SetIntegratorRange.vi										
X X X ProfiledPIDController Reset.vi X X X X ProfiledPIDController Reset PosOnly.vi X X X X ProfiledPIDController Reset PosVel.vi X X X ProfiledPIDController SetConstraints.vi X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal PosOnly.vi X X X ProfiledPIDController SetIntegratorRange.vi										
X X X X ProfiledPIDController_Reset.vi X X X X X ProfiledPIDController_Reset_PosOnly.vi X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X ProfiledPIDController_SetIntegratorRange.vi									_	
X X X ProfiledPIDController_Reset_PosOnly.vi X X X X ProfiledPIDController_Reset_PosVel.vi X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X ProfiledPIDController_SetIntegratorRange.vi								_		
X X X X ProfiledPIDController_Reset_PosVel.vi X X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi										
X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi										
X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi										
X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi					~					
X X ProfiledPIDController SetIntegratorRange.vi										
		-								
X X X ProfiledPIDController_SetTolerance_PosOnly.vi										
X X X ProfiledPIDController SetTolerance PosVel.vi					X					

Revision 2.X	11/12/2021 – State	Space Items –	(This list is still missing	ng one VI) Added additional	columns for test and sample.
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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	 VI Name	Function Prototype	Notes
RAMSETE	Χ	Χ		X	SI		Ramsete_New.vi	new	
	X	X		X	SI		Ramsete_New_B_Z.vi	new(b, zeta)	
	X	X		X	X		Ramsete_Calculate.vi	calculate	
	X	Χ		X	X		Ramsete_Calculate_Trajectory.vi	calculate_trajectory	
	Χ		Χ	X			Ramsete_Execute.vi		
	Χ		Χ	Χ			Ramsete_Execute_ENG.vi	Use this one!!	
	Χ		Χ	X			Ramsete_Execute_PackTuning.vi		
	Χ		Χ	X			Ramsete_Execute_PackTuning_ENG.vi		
	Χ	Χ		Χ	SI		Ramsete_AtReference.vi	AtReference	
	Χ	Χ		X	SI		Ramsete_SetEnabled.vi	SetEnabled	
	Χ	Χ		Χ	SI		Ramsete_SetTolerance.vi	SetTolerance	
	Χ	Χ		X	X		Ramsete_SINC.vi	sinc	internal
	Χ	X	X	Χ	Χ		Ramsete_Diff_DO_Eng.vi		
	Χ	X	X	X	X		Ramsete_Diff_DO_SI.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimizea	Test Routine	Sample Program	Function Prototype	Notes
SIMPLE MOTOR FEEDFORWARD	X	Χ		Χ	SI		SimpleMotorFF_New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)	
								public SimpleMotorFeedforward(double ks, double kv)	
	X	Χ		Χ	SI		SimpleMotorFF_Calculate.vi	public double calculate(double velocity, double acceleration)	
	X			Χ			SimpleMotorFF_Calculate_NextV_Dt.vi		
	X	X		X	SI		SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)	
			X				SimpleMotorFF_Execute.vi		LabVIEW style single call
			X				SimpleMotorFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	X	X		X	X			public double maxAchievableVelocity(double maxVoltage, double acceleration)	
	X	X		X	X			public double minAchievableVelocity(double maxVoltage, double acceleration)	
	X	Χ		Χ	X			public double maxAchievableAcceleration(double maxVoltage, double velocity)	
	X	Χ		Χ	X			public double minAchievableAcceleration(double maxVoltage, double velocity)	

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program Manual IV	Function Prototype	Notes
POSE								pose2d new()	can use cluster constant
	Χ	Χ		Χ	SI		Pose_New_TRRO.vi	pose2d new(translation2d, rotation2d)	
	Χ	Χ		Χ	SI		Pose_New.vi	pose2d new(double x, double y, rotation2d)	
	Χ	Χ		X	SI		Pose_Plus.vi	pose2d plus(transform2d other)	
	Χ	Χ		Χ	SI		Pose_Minus.vi	transform2d minus(pose2d other)	
	Χ	X		Χ	SI		Pose_getTranslation.vi	translation2d getTranslation()	can also use cluster unpack
	Χ	Χ		Χ	SI		Pose_getRotation.vi	rotation2d getRotation()	can also use cluster unpack

Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI) Added additional columns for test and	Revision 2.X 11/12/2021	 State Space Items – 	(This list is still missing one VI)	Added additional columns for test and sar	nple.
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. 13 31111 1	1113311	19 011	C VI.	,	/ luul	su auu	IIIOI	iai columnis for test and sample.	
X	X	´ X		X	SI			Pose_getXY.vi	
X	X	<i>X</i>		X	SI			Pose_getXYAngle.vi	
X	X		(X	SI			Pose_TransformBy.vi	pose2d transformby(transform2d other)
X	X		(X	SI			Pose_RelativeTo.vi	pose2d relativeto(pose2d other)
X	X		(X	X			Pose_Exp.vi	pose2d exp(twist2d twist)
X	X)	X	X			Pose_Log.vi	twist2d log(pose2d end)
X	X		(Χ	SI			Pose_Equals.VI	boolean equals(other obj)

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
ROTATION									rotation2d new()	can use cluster constant
	X	Χ		Χ	SI			Rotation_CreateAngle.vi	rotation2d new(double value)	
	X	Χ		X	SI			Rotation_CreateXY.vi	rotation2d new(double x, double y)	
	X	Χ		Χ	SI			Rotation_CreateAngleDegrees.vi	rotation2d fromDegrees(double degrees)	convert to radians then create
	Χ	Χ		Χ	SI			Rotation_Plus.vi	rotation2d plus(rotation2d other)	
	Χ	Χ		Χ	SI			Rotation_Minus.vi	rotation2d minus(rotation2d other)	
	Χ	Χ		Χ	SI			Rotation_UnaryMinus.vi	rotation2d unaryminus()	
	X	Χ		Χ	SI			Rotation_Times.vi	rotation2d times(double scalar)	
	X	X		X	SI			Rotation_RotateBy.vi	rotation2d rotateby(rotation2d other)	
	X	Χ	Χ	Χ	SI			Rotation_GetAngleCosSin.vi		New 1/26/21
	Χ	Χ		Χ	SI			Rotation_GetRadians.VI	double getRadians()	use cluster unpack
	X	X		X	SI				double getDegrees()	use cluster unpack, then convert to degree
	X	Χ		X	SI			Rotation_GetCos.VI	double getCos()	use cluster unpack
	X	Χ		Χ	SI			Rotation_GetSin.VI	double getSin()	use cluster unpack
	X	Χ		Χ	SI			Rotation_GetTan.VI	double getTan()	can calculate
	Χ	Χ		Χ	SI			Rotation_Equals.vi	boolean equals(rotation2d other)	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	VI Name	Function Prototype	Notes
TRANSFORM	X	Χ		Χ	SI			Transform_Create_PosePose.vi	transform2d new(pose2d, pose2d)	
	Χ	X		Χ	SI			Transform_Create_TransRot.vi	transform2d new(translation2d, rotation2d)	
									transform2d new()	can use cluster constant
	Χ	X		Χ	SI			Transform_Times.vi	transform2d times(double scalar)	
	Χ	Χ		Χ	SI			Transform_GetTranslation.VI	translation2d getTranslation()	use cluster unpack
	Χ	X		Χ	SI			Transform_GetRotation.VI	rotation2d getRotation()	use cluster unpack
	Χ	X	X	Χ	SI			Transform_GetXY.vi		
	X	X	X	Χ	SI			Transform_GetXYAngle.vi		
	X	X		Χ	SI			Transform_Inverse.vi	transform inverse()	new
	X	X		Χ	SI			Transform_Equals.VI	boolean equals(other transform2d)	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype	Notes
TRANSLATION								translation2d new()	can use cluster constant
	Χ	X		Χ	SI		Translation_Create.vi	translation2d new(double x, double y)	
	X	X		Χ	SI		Translation_Create_DistAng.vi		
	Χ	Χ		Χ	SI		Translation_GetDistance.vi	double getDistance(translation2d other)	
	Χ	Χ		Χ	SI		Translation_GetX.VI	double getX()	can use cluster unpack

FRC LabVIEW Trajectory Library – VI Implementation	n Lis	t						
Revision 2.X 11/12/2021 – State Space Items – (This list is s			one '				nal columns for test and sample.	
		X		X	SI		Translation_GetY.VI double getY()	can use cluster unpack
			X		SI		Translation_GetXY.VI	
	X	X			SI		Translation_GetNorm.VI double getNorm()	can use cluster unpack
	X	X			SI		Translation_RotateBy.vi translation2d rotateBy(rotation2d other)	
	X				SI		Translation_Plus.vi translation2d plus(translation2d other)	
	X	X		X	SI		Translation_Minus.vi translation2d minus(translation2d other)	
		X			SI		Translation_UnaryMinus.vi translation2d unaryminus()	
	X	Χ		Χ	SI		Translation_Times.vi translation2d times(double scalar)	
		X		X			translation2d div(double scalar) Translation_Equals.vi boolean equals(translation other)	can multiply by 1/scalar
TWIST			Not WPILIB	X Menu Item	SI		VI Name Function Prototype Twist_Create.vi twist new(x, y, theta)	Notes
	X	X	Х		SI SI		Twist_Equals.VI boolean equals(obj other) Twist_GetAll.VI	
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	Implemented	Documented	Not WPILIB	Wenu Item	Execution Optimizea	Test Routine Sample Program		
CHASSIS SPEEDS		Docr	Not 1	Menr	Exec	Test Sam _l	VI Name Function Prototype chassisspeeds new ()	Notes can use cluster constant
CHASSIS SPEEDS			Not 1				chassisspeeds new ()	can use cluster constant
CHASSIS SPEEDS	X	X		X	SI		chassisSpeeds new () ChassisSpeeds_New.vi chassisspeeds new (double xvel, double x	can use cluster constant
CHASSIS SPEEDS	X	X	X Not 1	X	SI SI		chassisSpeeds new () ChassisSpeeds_New.vi chassisspeeds new (double xvel, double y ChassisSPeeds_GetXYOmega.vi	can use cluster constant yvel, double angvel)
CHASSIS SPEEDS	X	X		X	SI		chassisSpeeds new () ChassisSpeeds_New.vi chassisspeeds new (double xvel, double x	can use cluster constant yvel, double angvel)
CHASSIS SPEEDS	X	X		X	SI S	st Routine mple Program	chassisspeeds new () ChassisSpeeds_New.vi chassisspeeds new (double xvel, double yellow chassisSpeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI chassisspeeds fromFieldRelativeSpeeds(can use cluster constant yvel, double angvel)
CHASSIS SPEEDS DIFFERENTIAL DRIVE KINEMATICS	X X X X X X X X X X	X X X X	X	X X X	Execution Optimized 19 19 19	Test Routine Sample Program	ChassisSpeeds_New.vi	can use cluster constant yvel, double angvel) double x, double y,
	X X X X X	X X Documented	X	X X X X	N Execution Optimized S S S	X X Test Routine Sample Program	chassisSpeeds new () ChassisSpeeds_New.vi chassisspeeds new (double xvel, double younged to chassisSpeeds new (double xvel, double younged to chassisSpeeds fromFieldRelativeSpeeds.VI chassisSpeeds fromFieldRelativeSpeeds(double angvel, rotation2d robotangle) VI Name ChassisSpeeds new (double xvel, double younged new (double xvel, double younged new (double xvel, double younged) ChassisSpeeds fromFieldRelativeSpeeds(double angvel, rotation2d robotangle)	can use cluster constant yvel, double angvel) double x, double y, Notes
	X X X X X	X X X X	X	X X X X	- Execution Optimized 19 19 19	X X Test Routine Sample Program	ChassisSpeeds_New.vi	can use cluster constant yvel, double angvel) double x, double y, Notes /heelSpeeds)
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DIFFERENTIAL DRIVE KINEMATICS	Implemented X X X X X X X X X X X X X X X X X X X	X X Documented	X Not WPILIB	X X X X X X	otimized 9 X - Execution Optimized 9 9 9 9	Test Routine X X X Test Routine Sample Program	ChassisSpeeds New.vi chassisSpeeds new () ChassisSPeeds GetXYOmega.vi chassisSpeeds fromFieldRelativeSpeeds.VI chassisSpeeds fromFieldRelativeSpeeds() ChassisSpeeds FromFieldRelativeSpeeds.VI chassisSpeeds fromFieldRelativeSpeeds() double angvel, rotation2d robotangle) VI Name Function Prototype DiffKinematics New.vi diffDriveKine new(double trackWidth) DiffKinematics toChassisSpeed.vi chassisSpeeds toChassisSpeeds(diffDrW.) DiffKinematics toWheelSpeed.vi diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds(chassisSpe	Can use cluster constant
DIFFERENTIAL DRIVE KINEMATICS	Implemented X X X X X X X X X X X X X X X X X X X	Documented X X X Documented	Not WPILIB X	Menu Item X X X Menu Item	otimized 9 X - Execution Optimized 9 9 9 9	Sample Program Sample Program	ChassisSpeeds New.vi chassisspeeds new () ChassisSPeeds GetXYOmega.vi ChassisSpeeds FromFieldRelativeSpeeds.VI chassisspeeds fromFieldRelativeSpeeds(double angvel, rotation2d robotangle) VI Name Function Prototype DiffKinematics New.vi diffDriveKine new(double trackWidth) DiffKinematics to ChassisSpeed.vi chassisSpeeds to ChassisSpeeds (diffDrW DiffKinematics to WheelSpeed.vi diffDriveWheelSpeed to WheelSpeeds(chassisSpeeds) VI Name Function Prototype diffDriveWheelSpeed to WheelSpeeds(chases) VI Name Function Prototype diffDrOdom new(rotation gyro, pose initial diffDrOdom new(rotation gyro) void resetPosition(pose2d, rotation2d) pose2d getPoseMeters()	Can use cluster constant

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DIFFERENTIAL DRIVE WHEEL SPEEDS									diffDrWheelSpeeds new()	
									diffDrWheelSpeeds new(double leftVel, double rightVel)	
	X	Χ		X	Χ			DiffWheel_Normalize.vi	void normalize(double maxVel)	
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MECANUM DRIVE KINEMATICS		X		X	- 1			MecaKinematics_New.vi		
	Χ	Χ		X	Χ			MecaKinematics_SetInverseKinematics.vi		
	X	Χ		X	Χ			MecaKinematics_ToChassisSpeeds.vi		
	X	X		X	X			MecaKinematics_ToWheelSpeeds.vi		
	Χ	X		Χ	X			MecaKinematics_ToWheelSpeedsZeroCenter.vi		
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notř	ning d	lone X Documented X X	WPILIB	X X Menu Item	imized	Routine	Sample Program	VI Name MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_GetPose.vi		
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MECANUM DRIVE ODOMETRY	unplemented X X X X X X X X X X X X X X X X X X X	Documented X X X Documented	X Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Execute.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi	Function Prototype Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double	Notes
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SWERVE DRIVE KINEMATICS									public SwerveDriveKinematics(Translation2d wheelsMeters)	variable parameters (replace with array and "4" calls)
	X	Χ	X	X			5	SwerveKinematics NewX.VI		uses array as input
	X	X	X	X				SwerveKinematics_New4.VI		For 4 module drives
	X	X		X			(SwerveKinematics_ToSwerveModuleStates.VI	public SwerveModuleState[]	
									toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters)	
	X	X		X				SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI	public SwerveModuleState[]	
									toSwerveModuleStates(ChassisSpeeds chassisSpeeds)	veniele a secondare (secondare veible
									public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)	variable parameters (replace with array and "4" calls)
	Χ			Χ				SwerveKinematics_ToChassisSpeedsX.VI		uses array as input
	X			X				SwerveKinematics_ToChassisSpeeds4.VI		For 4 module drives
	X	X	X	X				SwerveKinematics_NormalizeWheelSpeeds.vi	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)	
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SWERVE DRIVE ODOMETRY	X	X		X			(SwerveOdometry_New.VI	public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle, Pose2d initialPose)	
	X	Χ		X				SwerveOdometry_NewZeroCenter.VI	public SwerveDriveOdometry(SwerveDriveKinematics kinematics,	
	X	X		X				SwerveOdometry ResetPosition.VI	Rotation2d gyroAngle) public void resetPosition(Pose2d pose, Rotation2d gyroAngle)	
	X			X				SwerveOdometry_GetPosition.VI	public Pose2d getPoseMeters()	
									public Pose2d updateWithTime(double currentTimeSeconds,	variable parameters (replace with
	Y	Y	X	Χ			9	SwerveOdometry_UpdateWithTimeX.VI	Rotation2d gyroAngle, SwerveModuleState moduleStates)	array and "4" calls) uses array as input
	\overline{X}	X	$\frac{\lambda}{X}$	X				SwerveOdometry UpdateWithTime4.VI		For 4 module drives
									public Pose2d update(Rotation2d gyroAngle,	variable parameters (replace with
								SwerveOdometry_Execute4.vi	SwerveModuleState moduleStates)	array and "4" calls)
				1				SwerveOdometry_Execute4.vi		
	Х		X	X				SwerveOdometry_UpdateX.VI		uses array as input
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SWERVE DRIVE MODULE STATE	X	X		X	SI			SwerveModuleState_New.vi	public SwerveModuleState(double speedMetersPerSecond,	
	X	X		X	SI			SwerveModuleState_CompareTo.vi	Rotation2d angle) public int compareTo(SwerveModuleState o)	
	X			X	SI			SwerveModuleState_Optimize.vi	public SwerveModuleState optimize(SwerveModuleState desired,	
								- :	Rotation2d angle)	

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CUBIC HERMITE SPLINE	X /mplemented	X Nocumented	Not WPILIB	X X X X X X X X X X	Execution Optimize	Test Routine		VI Name CubicHermiteSpline_New.vi CubicHermiteSpline_makeHermiteBasis.vi CubicHermiteSpline_getControlVectorFromArrays.vi	Function Prototype public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) protected SimpleMatrix getCoefficients() private SimpleMatrix makeHermiteBasis() private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector)	Notes not needed, use cluster unpack
POSE WITH CURVATURE	X Implemented	X Documented	Not WPILIB	X Menu Item	9 Execution Optimized	Test Routine		VI Name PoseWithCurve_New.vi	Function Prototype public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter) public PoseWithCurvature() public Pose2d poseMeters public double curvatureRadPerMeter	Notes can use cluster constant not needed, use cluster unpack not needed, use cluster unpack
QUINTIC HERMITE SPLINE	X X Implemented	X Documented	Not WPILIB	X Wenu Item	Execution Optimized	Test Routine		VI Name QuinticHermiteSpline_New.vi QuinticHermiteSpline_makeHermiteBasis.vi QuinticHermiteSpline_getControlVectorFromArrays.vi	Function Prototype public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) protected SimpleMatrix getCoefficients() private SimpleMatrix makeHermiteBasis() private SimpleMatrix getControlVectorFromArrays(double[]	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 Spline(int degree) public PoseWithCurvature getPoint(double t) public static class ControlVector public ControlVector(double[] x, double[] y)	Notes implemented as data structure
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 11/12/2021 – State Space Items – (This list is still miss SPLINE HELPER

s sti	ll mis	sing	one \	/l)	Add	ed ac	lditional columns for test and sample.	
R	X	X		X		X	SplineHelp_GetCubicCtrlVectorsFromWayPts.vi	public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints(Pose2d start, Translation2d[] interiorWaypoints, Pose2d end)
	Χ	Χ	Χ	X			SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi	
	X	X		X			SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi	public static List <spline.controlvector> getQuinticControlVectorsFromWaypoints(List<pose2d> waypoints)</pose2d></spline.controlvector>
	Χ	Χ	Χ	X			SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi	
	X	X		Χ		Χ	SplineHelp_getCubicSplinesFromControlVectors.vi	public static CubicHermiteSpline[] getCubicSplinesFromControlVectors(Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end)
	X	Χ	Χ	No			SplineHelp_GetCubicSpline_Calc1.vi	internal
	X	Χ	Χ	No			SplineHelp_GetCubicSpline_Calc2.vi	internal
	X	Χ	X	No			SplineHelp_GetCubicSpline_Calc3.vi	internal
	X	X		Χ			SplineHelp_getQuinticSplinesFromControlVectors.vi	public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors(Spline.ControlVector[] controlVectors)
	X	Χ		No			SplineHelp_ThomasAlgorithm.vi	private static void thomasAlgorithm(double[] a, double[] b, double[] internal c, double[] d, double[] solutionVector)
	X	Χ		Χ	SI		SplineHelp_GetCubicCtrlVector.vi	private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point)
	X	Χ		Χ	SI		SplineHelp_GetQuinticCtrlVector.vi	private static Spline.ControlVector getQuinticControlVector(double scalar, Pose2d point)

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
SPLINE PARAMETERIZER	X	X		X		X		SplineParam_Spline.vi	public static List <posewithcurvature> parameterize(Spline spline)</posewithcurvature>	
	X	Χ		X					public static List <posewithcurvature> parameterize(Spline spline, double t0, double t1)</posewithcurvature>	
	X	Χ	X	No				SplineParam_StackGet.vi		internal
	X	Χ	X	No				SplineParam_StackPop.vi		internal
	X	X	X	No				SplineParam_StackPush.vi		internal

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

> Execution Optimizea Function Prototype VI Name Notes TRAJECTORY X X public Trajectory(final List<State> states) X SI Trajectory New.vi XX X SI Trajectory_New_Empty.vi public Pose2d getInitialPose() can use cluster unpack, array index public double getTotalTimeSeconds()
> public List<State> getStates() not needed, use unpack not needed, use unpack XX public State sample(double timeSeconds) Trajectory Sample.vi X X X X Trajectory_SampleReverse.vi Sample in reverse order. Negate sample. XX Trajectory_TransformBy.vi public Trajectory transformBy(Transform2d transform) Χ public Trajectory relativeTo(Pose2d pose) $X \mid X$ X Trajectory_RelativeTo.vi $X \mid X$ Χ Trajectory_equals.vi boolean equals(other obj) FUTURE $X \mid X$ No SI Trajectory_lerp_double.vi private static double lerp(double startValue, double endValue, internal No SI private static Pose2d lerp(Pose2d startValue, Pose2d endValue, $X \mid X$ Trajectory_lerp_Pose.vi double t)

Library – VI Implementation				. \ //	\ A -I		.1.1141			
State Space Items – (This list is s	still mi	ıssıng	g one	e VI	. 2			nal columns for test and sample.		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize		Sample Program	VI Name	Function Prototype	Notes
TRAJECTORY_STATE									public State()	
	X			Х				TrajectoryState_New.vi	public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter)	
	X	X		X				TrajectoryState_Interpolate.vi	State interpolate(State endValue, double i)	
	X	Χ		X				TrajectoryState_Equals.vi	boolean equals(other obj)	FUTURE
	mplemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
TRAJECTORY CONFIG	\overline{X}	\overline{X}	┬`	\overline{X}			Τ,	TrajectoryConfig Create.vi	public TrajectoryConfig(double maxVelocityMetersPerSecond,	
		,,		,	Ŭ.			g_0g_0g_0	double maxAccelerationMetersPerSecondSq)	
									public TrajectoryConfig addConstraint(TrajectoryConstraint	Implemented differently, can
									constraint)	duplicate. Implemented differently, can
									public TrajectoryConfig addConstraints(List extends TrajectoryConstraint constraints)	duplicate.
	X	X		X	SI			TrajectoryConfig_setKinematicsDiffDrive.vi	public TrajectoryConfig setKinematics(DifferentialDriveKinematics kinematics)	dupiloate.
	X	X		X	SI			TrajectoryConfig_setKinematicsMecanumfDrive.vi	public TrajectoryConfig setKinematics(MecanumDriveKinematics	
	X	X		X	SI			TrajectoryConfig_setKinematicsSwerveDrive.vi	kinematics) public TrajectoryConfig setKinematics(SwerveDriveKinematics	
									kinematics) public double getStartVelocity()	can use cluster unpack
									public double gerstartVelocity() public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond)	can use cluster unpack
									public double getEndVelocity()	can use cluster unpack
									public TrajectoryConfig setEndVelocity(double	San acc side an pack
									endVelocityMetersPerSecond)	
									public double getMaxVelocity()	can use cluster unpack
									public double getMaxAcceleration()	can use cluster unpack
									public List <trajectoryconstraint> getConstraints()</trajectoryconstraint>	Implemented differently, can duplicate.
	14			\	-			T :	public boolean isReversed()	can use cluster unpack
	X		X	X	SI		1	TrajectoryConfig_setReversed.vi	public TrajectoryConfig setReversed(boolean reversed)	
	X	X	X		SI			TrajectoryConfig_setCentripetalAccel.vi TrajectoryConfig_setVoltageDiffDrive.vi		
			\		_ <i>3i</i>			Trajectory coming_setvoltageDinDrive.vi	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	VI Name	Function Prototype	Notes
TRAJECTORY GENERATE	$\overline{}$	X		<u>≥</u> X		7	S	TrajectoryGenerate_Make_Cubic_CtrlVect.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector</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,</translation2d>	uses cubic splines
									TrajectoryConfig config)	
	X	X	X	X				TrajectoryGenerate_Make_Generic.vi	Helper to bring these all together	Use this one!!!

FRC LabVIEW Trajectory Library – VI Implementation	n Lis	t							
Revision 2.X 11/12/2021 – State Space Items – (This list is s					Added	additio			
	X			X			TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config)	uses quintic splines
	X	X		X			TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(List <pose2d> waypoints, TrajectoryConfig config)</pose2d>	uses quintic splines
	X	X		X			TrajectoryGenerate_splinePointsFromSplines.vi	public static List <posewithcurvature> splinePointsFromSplines(Spline[] splines)</posewithcurvature>	
TRAJECTORY GENERATE (Control Vector)	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Sample Program	VI Name	Function Prototype public ControlVectorList(int initialCapacity) public ControlVectorList() public ControlVectorList(Collection extends Spline.ControlVector collection)	Notes may not need, just data may not need, just data may not need, just data
	Implemented	Documented		Menu Item	Execution Optimized	sample Program	VI Name	Function Prototype	Notes
TRAJECTORY PARAMETERIZE		X		X			TrajectoryParam_timeParam.vi	public static Trajectory timeParameterizeTrajectory(List <posewithcurvature> points. List<trajectoryconstraint> constraints, double startVelocityMetersPerSecond, double endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq, boolean reversed) private static void enforceAccelerationLimits(boolean reverse,</trajectoryconstraint></posewithcurvature>	This routings mode to be abouted
	X	X		No			TrajectoryParam_enforceAccel.vi	List <trajectoryconstraint> constraints, ConstrainedState state)</trajectoryconstraint>	This routines needs to be changed when new constraints are added.
		X		No			TrajectoryParam_calcStuffFwd.vi		
	X	X					TrajectoryParam_calcStuffRev.vi		This was time a manufacture to a large and
	X	X	X	No			TrajectoryParam_enforceVelocity.vi		This routines needs to be changed when new constraints are added.
TRAJECTORY PARAMETERIZE CONSTRAINED STATE	X Implemented	X Documented		X Menu Item	Execution Optimized	Sample Program	VI Name ConstrainedState_New.vi	Function Prototype ConstrainedState(PoseWithCurvature pose, double	Notes
								distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq) ConstrainedState()	
	Χ	Χ	X	Χ			ConstrainedState_SetMaxAccel.vi	V	
		X					ConstrainedState_SetMinAccel.vi		
	X		X	X			ConstrainedState_SetVelAccel.vi		
	Ϋ́	X	X	X			ConstrainedState_SetVelocity.vi		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	rest Koutine Sample Program	VI Name	Function Prototype	Notes

Revision 2.X 11/12/2021 – State Space Items – (This list is s					Added	additio			
TRAJECTORY UTIL	. X			(TrajectoryUtil_fromPathWeaverJSON.vi	public static Trajectory fromPathweaverJson(Path path)	
	X	X	X	()	X		TrajectoryUtil_MakeWeightedWayPoint.vi		
	Χ	Χ	X	()	X		TrajectoryUtil_MakeWeightedWayPoint_ENG.vi		
	X	Χ)	<			TrajectoryUtil_toPathWeaverJSON.vi	public static void toPathweaverJson(Trajectory trajectory, Path path)	
								public static Trajectory deserializeTrajectory(String json) public static String serializeTrajectory(Trajectory trajectory)	
TRAPEZOID PROFILE	X X X X X X X	X X X X X	X		Execution Optimize Test Routine		VI Name TrapProfConstraint_New.vi TrapProfile_Calculate.vi TrapProfile_Direct.vi TrapProfile_Execute.vi TrapProfile_IsFinished.vi TrapProfile_New.vi TrapProfile_New_DefInitial.vi TrapProfile_ShouldFlipAcceleration.vi TrapProfile_TimeLeftUntil.vi TrapProfile_TotalTime.vi		Private, remove from menu Private, remove from menu
	X	X		·			TrapProfState_Equals.vi		
	X	X		<u>`</u>			TrapProfState New.vi		
	mplemented	Documented	ot WPILIB		Execution Optimiz Test Routine	Sample Program			
	<u></u>	ρc	Not	ا ق	TX F	Sa	VI Name		Notes
CENTRIPETAL ACCELERATION CONSTRAINT	X	X		<			CentripetalAccelConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
		X		(CentripetalAccelConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	Χ		()	SI		CentripetalAccelConstraint_New.vi	public CentripetalAccelerationConstraint(double maxCentripetalAccelerationMetersPerSecondSq)	Can use cluster pack for now
	mplemented	Documented	WPILIB		Execution Optimized Test Routine	Sample Program			
	пр	90	Not	ב ב ב	i Xe	San	VI Name	Function Prototype	Notes
				< '	7	. <u>()</u>	DiffDriveKinematicsConstraint_getMaxVelocity.vi	i dilodori i rototypo	
DIFF DRIVE KINEMATIC CONSTRAINT	_	X		<				public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double	
DIFF DRIVE KINEMATIC CONSTRAINT	_		,				DiffDriveKinematicsConstraint_getMinMaxAccel.vi	public double getMaxVelocityMetersPerSecond(Pose2d	

SwerveDriveKinematicsConstraint_getMinMaxAccel.vi

SwerveDriveKinematicsConstraint New.vi

TRAJECTORY CONSTRAINT

Interface class - nothing done (not needed)

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 $X \mid X$

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X SI

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

poseMeters, double curvatureRadPerMeter, double

Newpublic SwerveDriveKinematicsConstraint(final

SwerveDriveKinematics kinematics, double

getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)

Can use cluster pack for now

velocityMetersPerSecond)

maxSpeedMetersPerSecond)

public MinMax

TDAINT (Min May)	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program

	1	Ğ	ž	Ž	Ú	ì r	ഗ്ഗ് VI Name	Function Prototype N	Notes
TRAJECTORY CONSTRAINT (Min Max)	X	X		X	S	1	Constraint_MinMax_New.vi	Constraint_MinMax_New	
	Χ	X		X	S		Constraint MinMax NewMinMax.VI	Constraint MinMax New	

'=======

UTILITY

'========

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	NI Name	Function Prototype	Notes
UTIL	Χ	X	X	X	SI		Util_ApproxEqual.vi		
	Χ	Χ	Χ	Χ			Util_Array_PoseWCurv_to_XY.vi		
	Χ	Χ	X	Χ	SI		Util_CalcDist.vi		
	Χ	Χ	Χ	Χ			Util_GetLibraryUsage.vi		
	Χ	Χ	X	X	SI		Util_GetLibraryVersion.vi		
	X	X	X	X			Util_GetTime.vi		Once tested completely, this should be optimized!
	Χ	Χ	X		N/A		Util_LibraryGlobals.vi		Global Variables – no block diag.
	Χ	Χ	X	X			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	Χ	Χ	No			Util_Trajectory_WriteFile_OneState.vi		internal
	Χ	Χ	X	Χ			Util_Trajectory_WriteFile_PathFinder.vi		
	Χ	Χ	Χ	No			Util_Trajectory_WriteFile_PathFinderConfig.vi		internal
	X	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
	X	Χ	Χ	Χ			Util_Trajectory_WriteFile.vi		
	Χ	Χ	Χ	X			Util_TrajectoryState_Meters_To_Inches.vi		
	Χ	Χ	Χ	X			Util_TrajState_to_DiffDrive_WheelPos.vi		
	Χ	Χ	X	Χ			Util_Waypoint_Eng_To_SI.vi		
	Χ	Χ	X	X			Util_Waypoint_To_CubicInput.vi		
	Χ	Χ	Χ	X			Util_Waypoint_To_QuinticInput.vi		
	X	X	X	No			Util_WeightedWayPoint_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	X	X	SI			Conv_AngleRadians_Heading.vi		

s Sun m	ussing	g one	۷۱)	Add	ed additi	ional columns for test and sample.
X	X	X	X	SI		Conv_Centimeters_Meters.vi
X		X	X	SI		Conv_Deg_Radians.vi
X	X	X	X	SI		Conv_Feet_Meters.vi
X	X	X	X	SI		Conv_GyroDegrees_Heading.vi
X	X	X	X	SI		Conv_Heading_AngleRadians.vi
X	X	X	X	SI		Conv_Inches_Meters.vi
X	X	X	X	SI		Conv_Kilograms_Pounds.vi
X	X	X	X	SI		Conv_Meters_Feet.vi
X	X	X	X	SI		Conv_Meters_Inches.vi
X	X	X	X	SI		Conv_POSE_SI_Eng.vi
X	X	X	X	SI		Conv_Pounds_Kilograms.vi
X	X	X	X	SI		Conv_Radians_Deg.vi
X	Χ	X	X	SI		Conv_Yards_Meters.vi

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes
UNITS	X	Χ		Χ			Units_DegreesToRadians.vi	· · · · · · · · · · · · · · · · · · ·	
	X	Χ		Χ			Units_FeetToMeters.vi		
	X	X		Χ			Units_InchesToMeters.vi		
	X	Χ		Χ			Units_MetersToFeet.vi		
	Χ	Χ		Χ			Units_MetersToInches.vi		
	X	X		Χ			Units_RadiansPerSecondToRotationsPerMinute.vi		
	X	Χ		Χ			Units_RadiansToDegrees.vi		
	X	X		Χ			Units_RotationsPerMinuteToRadiansPerSecond.vi		

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PATHFINDER UTIL

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

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

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STATE SPACE MODEL

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized Test Routine	Sample Program emble Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DC MOTOR	Χ	X		X	SI	DCMotor_GetAndymark9015.vi					
	Χ	X		X	SI	DCMotor_GetAndymarkRs775_125.vi					
	Χ	Χ		Χ	SI	DCMotor_GetBag.vi					
	Χ	Χ		X	SI	DCMotor_GetBanebotsRs550.vi					

Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample.

		, , ,						
X	X	SI	DCMotor_GetBanebotsRs775.vi					
	X	SI	DCMotor_GetCIM.vi					
	X	SI	DCMotor_GetCurrent.vi					
X	X	SI	DCMotor_GetFalcon500.vi					
	X	SI						
	X	SI	DCMotor_GetNEO.vi					
X	X	SI	DCMotor_GetNEO550.vi					
X	X	SI	DCMotor_GetVex775Pro.vi					
	X	SI	DCMotor_GetRomiBuiltIn.vi					
	X	SI	DCMotor_New.vi					
X	X		DCMotor_PickMotor.vi					
	X	X	X	X X SI DCMotor_GetCIM.vi X X SI DCMotor_GetCurrent.vi X X SI DCMotor_GetFalcon500.vi X X SI DCMotor_GetMiniCIM.vi X X SI DCMotor_GetNEO.vi X X SI DCMotor_GetNEO550.vi X X SI DCMotor_GetVex775Pro.vi X X SI DCMotor_GetRomiBuiltIn.vi X X SI DCMotor_New.vi Y Y DCMotor_New.vi	X X SI DCMotor_GetBanebotsRs775.vi X X SI DCMotor_GetCIM.vi X X SI DCMotor_GetCurrent.vi X X SI DCMotor_GetFalcon500.vi X X SI DCMotor_GetMiniCIM.vi X X SI DCMotor_GetNEO.vi X X SI DCMotor_GetNEO550.vi X X SI DCMotor_GetVex775Pro.vi X X SI DCMotor_GetRomiBuiltIn.vi X X SI DCMotor_New.vi	X X SI DCMotor_GetBanebotsRs775.vi X X SI DCMotor_GetClM.vi X X SI DCMotor_GetCurrent.vi X X SI DCMotor_GetFalcon500.vi X X SI DCMotor_GetMiniClM.vi X X SI DCMotor_GetNEO.vi X X SI DCMotor_GetNEO550.vi X X SI DCMotor_GetVex775Pro.vi X X SI DCMotor_GetRomiBuiltln.vi X X SI DCMotor_New.vi	X X SI DCMotor_GetBanebotsRs775.vi X X SI DCMotor_GetCIM.vi X X SI DCMotor_GetCurrent.vi X X SI DCMotor_GetFalcon500.vi X X SI DCMotor_GetMiniCIM.vi X X SI DCMotor_GetNEO.vi X X SI DCMotor_GetNEO550.vi X X SI DCMotor_GetVex775Pro.vi X X SI DCMotor_GetRomiBuiltIn.vi X X SI DCMotor_New.vi	X X SI DCMotor_GetBanebotsRs775.vi X X SI DCMotor_GetClM.vi X X SI DCMotor_GetCurrent.vi X X SI DCMotor_GetFalcon500.vi X X SI DCMotor_GetMiniClM.vi X X SI DCMotor_GetNEO.vi X X SI DCMotor_GetNEO550.vi X X SI DCMotor_GetVex775Pro.vi X X SI DCMotor_GetRomiBuiltIn.vi X X SI DCMotor_New.vi

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

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

> Function Prototype Notes DIFFERENTIAL DRIVE POSE ESTIMATOR X X Χ DiffDrivePoseEst_AddVisionMeasurement.vi Just a shell, not functional! XX Χ DiffDrivePoseEst_FillStateVector.vi XX Χ DiffDrivePoseEst_GetEstimatedPosition.vi Χ X DiffDrivePoseEst_Kalman_F_Callback.vi Χ Χ DiffDrivePoseEst_Kalman_H_Callback.vi X X Χ DiffDrivePoseEst_New.vi XX Χ DiffDrivePoseEst_ResetPosition.vi X X Χ DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi XX Χ

DiffDrivePoseEst_Update.vi

DiffDrivePoseEst UpdateWithTime.vi

DiffDrivePoseEst VisionCorrect Callback.vi

DiffDrivePoseEst VisionCorrect Kalman H Callback.vi

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Function Prototype Notes EXTENDED KALMAN FILTER X X Χ Just a shell, not functional! ExtendedKalmanFilter_Correct.vi Χ ExtendedKalmanFilter_Correct_OnlyUY.vi XX X ExtendedKalmanFilter_GetP.vi

RALMAN FILTER LATENCY COMPENSATOR X X X X X X X X X	RC LabVIEW Trajectory Library – VI Implementat	on List	t							
	evision 2.X 11/12/2021 – State Space Items – (This list i					Added add				
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ALAMA FILTER LATERCY COMPENSATION X X X X X X X X X		X	X							
X		X	X							
MALMAN FILTER LATERCY COMPENSATION		X	X		Χ		_			
Control Cont		X	X							
Function Printings		X	X							
Section		X	X		Χ		ExtendedKalmanFilter_SetXHat_Single.vi			
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KalmanFilterLatencyComp FindClosestMeasurement.vi Work in progress.			^	.	- `					
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SWERVE DRIVE POSE ESTIMATOR SwerveDrive PoseEst Madd/sionMeasurement_StdDev.vi Haven't started yet		X	X				KalmanFilterLatencyComp_Reset.vi Work in progress.			
SWERVE DRIVE POSE ESTIMATOR Swerve Drive Pose Est_AddVision Measurement_Std Dev.vi		X	$\perp X \perp$		X		KalmanFilterLatencyComp_New.vi Work in progress.			
SWERVE DRIVE POSE ESTIMATOR SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi		mplemented	<i>Socumented</i>	Vot WPILIB	Jenu Item	Execution Optimized Fest Routine	VI Name Function Prototyne Notes	Sode Review	Fest Program	Error Checking
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X X SwerveDrivePoseEst GetEstimatedPosition.vi		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\							
X X SwerveDrivePoseEst GetEstimatedPosition.vi		\ \rightarrow\cdot\ \rightarro	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	\rightarrow	л У					
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X X X		Y	Y	·	Y		Swervel IrivePoseEst (GetEstimatedPosition VI			

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XX	X		SwerveDrivePoseEst_ResetPosition.vi	Haven't started yet
XX	X		SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi	Haven't started yet
XX	X		SwerveDrivePoseEst_Update.vi	Haven't started yet
XX	X		SwerveDrivePoseEst_UpdateWithTime.vi	Haven't started yet
				Haven't started vet

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER	Χ			Χ				UnscentedKalmanFilter_Correct.vi		Work in progress.			
	Χ			Χ				UnscentedKalmanFilter_Correct_FuncGroup.vi					
	Х			Χ				UnscentedKalmanFilter_Correct_OnlyUY.vi					
	Χ			Χ				UnscentedKalmanFilter_Correct_OnlyUYR.vi					
	Χ	X		Χ				UnscentedKalmanFilter_GetP.vi					
	Χ	X		Χ				UnscentedKalmanFilter_GetP_Single.vi					
	Χ	X		Χ				UnscentedKalmanFilter_GetXHat.vi					
	Χ	X		Х				UnscentedKalmanFilter_GetXHat_Single.vi					
	Χ			Χ				UnscentedKalmanFilter_New.vi					
	Χ			Χ				UnscentedKalmanFilter_New_Default.vi					
	Χ			Χ				UnscentedKalmanFilter_New_FuncGroup.vi					
	X	Χ		Х				UnscentedKalmanFilter_Predict.vi					
	Χ	Χ		Χ				UnscentedKalmanFilter_Reset.vi					
	Χ	Χ		Χ				UnscentedKalmanFilter_SetP.vi					
	Χ	Χ		Χ				UnscentedKalmanFilter_SetXHat.vi					
	Χ	Χ		Χ				UnscentedKalmanFilter_SetXHat_Single.vi					
	Χ			Χ				UnscentedKalmanFilter_Transform.vi					

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

Function Prototype Notes CONTROL AFFINE PLANT INVERSION FEEDFORWARD

X X Menu Item Function Prototype Notes LinearPIntInvFF_Calculate.vi LinearPIntInvFF_Calculate_NextR.vi Χ LinearPIntInvFF GetUff.vi Χ LinearPIntInvFF New.vi X LinearPIntInvFF_New_Plant.vi LinearPIntInvFF_Reset_Initial.vi $\frac{X}{X}$ LinearPIntInvFF Reset Zero.vi X X LinearPIntInvFF GetUff Single.vi Χ XX

RC LabVIEW Trajectory Library – VI Implementation evision 2.X 11/12/2021 – State Space Items – (This list is s	n List	t issina (nne VI) Adde	he he	ditional columns for test and sample					
11/12/2021 - State Space Items - (11113 1131 13 3	X	X	X		Ju au	LinearPIntInvFF_GetR.vi					
	Χ	X	X			LinearPIntInvFF_GetR_Single.vi					
	Implemented	Documented	Not WPILIB	Execution Optimized	Test Routine	Nample Program			Code Review	Program	. Checking
	əldu	700	ot V	xec	est	W VI Name	From atting Department	Mada	oqe	Test	Error
LINEAR QUADRATIC REGULATOR	_ <u>2</u> _		> > X		<u> </u>	LinearQuadraticRegulator_Calculate_NextR.vi	Function Prototype	Notes			Щ
LINEAR QUADRATIC REGULATOR	X		$\frac{1}{x}$			LinearQuadraticRegulator_Calculate.vi					
	X		$\frac{\lambda}{\lambda}$			LinearQuadraticRegulator_GetK_Single.vi		NOT ORIGINAL			
	X		X		X	LinearQuadraticRegulator GetK.vi					
	X		X			LinearQuadraticRegulator_GetR_Single.vi					
	X		X			LinearQuadraticRegulator_GetR.vi					
	X		X			LinearQuadraticRegulator_GetU_Single.vi					
	X		X			LinearQuadraticRegulator_GetU.vi					
	/	X	X		X	LinearQuadraticRegulator_LatencyCompensate.vi		Routine exists, but it only has			
	V	V			-	LincowOverdentia Denvelator Neve FLMC vi		interger raise matrix to power.			
	Χ	<i>\</i>	X			LinearQuadraticRegulator_New_ELMS.vi LinearQuadraticRegulator_New_Raw.vi					
		X	X		X	LinearQuadraticRegulator_New_SystemELMS.vi					
	^	^	^		^	LinearQuadraticRegulator_New_N.vi					
	X	X	X			LinearQuadraticRegulator_New.vi					
	X		$\frac{1}{x}$			LinearQuadraticRegulator_Reset.vi					
	Q	Ø)ptimi.	Φ.	gram			Ŋ	E	ging
LINEAR SYSTEM		X	Not WPILIB X Menu Item		Test Routine	VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM	X X X	X X X	X	Execution	Test Routine	VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi	Function Prototype	Notes	Code Review	Test Program	õ
LINEAR SYSTEM	X X X X	X X X	X X X	Execution	Test Routine	VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi	Function Prototype	Notes	Code Review	Test Program	õ
LINEAR SYSTEM	X X X X	X X X X	X X X	Execution	Test Routine	VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi	Function Prototype	Notes	Code Review	Test Program	jo.
LINEAR SYSTEM	X X X X X	X X X X X	X X X X	Execution	Test Routine	VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi	Function Prototype	Notes	Code Review	Test Program	<u>0</u>
LINEAR SYSTEM	X X X X X X	X X X X X X	X X X X X	Execution	Test Routine	VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetBElement.vi LinearSystem_GetBC.vi	Function Prototype	Notes	Code Review	Test Program	<u>0</u>
LINEAR SYSTEM	X X X X X X X	X X X X X X X	X	Execution	Test Routine	VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi	Function Prototype	Notes	Code Review	Test Program	<u>0</u>
LINEAR SYSTEM	X X X X X X X X	X X X X X X X X	X	Execution	Test Routine	VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi	Function Prototype	Notes	Code Review	Test Program	<u>0</u>
LINEAR SYSTEM	X X X X X X X X X	X X X X X X X X X X X	X	Execution	Test Routine	VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi	Function Prototype	Notes	Code Review	Test Program	<u>0</u>
LINEAR SYSTEM	X X X X X X X X X	X X X X X X X X	X	Execution	Test Routine	VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi	Function Prototype	Notes	Code Review	Test Program	ó
LINEAR SYSTEM	X X X X X X X X X	X X X X X X X X X X	X	Optimized		VI Name LinearSystem_CalculateX.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetBelement.vi LinearSystem_GetBelement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetD.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi	Function Prototype	Notes			Error
LINEAR SYSTEM	X X X X X X X X X	X X X X X X X X X X	X	Optimized		VI Name LinearSystem_CalculateX.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetBElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetD.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi	Function Prototype	Notes			r Checking Error
LINEAR SYSTEM	X X X X X X X X X	X X X X X X X X X X	X	Optimized		VI Name LinearSystem_CalculateX.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetBElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetD.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi					r Checking Error
	Implemented X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	XX	Execution Optimized Execution		VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi LinearSystem_New.vi	Function Prototype Function Prototype	Notes	Code Review Code Review	Test Program Test Program	0
LINEAR SYSTEM	X X X X X X X X X X X X X X X 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 Execution		VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetBelement.vi LinearSystem_GetBelement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi LinearSystem_New.vi					r Checking Error
	X X X X X X X X X X X X X X 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	Execution Optimized Execution		VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetBelement.vi LinearSystem_GetBelement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi LinearSystem_New.vi					r Checking Error
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	XX	Execution Optimized Execution		LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi LinearSystem_New.vi					r Checking Error
	X X X X X X X X X X X X X X 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	Execution Optimized Execution		VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetBelement.vi LinearSystem_GetBelement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetDelement.vi LinearSystem_GetDelement.vi LinearSystem_New.vi					r Checking Error

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X	X	X			LinearSystemLoop_GetFeedForward.vi
X		X			LinearSystemLoop_GetNextR_Single.vi
X		X			LinearSystemLoop_GetNextR.vi
X	X	X			LinearSystemLoop_GetObserver.vi
X	X	X			LinearSystemLoop_GetU_Row.vi
X	X	X			LinearSystemLoop_GetU.vi
X	X	X			LinearSystemLoop_GetXHat_Single.vi
X	X	X			LinearSystemLoop_GetXHat.vi
					LinearSystemLoop_New_BBB
					LinearSystemLoop_New_LinearSystem_ClampFunc
X	X	X			LinearSystemLoop_New_LinearSystem_ClampVal.vi
X	X	X			LinearSystemLoop_New.vi
X	X	X			LinearSystemLoop_Predict.vi
X	X	X			LinearSystemLoop_Reset.vi
					LinearSystemLoop_SetClampFunction.vi
					LinearSystemLoop_SetNextR_Some.vi
X	X	X			LinearSystemLoop_SetNextR.vi
					LinearSystemLoop_SetXHat_Single.vi
					LinearSystemLoop_SetXHat.vi

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

CALLBACK HELPER	X X Implemented		X X X		Execution Optimized	Test Routine	VI Name CallbackHelp_MatrixMinus.vi CallbackHelp_MatrixMult.vi CallbackHelp_MatrixMult_CoerceSizeB.vi CallbackHelp_MatrixPlus.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	mplemented	nented	PILIB	Item	Execution Optimized	Test Routine	eg S VI Name			Review	Test Program	Checking
	трІеп	ocun	lot W.	Jenn	xecu	est R	O E E VI Name	Function Prototyne	Notes	Sode F	est P	irror C
DISCRETIZATION	_	_					VI Name Discretization DiscretizeA.vi	Function Prototype	Notes	Code Review	Test P	Error C
DISCRETIZATION	X	X X	1	X X		X X	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi	Function Prototype	Notes	Code F	Test P.	Error C
DISCRETIZATION	X	Χ	1	X		X	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi	Function Prototype	Notes	Code F	Test P.	Error C
DISCRETIZATION	X X X	X X X		X X X		X X X	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi	Function Prototype	Notes	Code F	Test P.	Error C
DISCRETIZATION	X X X	X X X		X X X		X X	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi	Function Prototype	Notes	Code F	Test P.	Error C
DISCRETIZATION	X X X	X X X		X X X		X X X	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi	Function Prototype	Notes	Code F	Test P	Error C
DISCRETIZATION	X X X	X X X		X X X		X X X	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi	Function Prototype	Notes	Code F	Test P	Error C
DISCRETIZATION	X X X X	X X X	m	X X X X	otimized	X X X	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi				Program	Checking
	Implemented X X X	X X X X	Not WPILIB	Wenu Item	Execution Optimized	X X X X X X X X X X X X X X X X X X X	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi	Function Prototype Function Prototype	Notes	Code Review Code F		Error
DISCRETIZATION	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	Execution Optimized	X X X X X X X X X X X X X X X X X X X	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi				Program	Checking
	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	Wenu Item	Execution Optimized	X X X X X X X X X X X X X X X X X X X	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi				Program	Checking

/	' X			StateSpaceUtil_IsStabalizable.vi			1
\ \ \	(X	X		StateSpaceUtil_PoseToVector.vi			1
>	(X	X		StateSpaceUtil_ClampInputMaxMagnitude.vi	Routine exists, it is just a shell		i
>	<i>(X</i>	X		StateSpaceUtil_NomalizeInputVector.vi			1
>	(X	X		StateSpaceUtil_PoseTo4dVector.vi			ı
>	(X	X		StateSpaceUtil_PoseTo3dVector.vi			
							1

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

> Function Prototype Notes BatterySim_CalculateDefaultBatteryLoadedVoltage.vi
> BatterySim_CalculateLoadedVoltage.vi X SI X SI

	Implemented Documented Not WPILIB	Menu Item	Execution Optimi:	Test Routine Sample Program <	/I Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE TRAIN SIM		\overline{X}			DiffDriveTrainSim_ClampInput.vi	71				
	XX	X			DiffDriveTrainSim CreateKitbotSim.vi					
	XX	X			DiffDriveTrainSim_CreateKitbotSim_EstMass.vi					
	XX	X		D	DiffDriveTrainSim CreateKitbotSim EstMassMOI.vi					
	XX	X		D	DiffDriveTrainSim_GetCurrentDrawAmps.vi					
	XX	X		D	DiffDriveTrainSim_GetCurrentGearing.vi					
	XX	X		D	DiffDriveTrainSim_GetDynamics.vi					
	XX	X			DiffDriveTrainSim_GetHeading.vi					
	XX	X			DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi					
	XX	X			DiffDriveTrainSim_GetLeftPositionMeters.vi					
	XX	X			DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi					
	XX	X		D	DiffDriveTrainSim_GetOutput_Single.vi					
	XX	X			DiffDriveTrainSim_GetPose.vi					
	X X	X			DiffDriveTrainSim_GetRightCurrentDrawAmps.vi					
	XX	X			DiffDriveTrainSim_GetRightPositionMeters.vi					
	XX	X		D	DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi					
<u> </u>	XX	X			DiffDriveTrainSim_GetState.vi					
<u> </u>	XX	X			DiffDriveTrainSim_GetState_Single.vi					
	XX	X			DiffDriveTrainSim_KitBotWheelSize.vi					
	XX	X			DiffDriveTrainSim_New.vi					
	XX	X			DiffDriveTrainSim_New_Mass_MOI.vi					
	XX	X			DiffDriveTrainSim_SetCurrentGearing.vi					
	XX	X			DiffDriveTrainSim_SetInputs.vi					
	XX	X			DiffDriveTrainSim_SetPose.vi					
	XX	X			DiffDriveTrainSim_SetState.vi					
	XX	X		D	DiffDriveTrainSim_ToughBoxMiniGearRatio.vi					
	XX	X			DiffDriveTrainSim_ToughBoxMiniMotor.vi					
	XX	X		D	DiffDriveTrainSim_Update.vi					
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		(Х			ElevatorSim_GetCurrentDraw.vi					
		(X			ElevatorSim_GetPositionMeters.vi					
	X	(X			ElevatorSim_GetVelocityMetersPerSecond.vi ElevatorSim_SetState.vi					+
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		(X			ElevatorSim_UpdateX.vi					
		(X			ElevatorSim_WouldHitLowerLimit.vi					
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	λ	(X	X			ElevatorSim_Update.vi		Needed because this doesn't			
		(X			ElevatorSim HasHitLowerLimit.vi		extend.			
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		(X	No			ElevatorSim_RKF45_Func.vi					+
							ElevatorSim_New_NoNoise.vi					
							ElevatorSim_New_LinSys.vi					
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F	FLYWHEEL SIM >	(Not 1	X	Exec Test	Sam	FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_New_MOI.vi	Function Prototype	Notes	Code	Test	
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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
SINGLE JOINT ARM SIM		X		Χ			SngJntArmSim_EsitmateMOI.vi					
	X	X		Χ			SngJntArmSim_GetAngleRads.vi					
	X	X		Χ			SngJntArmSim_GetCurrentDraw.vi					
	X	X		Χ			SngJntArmSim_GetVelocityRadsPerSec.vi					
	X	X		Χ			SngJntArmSim_HasHitLowerLimit.vi					
	X	X		X			SngJntArmSim_HasHitUpperLimit.vi					
	X	X		Χ			SngJntArmSim_New.vi					
	X	X		No			SngJntArmSim_Rkf45_Func.vi					
	X	X		Χ			SngJntArmSim_SetInputVoltage.vi					
	X			Χ			SngJntArmSim_Update.vi					
	X	X		Χ			SngJntArmSim_UpdateX.vi					
	X	X		Χ			SngJntArmSim_WouldHitLowerLimit.vi					
	X	X		X			SngJntArmSim_WouldHitUpperLimit.vi					

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

> X X Menu Item
>
> 9 9 Execution Optimized Function Prototype Notes MAT BUILDER X MatBuilder Fill.vi MatBuilder_Create.vi

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimi	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX	X	X		X	SI			Matrix_AssignBlock.vi					
	X	X		X	SI			Matrix_Block.vi					
	X	X		X	SI			Matrix_Create.vi					
	X	X		X	SI			Matrix_Diag.vi					
	X	X		X	SI			Matrix_ElementSum.vi					
	X	X		X	I			Matrix_Exp.vi					
	X	X		X	SI			Matrix_ExtractColumnVector.vi					
	X	X		X	SI			Matrix_ExtractFrom.vi					
	X			X	SI			Matrix_ExtractMatrix.vi					
	X	X		X	SI			Matrix_ExtractRowVector.vi					
	X	X		X	SI			Matrix_Fill.vi					
	X	X		X	1			Matrix_Ident.vi					
	X	X		X	SI			Matrix_lsEqual.vi					
	X	X		X	I			Matrix_LItDecompose.vi					
	X	X		X	I			Matrix_Pow.vi					
	X	X		X	SI			Matrix_SetColumn.vi					

X X	(X	SI	Matrix_SetRow.vi	THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT SHOULD BE INCLUDED HERE FOR ISOLATION.	

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

	Implemented	Documen	Not WPILIB	Menu rem	Execution Optimized Test Routine	O VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
VECTOR BUILDER	X	X		Υ .		VecBuilder_1x1Fill.vi					
	X	X			SI	VecBuilder_2x1Fill.vi					
	X	X			SI	VecBuilder_3x1Fill.vi					
	X	X			SI	VecBuilder_4x1Fill.vi					
	X	X			SI	VecBuilder_5x1Fill.vi					
	X	X			SI	VecBuilder_6x1Fill.vi					
	Χ	X		Χ .	SI	VecBuilder_7x1Fill.vi					
	Χ	X		Χ .	SI	VecBuilder_8x1Fill.vi					
						VecBuilder_9x1Fill.vi					
						VecBuilder_10x1Fill.vi					
	X	X	X = 2	Χ ,	SI	VecBuilder_ArrayBy1Fill.vi					

'======== MATH '========

> Function Prototype Notes AngleStats_AngleAdd.vi
> AngleStats_AngleAdd_CallbackHelp.vi
> AngleStats_AngleMean.vi
> AngleStats_AngleMean_CallbackHelp.vi
> AngleStats_AngleResidual.vi ANGLE STATISTICS X X XIX X X X X X XX X I X X X X X X XX X I X X X X X X AngleStats_AngleResidual_CallbackHelp.vi

	list is still m	t issing on	ne VI	.) Add	led additi	onal columns for test and sample.					
	Implemented	Documented	icib tem	ion Optimizec	Test Routine Sample Program				Review	Program	;
	nelc	cum	Menu Item	Execution	Test Rou Sample				de F	st Pr	
					Sa 7e		Function Prototype	Notes	ಟ	Test	
MATH U	TILITY X		X	SI		MathUtil_AngleModulus.vi MathUtil_Clamp.vi					
	X			SI		MathUtil_ApplyDeadband.vi					
	X		X	SI		MathUtil_Clamp_Int.vi					
	X	X	X	SI		MathUtil_InputModulus.vi					
MERWE SCALED SIGMA PO	DINTS X X X 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.vi MerweScSigPts_GetWc_Single.vi MerweScSigPts_GetWm.vi MerweScSigPts_GetWm_Single.vi	Function Prototype	Notes	Code Review	Test Program	
	X			1		MerweScSigPts_New.vi					
	X	X	X	1		MerweScSigPts_New_Default.vi					
	X	X	Y	1		MerweScSigPts_SigmaPoints.vi					
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				timized	Test Routine Sample Program		Function Prototype	Notes	Code Review	Test Program	
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NUMERICAL INTEGRA	X Implemented	Documented Not Milling	No. Wern Item	Execution Optimized	Test Routine Sample Program	VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi	Function Prototype	Notes	Code Review	Test Program	
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NUMERICAL INTEGRA	ATION X X X X X X X X X X X X X	d Documented	No No No No X X X X X X X X X X X X X X	Optimized Execution Optimized	ne ogram	VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_K_Dbl.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rk45Impl.vi NumIntegrate_Trap_Dbl.vi NumIntegrate_Trap_Mat.vi	Function Prototype	NOT DONE	?eview Code Review		
NUMERICAL INTEGRA	ATION X X X X X X X X X X X X X	d Documented	No No No No X X X X X X X X X X X X X X	Optimized Execution Optimized	ne ogram	VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_K_Dbl.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rk45Impl.vi NumIntegrate_Trap_Dbl.vi NumIntegrate_Trap_Mat.vi	Function Prototype	NOT DONE	e Review		
NUMERICAL INTEGRA	ATION X X X X X X X X X X X X X	Documented Not Will IR	No No X X X No X X X X X X X X X X X X X	Optimized Execution Optimized	Test Routine Sample Program	VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_K_Dbl.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rk45Impl.vi NumIntegrate_Trap_Dbl.vi NumIntegrate_Trap_Mat.vi	Function Prototype Function Prototype	NOT DONE	Code Review Code Review	Test Program Test Program	

Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample

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X		Χ			NumJacobian_U.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nampe Nogram	Function Prototype	Notes	Code Review	Test Program	Error Checking
RICCATI	/			Χ			Riccati_Check_Detectable.vi		Routine exists, it is just a shell			
	/			X			Riccati_Check_Stabilizable.vi		Not really done !!!			
	Χ	Χ		X		X	Riccati_DARE.vi					
	Χ			X		X	Riccati_DARE_Iterate.vi					
	Χ	Χ		X			Riccati_DARE_N.vi					
	Χ			X			Riccati_Input_Check.vi					

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

> Sample Prog Not WPILIB VI Name Function Prototype Notes X X N/A ARM FF.CTL TypeDef Z X X N/A BICon-Matrix FUNC TYPE.CTL Ζ X X N/A CALLBACK_FUNC_TYPE.CTL Z X X X N/A CHASSIS_SPEEDS.CTL Z X X X N/A CONTRAINED STATE.CTL Z X X N/A DCMOTOR.CTL Z X X X N/A DIFF_DRIVE_KINEMATICS.CTL Ζ X X N/A DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl Ζ X X N/A DiFF_DRIVE_POSE_EST.ctl X X N/A Ζ DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl X X N/A Ζ DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl X X N/A Ζ DIFF DRIVE TRAIN SIM.ctl Ζ X X N/A ELEVATOR_SIM.CTL X X N/A Ζ ELEV FF.CTL X X N/A Ζ EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL X X N/A ExTENDED_KALMAN_FILTER.CTL Ζ Ζ X X N/A FLYWHEEL SIM.ctl Ζ X X N/A HOLONOMIC DRV CTRL.CTL New 1/26/21 Ζ X X N/A KALMAN_FILTER.ctl X X N/A KALMAN_FILTER_LATENCY_COMP.CTL Z X X X N/A LINEAR_FILTER.CTL X X N/A LINEAR_PLANT_INV_FF.ctl X X N/A LINEAR_QUADRATIC_REGULATOR.ctl Ζ X X N/A LINEAR_SYSTEM_LOOP.ctl X X N/A LINEAR_SYSTEM_SIM.ctl X X N/A LINEAR SYSTEM.ctl Z X X X N/A MECA DRIVE KINEMATICS.CTL Z X X X N/A MECA_DRIVE_ODOMETRY.CTL Z X X X N/A MECA_WHEEL_SPEEDS.CTL Ζ X X N/A MEDIAN FILTER.CTL X X N/A MERWE_SCALED_SIGMA_PTS.ctl

still mi	ssing			Added a	dditional columns for test and sample.	
Z		Χ	Χ	N/A	OBSERVER_SNAPSHOT.CTL	
Z		X	X	N/A	OBSERVER_SNAP_LIST_ITEM.CTL	
Z	Χ	X		N/A	PARAM STACK ITEM.CTL	
Z	Χ	X		N/A	PARAM STACK.CTL	
Z	, ,	X		N/A	PID ADV LIMITS.CTL	
Z		X	\overline{X}	N/A	PID ADV TUNING.CTL	
Z		X	\overline{X}	N/A	PID CONTROLLER.CTL	
Z		X		N/A	PID ERROR TOLERANCE.CTL	
Z		X	\hat{X}	N/A	PID INPUT LIMITS.CTL	
			X	N/A	PID_INFO1_CIMITS.CTL PID_TUNING.CTL	
Z	V	X		N/A	POSE2D.CTL POSE2D.CTL	
Z	X	X	X			
Z	Х	X		N/A	POSEwCURVATURE.CTL	
Z	`	X		N/A	PROFILED_PID_CONTROLLER.CTL	
Z	Χ	Χ	Χ	N/A	RAMSETE.CTL	
Ζ		Χ		N/A	RAMSETE_EXE_TUNING.CTL	
Z	Χ	Χ		N/A	ROTATION2D.CTL	
Z		X		N/A	SINGLE_JOINT_ARM_SIM.CTL	
Z	Χ	X	X	N/A	SIMPLE_MOTOR_FF.CTL	
Z		X	X	N/A	SLEW_RATE_LIMITER.CTL	
Z	Χ	X	X	N/A	SPLINE CTRL VECTOR.CTL	
Z	Χ	X	X	N/A	SPLINE.CTL	
Z	Χ	X		N/A	SWERVE DRIVE KINEMATICS.CTL	
Z	Χ	X		N/A	SWERVE DRIVE MODULE STATE.CTL	
Z	X	X		N/A	SWERVE DRIVE ODOMETRY.CTL	
Z	,,	- / /		N/A	SWERVE DRIVE POSE EST.CTL	
Z		Х	X	N/A	TIMER.CTL	
Z	Χ	X	X	N/A	TRAJ_CONFIG.CTL	
Z	X	X	\dot{X}	N/A	TRAJ_CONTRICTE TRAJ_CONTRICTE TRAJ_CONTRICTE TRAJ_CONTRICTE	
Z	X	X	X	N/A	TRAJ_CONSTRAINT_CENTRIFETAL_ACCEL.CTL TRAJ_CONSTRAINT_DIFF_DRIVE_KINEMATICS.CTL	
	X					
Z	<i>X</i>	X	Χ	N/A	TRAJ_CONSTRAINT_DIFF_DRIVE_VOLTAGE.CTL	Devision exists it is instancially
١ -		X		N/A	TRAJ_CONSTRAINT_JERK.CTL	Routine exists, it is just a shell
Z	X	X		N/A	TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL	
Ζ	Χ	Χ		N/A	TRAJ_CONSTRAINT_MINMAX.CTL	
Ζ	Χ	Χ	Χ	N/A	TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	
Ζ	Χ	Χ	Χ	N/A	TRAJ_STATE.CTL	
Z	Χ	X	Χ	N/A	TRAJECTORY.CTL	
Z		Χ		N/A	TRAJECTORY_SPLINE_TYPE_ENUM.CTL	
Z	Χ	X		N/A	TRANSFORM2D.CTL	
Z	Χ	X		N/A	TRANSLATION2D.CTL	
Z		X		N/A	TRAPEZOID_PROFILE_CONSTRAINT.CTL	
Z		Х		N/A	TRAPEZOID PROFILE STATE.CTL	
Ζ		Х		N/A	TRAPEZOID_PROFILE.CTL	
	Χ	X			TWIST2D.CTL	
Z	-			N/A	UNSCENTED KALMAN FILTER.ctl	
Z		X		N/A	UNSCENTED KALMAN NEW FUNC GROUP.CTL	
Z		$\frac{\lambda}{X}$		N/A	UNSCENTED KALMAN CORRECT FUNC GROUP.CTL	
Z	X	X		N/A	UTIL PATHFINDER CONFIG.CTL	
				NA NA	UTIL WAYPOINT.ctl	
Z	Χ	X	X	NA NA	UTIL WEIGHTED WAYPOINT.ctl	Now V1 5
		X	Χ			New V1.5
N/A		N/A	1/	N/A	WAYPOINTS.CTL	Delete – obsolete
Z		X	Χ	NA	WEIGHTED_WAYPOINT.CTL	New V1.5
N/A		N/A		N/A	X_Y_HEADINGS.CTL	Delete – obsolete