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 (/)
STRL Shell Total (\)
2

VI Total (X)
CTL Total (Z)
VI Shell Total (/)
2

VI Total (X)
79
9
2

Doc completed Pct 77.84% Optimization Pct 41.29%

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

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BASE

								,		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program			
			ž			۳,	Ŋ		unction Prototype	Notes
LINEAR FILTER		X	V	X	SI			LinearFilter_Calculate.vi		
	X	X	X	X	7		X	LinearFilter_CutoffFrequency.vi LinearFilter Execute.vi		Labriour atria balbar
	X	X	_^	X	X		^	LinearFilter_HighPass.vi		Labview style helper
	X	X	X	X	X			LinearFilter_HighPassBW1.vi		
	\hat{x}	X	X	X	X			LinearFilter_HighPassBW2.vi		
	X	X	X	X	X			LinearFilter LowPassBW1.vi		
	X	X	X	X	X			LinearFilter LowPassBW2.vi		
	X	X	-	X	X			LinearFilter_MovingAverage.vi		
	X	Χ		X	I			LinearFilter New.vi		
	X	Χ		X	SI			LinearFilter Reset.vi		
	X	X	X	X	SI			LinearFilter_ResetToValue.vi		
	X	X		X	Χ			LinearFilter_SinglePoleIIR.vi		
	X	Χ	X	X	Χ			LinearFilter_TimeConst.vi		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name F	function Prototype	Notes
MEDIAN FILTER		X		X	X		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	MedianFilter Calculate.vi	anoton i rototypo	11000
MEDIMATICIEN	\hat{x}	X	X	X	1		X	MedianFilter Execute.vi		Labview style helper
	X	X		X	SI		-/-	MedianFilter New.vi		Lastion otylo holpol
	X	X		X	SI			MedianFilter Reset.vi		
	X	X	X	X	SI			MedianFilter ResetToValue.vi		
						1				

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

	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	I			SlewRateLimiter_Reset.vi		
	Χ	X		X	SI			SlewRateLimiter_SetRate.vi		

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

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		Function Prototype	Notes
ARM FF	X	Χ		Χ			ArmFF_Calculate.vi		
	Χ	Χ		Χ			ArmFF_CalculateVelocityOnly.vi		
			Χ				ArmFF_Execute.vi		LabVIEW style single call
			Χ				ArmFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	X	Χ		Χ			ArmFF_MaxAchieveAccel.vi		
	X	Χ		Χ			ArmFF_MaxAchieveVelocity.vi		
	X	Χ		Χ			ArmFF_MinAchieveAccel.vi		
	X	Χ		Χ			ArmFF_MinAchieveVelocity.vi		
	X	Χ		Χ			ArmFF_New.vi		
	X	Χ		Χ			ArmFF_New_ZeroGravity.vi		

Re Space Items – (This list is still missing one VI) Added additional columns for test and sample. Space Items – (This list is still missing one VI) Added additional columns for test and sample. Respect Items – (This list is still missing one VI) Added additional columns for test and sample. Respect Items – (This list is still missing one VI) Added additional columns for test and sample. Respect Items – (This list is still missing one VI) Added additional columns for test and sample. Respect Items – (This list is still missing one VI) Added additional columns for test and sample. Respect Items – (This list is still missing one VI) Added additional columns for test and sample.	rary – VI Implementatio	on L	st								
Purction Prototype	Space Items – (This list is	s still	missir	g one	VI	.) Add	ded a	dditio	nal columns for test and sample.	_	
Barrier Barr					Menu Item	Execution Optimizec	Test Routine	Sample Program		Function Prototype	
Pundon Prototype	CONTROLLER UT	IL X	X		X	SI			ControllerUtil_GetModulusError.vi		This was short lived in WPILIB, but
HOL_DRY_CTRL X	ELEV F	X	X X X X X X X X	X	X X X X X X	Execution	Test Routine	Sample Program	VI Name ElevFF_Calculate.vi ElevFF_CalculateVelocityOnly.vi ElevFF_Execute.vi ElevFF_ExecuteVelocityOnly.vi ElevFF_MaxAchieveAccel.vi ElevFF_MaxAchieveVelocity.vi ElevFF_MinAchieveAccel.vi ElevFF_MinAchieveVelocity.vi ElevFF_MinAchieveVelocity.vi ElevFF_New.vi	Function Prototype	Notes LabVIEW style single call
HOL_DRY_CTRL X		lmnlemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
Added 1/26/21 Added 1/26/21 Future Futur	HOL_DRV_CTR	$RL \Delta$	X		X				HolDrvCtrl_AtReference.vi	7.	
Notes PID CONTROLLER		X	X	X	X				HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_New.vi		Added 1/26/21 Future Future Added 1/26/21
PID CONTROLLER X X X X X PIDController AdvCalculate FF Sp Pv. vi X X X X PIDController AdvExecute.vi PIDController Advanced PID Advanced PID Labview style helper. Advanced X X X X X PIDController Calculate PV.vi X X X X X PIDController Calculate PV.vi X X X X X PIDController Calculate PV.vi X X X X X PIDController DisableContinousInput.vi X X X X X PIDController Execute.vi Advanced PID Labview style helper. Advanced PID Advanced PID Labview style helper. Advanced PIDController Calculate SP.V.vi X X X X PIDController DisableContinousInput.vi X X X X Y PIDController Execute.vi Labview style helper PIDController Execute.vi Labview style helper PIDController Execute.vi Advanced PID		$\frac{1}{\lambda}$	· X								
X X X X X X Advanced PID X X X X X Labview style helper. Advanced PID X X X X PIDController_AtSetpoint.vi Image: Controller_AtSetpoint.vi Image: Controller_AtSetpoint.vi X X X X PIDController_Calculate_PV.vi Image: Controller_AtSetpoint.vi Image: Controller_AtSetpoint.vi X X X X PIDController_Calculate_PV.vi Image: Controller_AtSetpoint.vi Image: Controller_AtSetpoint.vi X X X X PIDController_DisableContinousInput.vi Image: Controller_AtSetpoint.vi Image: Controller_AtSetpoint.vi X X X X X PIDController_EnableContinousInput.vi Image: Controller_AtSetpoint.vi Image: Controller_AtSetpoint.vi Image: Controller_AtSetpoint.vi X X X X X X PIDController_EnableContinousInput.vi Image: Controller_AtSetpoint.vi Image: Controller_A			Documented	Not WPILIB	Menu Item		Test Routine	Sample Program	VI Name	Function Prototype	Notes
X X X X PIDController_AdvExecute.vi Labview style helper. Advanced PID X X X X PIDController_AtSetpoint.vi IDController_Calculate_PV.vi X X X X PIDController_Calculate_PV.vi IDController_Calculate_SP_PV.vi X X X X PIDController_DisableContinousInput.vi IDController_EnableContinousInput.vi X X X X X PIDController_Execute.vi Labview style helper PIDController_GetContinuousError.vi OBSOLETE - Removed	PID CONTROLLE										
PIDController_GetContinuousError.vi OBSOLETE – Removed		X	X X X X	X	X X X X X				PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi		Labview style helper. Advanced PID
		X	X	X	X			X			
		χ	X		X						133322.2 110110100

FRC_LabVIEW_Trajectory_Library_Routines.xlsx Page 3 / 29

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_										
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_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.poonly.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_SetGoal.vi X X X ProfiledPIDController_SetGoal.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 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 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										
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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									_	
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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 S	pace Items - ((This list is still missin	a one VI)	Added additional colum	ins for test and sample.

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
RAMSETE	X	Χ		X	SI			Ramsete_New.vi	new	
	Χ	Χ		X	SI			Ramsete_New_B_Z.vi	new(b, zeta)	
	X	Χ		X	Χ			Ramsete_Calculate.vi	calculate	
	Χ	Χ		X	X			Ramsete_Calculate_Trajectory.vi	calculate_trajectory	
	Χ		Χ					Ramsete_Execute.vi		
	Χ		Χ					Ramsete_Execute_ENG.vi	Use this one!!	
	Χ		Χ					Ramsete_Execute_PackTuning.vi		
	Χ		Χ					Ramsete_Execute_PackTuning_ENG.vi		
	Χ	X		X	SI			Ramsete_AtReference.vi	AtReference	
	Χ	Χ		X	SI			Ramsete_SetEnabled.vi	SetEnabled	
	Χ	Χ		Χ	SI			Ramsete_SetTolerance.vi	SetTolerance	
	Χ	Χ		Χ	X			Ramsete_SINC.vi	sinc	internal
	Χ	Χ	X	Χ	Χ			Ramsete_Diff_DO_Eng.vi		
[Χ	X	X	Χ	X			Ramsete_Diff_DO_SI.vi		

	Implemented	Documented	Not WPILIB	Jenu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes
SIMPLE MOTOR FEEDFORWARD		X		X	SI				140103
SIMPLE MOTOR FEEDFORWARD	′ ^	^		^	31		SimpleMotorFF_New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)	
								public SimpleMotorFeedforward(double ks, double kv)	
	Χ	Χ		Χ	SI		SimpleMotorFF_Calculate.vi	public double calculate(double velocity, double acceleration)	
	X	Χ		X	SI		SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)	
			Χ				SimpleMotorFF_Execute.vi		LabVIEW style single call
			Χ				SimpleMotorFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	X	X		X	X		SimpleMotorFF_MaxAchieveVel.vi	public double maxAchievableVelocity(double maxVoltage, double acceleration)	
	X	X		X	X		SimpleMotorFF_MinAchieveVel.vi	public double minAchievableVelocity(double maxVoltage, double acceleration)	
	X	X		Х	X		SimpleMotorFF_MaxAchieveAccel.vi	public double maxAchievableAcceleration(double maxVoltage, double velocity)	
	X	X		Х	X		SimpleMotorFF_MinAchieveAccel.vi	public double minAchievableAcceleration(double maxVoltage, double velocity)	

'===== GEOMETRY

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

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

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

TRANSLATION	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program			Notes
IKANSLATION		14			01				V	can use cluster constant
	Χ	X		Χ	SI				translation2d new(double x, double y)	
	Χ	Χ		Χ	SI			Translation_Create_DistAng.vi		
	Χ	Χ		Χ	SI			Translation_GetDistance.vi	double getDistance(translation2d other)	
	Χ	Χ		Χ	SI					can use cluster unpack
	Χ	Χ		Χ	SI			Translation_GetY.VI	double getY()	can use cluster unpack
	Χ	Χ	Χ	Χ	SI			Translation GetXY.VI		

C LabVIEW Trajectory Library – VI Implementation is 11/12/2021 – State Space Items – (This list is	s Sun m		11C VI	. <i>)</i> Auc	cu auu	itional columns for test and sample.		
	X	X	X	SI		Translation GetNorm.VI	double getNorm()	can use cluster unpack
	X	X	X	SI		Translation_RotateBy.vi	translation2d rotateBy(rotation2d other)	
	X	X	X	SI		Translation_Plus.vi	translation2d plus(translation2d other)	
	X	X	X	SI		Translation_Minus.vi	translation2d minus(translation2d other)	
	X		X	SI		Translation_UnaryMinus.vi	translation2d unaryminus()	
	X	X	X	SI		Translation_Times.vi	translation2d times(double scalar)	
							translation2d div(double scalar)	can multiply by 1/scalar
	X	Χ	X	SI		Translation_Equals.vi	boolean equals(translation other)	
TWIS	T. X X Implemented	X	Not WPILIB X X X	SI	Test Routine	VI Name Twist_Create.vi Twist_Equals.VI Twist_GetAll.VI	Function Prototype twist new(x, y, theta) boolean equals(obj other)	Notes
			, , ,					
MATICS								
	Implementec	Documentec	Not WPILIB Menu Item	Execution Optimized	Test Routine	Nample Program		
		Q	> >	Û	ř	VI Name	Function Prototype	Notes
CHASSIS SPEED	S				F		chassisspeeds new ()	Notes can use cluster constant
CHASSIS SPEED	S	X	X	SI	Ž.	ChassisSpeeds_New.vi		
CHASSIS SPEED	X X			SI SI	ř.		chassisspeeds new ()	
	S X X X X X	Documented	Not WPILIB XX X Menu Item	Execution Optimized	Test Routine	ChassisSpeeds_New.vi ChassisSPeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype	
CHASSIS SPEED:	S X X X X X X X X X X X X X X X X X X X	X Documented	X X X X X X X X X X X X X X X X X X X	- Execution Optimized	X Test Routine	ChassisSpeeds_New.vi ChassisSPeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype diffDriveKine new(double trackWidth)	can use cluster constant
	S X X X Implemented	X X Documented	X X X X X X X X X X X X X X X X X X X	X - Execution Optimized	X X Test Routine	ChassisSpeeds_New.vi ChassisSPeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds)	can use cluster constant
	S X X X Implemented	X Documented	X X X X X X X X X X X X X X X X X X X	X - Execution Optimized	X Test Routine	ChassisSpeeds_New.vi ChassisSPeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype diffDriveKine new(double trackWidth)	can use cluster constant
	S X X X X X X X X X X X X X X X X X X X	X Documented X	X X X X X X X X X X X X X X X X X X X	tion Optimized S X I Execution Optimized	X X X Test Routine	ChassisSpeeds_New.vi ChassisSpeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI Egg VI Name DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi DiffKinematics_toWheelSpeed.vi	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds)	can use cluster constant
	S X X X X X X X X X X X X X X X X X X X	X Documented X	X X X X X X X X X X X X X X X X X X X	tion Optimized S X I Execution Optimized	X X X Test Routine	ChassisSpeeds_New.vi ChassisSpeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI Egg VI Name DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi DiffKinematics_toWheelSpeed.vi	chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds)	Notes
DIFFERENTIAL DRIVE KINEMATIC	Implemented X X X Implemented S	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	tion Optimized S X I Execution Optimized	utine X X X Test Routine	ChassisSpeeds_New.vi ChassisSpeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI VI Name DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi DiffKinematics_toWheelSpeed.vi	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds)	can use cluster constant
	Implemented X X X Implemented S	X Documented X	X X X X X X X X X X X X X X X X X X X	tion Optimized S X I Execution Optimized	X X X Test Routine	ChassisSpeeds_New.vi ChassisSpeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI Egg VI Name DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi DiffKinematics_toWheelSpeed.vi	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds)	Notes
DIFFERENTIAL DRIVE KINEMATIC	Implemented X X X Implemented S	X Documented X	X X X X X X X X X X X X X X X X X X X	tion Optimized S X I Execution Optimized	X X X Test Routine	ChassisSpeeds_New.vi ChassisSpeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI Egg VI Name DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi DiffKinematics_toWheelSpeed.vi	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds) Function Prototype diffDrOdom new(rotation gyro, pose initial) diffDrOdom new(rotation gyro)	Notes Notes
DIFFERENTIAL DRIVE KINEMATIC	Implemented X X X Implemented S	X Documented X	X X X X X X X X X X X X X X X X X X X	tion Optimized S X I Execution Optimized	X X X Test Routine	ChassisSpeeds_New.vi ChassisSpeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI Egg VI Name DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi DiffKinematics_toWheelSpeed.vi	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds) Function Prototype diffDrOdom new(rotation gyro, pose initial) diffDrOdom new(rotation gyro) void resetPosition(pose2d, rotation2d)	Notes
DIFFERENTIAL DRIVE KINEMATIC	S X X X X X X X X X X X	X Documented X	X X X X X X X X X X X X X X X X X X X	Execution Optimized Structured Structures Structure Structures Structure Structures Structure Structures Structure Structur	X X X Test Routine	ChassisSpeeds_New.vi ChassisSpeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI Egg VI Name DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi DiffKinematics_toWheelSpeed.vi	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds) Function Prototype diffDrOdom new(rotation gyro, pose initial) diffDrOdom new(rotation gyro)	Notes Notes incorporated into "update"

rajectory Library – VI Implementatio	n Lis	<u>it</u>						<u> </u>	
2/2021 – State Space Items – (This list is	still m	ıssıng	g one	VI) Add	ded ac	Iditional columns for test and sample.		
					mize		шe.		
	g	P			Optii	a)	ıgra		
	Implementea	Documentea	Not WPILIB	ш	_	Fest Routine	Progr		
	эше	ıme	ΜP	Menu Item	Execution	Rol	e/a		
	nple	700	ot V	Jeni	xec	est	S Name NI Name	Curation Dustations	Notes
DIFFERENTIAL DRIVE WHEEL SPEEDS		<u> </u>	_ <	_≥	Ш	<u> </u>	ශී VI Name	Function Prototype diffDrWheelSpeeds new()	Notes
DIFFERENTIAL DRIVE WHEEL SPEEDS	'	_	+					diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel)	
	X	X		X	X		DiffWheel Normalize.vi	void normalize(double maxVel)	
				-1					
					zeo				
					Optimi		äπ		
	pə	pə	В	_	do	ne	Progr		
	Implemented	Documentea	Not WPILIB	Menu Item		Test Routine	Ţ.		
	lem	щn	Ŋ	ון ח	Execution	t RC	S VI Name		
	dm	90	ζo	Ner	i. X	res	S VI Name	Function Prototype	Notes
MECANUM DRIVE KINEMATICS		X		\overline{X}	I		MecaKinematics_New.vi	Interest Interest	
	X	X		X	X		MecaKinematics_SetInverseKinematics.vi		
	X	Χ		X			MecaKinematics_ToChassisSpeeds.vi		
	X	X		X	X		MecaKinematics_ToWheelSpeeds.vi		
	Χ	Χ		X	X		MecaKinematics_ToWheelSpeedsZeroCenter.vi		
					P				
					ized				
					ţin		ra T		
	jed,	p _e	В	_	Optin	Je	Progr		
	ent	ent	77/	e.	on	iti	<u>a</u>		
	_e m	ŭ,	¥	ת ח	cuti	R	ə <i>ldt</i>		
	Implemented	Documented	Not WPILIB	Menu Item	Execution	Test Routine	S VI Name	Function Prototype	Notes
MECANUM DRIVE MOTOR VOLTAGE		_		_<			VITALITO	T diletion i Tototype	140103
		done					-		
					~				
					Execution Optimized				
					timi		Program		
	pə	pa	99		Õ	e 2	<i>go</i>		
	mented	mented	VPILIB	Item	on	Routine	Ţ.		
	em	ű,	×		cuti	Ä	e/di		
	Imple	Docui	Not N	Menu	ĕ	Test F	Name	Function Prototype	Notes
MECANUM DRIVE ODOMETRY		X		<u> </u>	Ш.	_	MecaOdometry_New.vi		Notes
	X			X	1		MecaOdometry_NewDefaultPose.vi		
	X	Χ		X			MecaOdometry_GetPose.vi		
	X	X		X			MecaOdometry_Reset.VI		
	X	X		X			MecaOdometry_Update.vi		
	X	X		X			MecaOdometry_UpdateWithTime.vi		
					Q				
					ize				
					Optimized		άπ		
	<i>ted</i>	ρə	В	_	õ	ne	60		
	ien:	ent	게	tem		inc			
	Implemented	Documented	Not WPILIB	Menu Item	Execution	Test Routine	Sample Prog		
	шb	200	Vot	/Jen	ě	Pesi	N Name	Function Prototype	Notes
MECANUM DRIVE WHEEL SPEEDS		X	_~	<u> </u>	SI	_	MecaWheel_New.Vi	public MecanumDriveWheelSpeeds(double	1.000
	^`			^`	"			frontLeftMetersPerSecond, double frontRightMetersPerSecond,	
								double rearLeftMetersPerSecond, double	
	-		+	\	V		MocaWhaal Normaliza vi	rearRightMetersPerSecond)	
	X	X		\ \ \	X		MecaWheel_Normalize.vi	public void normalize(double attainableMaxSpeedMetersPerSecond)	
								Attainabilitian operativistici el Decolla)	1

Revision 2.X 11/12/2021 – State Space Ite	ems – (This list is st	ill mi	ssing	one \	/l)	Adde	ed ad	ditio	al columns for test and sample.	_	
		Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	// Nama	Function Protetyne	Notes
SWERVE DR	IVE KINEMATICS	=	٥	_	2	Ш	_	S	/I Name	Function Prototype public SwerveDriveKinematics(Translation2d wheelsMeters)	variable parameters (replace with
										,	array and "4" calls)
		X	X	X	X				SwerveKinematics_NewX.VI SwerveKinematics_New4.VI		uses array as input For 4 module drives
		X	X	^	X				SwerveKinematics_New4.vi	public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds,	For 4 module drives
		Χ	X		X				SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI	Translation2d centerOfRotationMeters) public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)	
										public ChassisSpeeds to ChassisSpeeds (Swerve Module State wheel States)	variable parameters (replace with array and "4" calls)
		X	Χ						SwerveKinematics_ToChassisSpeedsX.VI		uses array as input
				X					SwerveKinematics_ToChassisSpeeds4.VI		For 4 module drives
		X	X	X	<i> </i>				SwerveKinematics_NormalizeWheelSpeeds.vi	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)	
SWERVE DF	RIVE ODOMETRY	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine		/I Name SwerveOdometry_New.VI	Function Prototype public SwerveDriveOdometry(SwerveDriveKinematics kinematics,	Notes
		X	X	-	X				SwerveOdometry_NewZeroCenter.VI	Rotation2d gyroAngle, Pose2d initialPose) public SwerveDriveOdometry(SwerveDriveKinematics kinematics,	,
	-									Rotation2d gyroAngle)	
			· V	\rightarrow					Swanta Odomatry Pasat Position VI	nublic yold resetPosition(Pose2d nose, Potation2d gyroAngle)	
			X		X				SwerveOdometry_ResetPosition.VI SwerveOdometry_GetPosition_VI	public void resetPosition(Pose2d pose, Rotation2d gyroAngle)	
		X	X		X				SwerveOdometry_GetPosition.VI	public void resetPosition(Pose2d pose, Rotation2d gyroAngle) public Pose2d getPoseMeters() public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState moduleStates)	array and "4" calls)
		X	X	X	X				SwerveOdometry_GetPosition.VI SwerveOdometry_UpdateWithTimeX.VI	public Pose2d getPoseMeters() public Pose2d updateWithTime(double currentTimeSeconds,	array and "4" calls) uses array as input
		X	X	X X	X				SwerveOdometry_GetPosition.VI	public Pose2d getPoseMeters() public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState moduleStates)	array and "4" calls) uses array as input For 4 module drives
		X X X	X X X	X	X X X				SwerveOdometry_GetPosition.VI SwerveOdometry_UpdateWithTimeX.VI SwerveOdometry_UpdateWithTime4.VI	public Pose2d getPoseMeters() public Pose2d updateWithTime(double currentTimeSeconds,	array and "4" calls) uses array as input For 4 module drives
		X X X	X X X	X	X X X				SwerveOdometry_GetPosition.VI SwerveOdometry_UpdateWithTimeX.VI SwerveOdometry_UpdateWithTime4.VI SwerveOdometry_UpdateWithTime4.VI	public Pose2d getPoseMeters() public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState moduleStates) public Pose2d update(Rotation2d gyroAngle,	array and "4" calls) uses array as input For 4 module drives variable parameters (replace with array and "4" calls) uses array as input
		X X X	X X X	X	X X X				SwerveOdometry_GetPosition.VI SwerveOdometry_UpdateWithTimeX.VI SwerveOdometry_UpdateWithTime4.VI	public Pose2d getPoseMeters() public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState moduleStates) public Pose2d update(Rotation2d gyroAngle,	array and "4" calls) uses array as input For 4 module drives variable parameters (replace with array and "4" calls)
		X X X X	X X X X	X X X	X X X X	ecution Optimized	st Routine	mple Program	SwerveOdometry_GetPosition.VI SwerveOdometry_UpdateWithTimeX.VI SwerveOdometry_UpdateWithTime4.VI SwerveOdometry_UpdateX.VI SwerveOdometry_UpdateX.VI	public Pose2d getPoseMeters() public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState moduleStates) public Pose2d update(Rotation2d gyroAngle, SwerveModuleState moduleStates)	array and "4" calls) uses array as input For 4 module drives variable parameters (replace with array and "4" calls) uses array as input For 4 module drives
		X X X X 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	Test Routine	Sample Program	SwerveOdometry_GetPosition.VI SwerveOdometry_UpdateWithTimeX.VI SwerveOdometry_UpdateWithTime4.VI SwerveOdometry_UpdateX.VI SwerveOdometry_UpdateX.VI SwerveOdometry_Update4.VI	public Pose2d getPoseMeters() public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState moduleStates) public Pose2d update(Rotation2d gyroAngle, SwerveModuleState moduleStates) Function Prototype	uses array as input For 4 module drives variable parameters (replace with array and "4" calls) uses array as input
SWERVE DRIVE	MODULE STATE	X X X X X	X X X X	X X X	X X X X X	SI	Test Routine	Sample Program	SwerveOdometry_GetPosition.VI SwerveOdometry_UpdateWithTimeX.VI SwerveOdometry_UpdateWithTime4.VI SwerveOdometry_UpdateX.VI SwerveOdometry_UpdateX.VI SwerveOdometry_Update4.VI	public Pose2d getPoseMeters() public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState moduleStates) public Pose2d update(Rotation2d gyroAngle, SwerveModuleState moduleStates) Function Prototype public SwerveModuleState(double speedMetersPerSecond, Rotation2d angle)	array and "4" calls) uses array as input For 4 module drives variable parameters (replace with array and "4" calls) uses array as input For 4 module drives
SWERVE DRIVE	MODULE STATE	X X X X X X X X X X X X X X X X X X X	X X X X	X X X	X X X X X		Test Routine	Sample Program	SwerveOdometry_GetPosition.VI SwerveOdometry_UpdateWithTimeX.VI SwerveOdometry_UpdateWithTime4.VI SwerveOdometry_UpdateX.VI SwerveOdometry_UpdateX.VI SwerveOdometry_Update4.VI	public Pose2d getPoseMeters() public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState moduleStates) public Pose2d update(Rotation2d gyroAngle, SwerveModuleState moduleStates) Function Prototype public SwerveModuleState(double speedMetersPerSecond,	array and "4" calls) uses array as input For 4 module drives variable parameters (replace with array and "4" calls) uses array as input For 4 module drives Notes

'========= SPLINE '=========

- State Space Items – (This list is s	still mi	issing	one	VI)	Add	ed ad	ditior	nal columns for test and sample.	_	
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
	Χ	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)

Trajectory Library – VI Implementatio										
12/2021 – State Space Items – (This list is	still m	ssing	one	VI)	Add	ed ad	dition	al columns for test and sample.		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	√I Name	Function Prototype	Notes
TRAJECTORY_STATE									public State()	
	X	X		X	SI		•	TrajectoryState_New.vi	public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter)	
	Χ	X		X				TrajectoryState_Interpolate.vi	State interpolate(State endValue, double i)	
	Χ	X		X				TrajectoryState_Equals.vi	boolean equals(other obj)	FUTURE
					ρ					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program IN Bustandaria Bustanda Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustandaria Bustanda Bustandaria Bustan		Fund	ction Prototype	Notes
TRAJECTORY CONFIG	X	Χ		Χ	SI			yConfig_Create.vi	publ	ic TrajectoryConfig(double maxVelocityMetersPerSecond,	
									publ	ble maxAccelerationMetersPerSecondSq) lic TrajectoryConfig addConstraint(TrajectoryConstraint straint)	Implemented differently, can't duplicate.
									publ	ic TrajectoryConfig addConstraints(List extends</td <td>Implemented differently, can't duplicate.</td>	Implemented differently, can't duplicate.
	Х	Χ		Χ	SI		Trajecto	ryConfig_setKinematicsDiffDrive.vi	publ	ic TrajectoryConfig setKinematics(DifferentialDriveKinematics matics)	duplicate.
	X	Χ		X	SI		Trajecto	ryConfig_setKinematicsMecanumfDrive.vi		lic TrajectoryConfig setKinematics(MecanumDriveKinematics matics)	
	X	Χ		X	SI		Trajecto	ryConfig_setKinematicsSwerveDrive.vi	publ	lic TrajectoryConfig setKinematics(SwerveDriveKinematics matics)	
											can use cluster unpack
									publ start	lic TrajectoryConfig setStartVelocity(double tVelocityMetersPerSecond)	
									publ	ic double getEndVelocity()	can use cluster unpack
									publ end\	lic TrajectoryConfig setEndVelocity(double VelocityMetersPerSecond)	
											can use cluster unpack
									publ	ic double getMaxAcceleration()	can use cluster unpack
									publ	ic List <trajectoryconstraint> getConstraints()</trajectoryconstraint>	Implemented differently, can't duplicate.
									publ	ic boolean isReversed()	can use cluster unpack
	Χ	Χ		Χ	SI			ryConfig_setReversed.vi	publ	ic TrajectoryConfig setReversed(boolean reversed)	
	Χ	Χ	X	Χ	SI		Trajecto	ryConfig_setCentripetalAccel.vi			
	Χ	Χ	X	Χ	SI		Trajecto	ryConfig_setVoltageDiffDrive.vi			
									NOT	TE ADD OTHER "SET" ROUTINES FOR OTHER	

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

	mplemented	Documented	Vot WPILIB	Jenu Item	Execution Optimizea	Fest Routine	Sample Program	Function Prototype	Notes
TRAJECTORY GENERATE	X	X		X	F		TrajectoryGenerate_Make_Cubic_CtrlVect.vi		uses cubic splines
	X	Х		X			TrajectoryGenerate_Make_Cubic.vi	public static Trajectory generateTrajectory(Pose2d start, List <translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config)</translation2d>	uses cubic splines
	Χ		Χ				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 times and a factor of the same
	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

TRAJECTORY UTIL				X	Addec	addit	TrajectoryUtil_fromPathWeaverJSON.vi	public static Trajectory fromPathweaverJson(Path path)	
TRAJECTORT UTIL		^	Х	^	~		TrajectoryUtil MakeWeightedWayPoint.vi	public static frajectory from Fattiweaversson(Fatti patti)	
	X		X		X	+	TrajectoryUtil_MakeWeightedWayPoint_ENG.vi		
	$\frac{\lambda}{X}$	X	^	Х	^	+	TrajectoryUtil_toPathWeaverJSON.vi	public static void toPathweaverJson(Trajectory trajectory, Path	
	^	^		^			TrajectoryOtti_tor attriveaver35Ott.vi	path)	
								public static Trajectory deserializeTrajectory(String json)	
								public static String serializeTrajectory(Trajectory trajectory)	
								public ciano ching contained trajectory (trajectory)	
	рe	ρe	m		Optimizec	utine Program			
	Implementea	Documentea	WPILIB	Menu Item	Execution	l est Koutine Sample Prod			
	ldu	00	Not	len	ě	esi	VI Name	Function Protetune	Notes
TRAPEZOID PROFILE			_ <		Щ	<u>~ (/</u>	TrapProfConstraint New.vi	Function Prototype	Notes
TRAPEZOID PROFILE	X			X		_	TrapProfile Calculate.vi		
	$\frac{\lambda}{X}$	X	+	No		+	TrapProfile Direct.vi		Private, remove from menu
	$\frac{\lambda}{X}$		X	X		+	TrapProfile Execute.vi		Private, remove from menu
	$\frac{\lambda}{X}$		 ^ 	X			TrapProfile IsFinished.vi		
	$\frac{\lambda}{X}$			X			TrapProfile New.vi		
	$\frac{\lambda}{X}$	X	+	X	+	_	TrapProfile New DefInitial.vi		
	X		+ +	No	+	+	TrapProfile_ShouldFlipAcceleration.vi		Private, remove from menu
	X			X			TrapProfile TimeLeftUntil.vi		Filvate, remove from menu
	X			\dot{x}		_	TrapProfile_TotalTime.vi		
	X	X		\hat{X}			TrapProfState_Equals.vi		
	X	X		\hat{x}			TrapProfState New.vi		
		,,,					Trapi foretato_from.vi		
CENTRIPETAL ACCELERATION CONSTRAINT	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	l est Koutine Sample Program	VI Name CentripetalAccelConstraint_getMaxVelocity.vi CentripetalAccelConstraint_getMinMaxAccel.vi	Function Prototype public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public MinMax	Notes
								getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters,	
								double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI		CentripetalAccelConstraint_New.vi	public CentripetalAccelerationConstraint(double maxCentripetalAccelerationMetersPerSecondSq)	Can use cluster pack for now
	Implemented	Documented	ot WPILIB	Menu Item	Execution Optimized	rest Koutine Sample Program			
			Not		Щ I	بر بر ج	VI Name	Function Prototype	Notes
DIFF DRIVE KINEMATIC CONSTRAINT		X		X			DiffDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X			X			DiffDriveKinematicsConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI		DiffDriveKinematicsConstraint_New.vi	public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond)	

SwerveDriveKinematicsConstraint_getMinMaxAccel.vi

SwerveDriveKinematicsConstraint New.vi

TRAJECTORY CONSTRAINT

Interface class - nothing done (not needed)

XX

 $X \mid X$

Χ

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

NDV CONOTRAINT (Min March	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program

	<u>u</u>	Ğ	ž	Ž	ш́Ý	S S	VI Name	Function Prototype	Notes
TRAJECTORY CONSTRAINT (Min Max)	X	Χ		X	SI		Constraint_MinMax_New.vi	Constraint_MinMax_New	
	X	X		X	SI		Constraint MinMax NewMinMax.VI	Constraint MinMax New	

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UTILITY

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

	Implemented	Documented	Not WPILIB	Menu Item		Test Routine	Sample Program	Function Prototype	Notes
UTIL	X		X		SI		Util_ApproxEqual.vi		
	X	Χ	Χ	Χ			Util_Array_PoseWCurv_to_XY.vi		
	X	Χ	Χ	X	SI		Util_CalcDist.vi		
	X	Χ	Χ	Χ	SI		Util_GetLibraryUsage.vi		
	X	Χ	Χ	Χ	SI		Util_GetLibraryVersion.vi		
	X	X	X	X			Util_GetTime.vi		Once tested completely, this should be optimized!
	X	Χ	X		N/A		Util_LibraryGlobals.vi		Global Variables – no block diag.
	Χ	Χ	X	X			Util_Trajectory_Absolute_To_Relative.vi		
	X	Χ	X	X			Util_Trajectory_ReadFile.vi		
	Χ	Χ	X	X			Util_Trajectory_to_XY.vi		
	X	Χ	X	No			Util_Trajectory_WriteFile_Config.vi		internal
	X	Χ	Χ	No			Util_Trajectory_WriteFile_OneState.vi		internal
	X	Χ	Χ	Χ			Util_Trajectory_WriteFile_PathFinder.vi		
	X	Χ	Χ	No			Util_Trajectory_WriteFile_PathFinderConfig.vi		internal
	X	Χ	Χ	Χ			Util_Trajectory_WriteFile_Pathweaver.vi		
	X	Χ	Χ	No			Util_Trajectory_WriteFile_States.vi		internal
	X	Χ	X	No			Util_Trajectory_WriteFile_WayPoints.vi		internal
	X	Χ	X	X			Util_Trajectory_WriteFile.vi		
	X	Χ	X	X			Util_TrajectoryState_Meters_To_Inches.vi		
	X	Χ	X	Χ			Util_TrajState_to_DiffDrive_WheelPos.vi		
	X	Χ	X	X			Util_Waypoint_Eng_To_SI.vi		
	X	Χ	X	Χ			Util_Waypoint_To_CubicInput.vi		
	Χ	Χ	Χ	Χ			Util_Waypoint_To_QuinticInput.vi		
	X	Χ	Χ	No			Util_WeightedWayPoint_To_WeightedWayPoint.vi		Sorry about the confusing name

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CONVERSIONS

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

	2	Documented Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes
CONV	X .	XX	X	SI		Conv_AngleDegrees_Heading.vi		
	X .	XX	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		
	Χ	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		Χ	SI	DCMotor_GetBanebotsRs550.vi					

13 34111 1	111331116	j Olic VI	.) Muucu	a duditional columns for test and sample.
X	X	X	SI	DCMotor_GetBanebotsRs775.vi
X	X	X	SI	DCMotor_GetCIM.vi
X	X	X	SI	DCMotor_GetCurrent.vi
X	X	X	SI	DCMotor_GetFalcon500.vi
X	X	X	SI	DCMotor_GetMiniCIM.vi
X	X	X	SI	DCMotor_GetNEO.vi
X	X	X	SI	DCMotor_GetNEO550.vi
X	X	X	SI	DCMotor_GetVex775Pro.vi
X	X		SI	DCMotor_GetRomiBuiltIn.vi
X	X	X	SI	DCMotor_New.vi

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

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STATE SPACE ESTIMATION

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	Implemented Documented		Menu Item	Execution Optimized	Test Routine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATOR			X			DiffDrivePoseEst_AddVisionMeasurement.vi		Just a shell, not functional!			
	XX		X			DiffDrivePoseEst_FillStateVector.vi					
	XX		X			DiffDrivePoseEst_GetEstimatedPosition.vi					
	X		X			DiffDrivePoseEst_Kalman_F_Callback.vi					
	Χ		Χ			DiffDrivePoseEst_Kalman_H_Callback.vi					
	XX		X			DiffDrivePoseEst_New.vi					
	XX		X			DiffDrivePoseEst_ResetPosition.vi					
	XX		X			DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi					
	XX		X			DiffDrivePoseEst_Update.vi					
	XX		X			DiffDrivePoseEst_UpdateWithTime.vi					
	XX					DiffDrivePoseEst_VisionCorrect_Callback.vi					
	Χ		X			DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi					
	Implemented Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
EXTENDED KALMAN FILTER			X	F		ExtendedKalmanFilter Correct.vi	- anatom rototype	Just a shell, not functional!			-
LATERDED RALMANTIETER	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$		X			ExtendedKalmanFilter Correct OnlyUY.vi		uust a shell, not landional:			
	X X		X			ExtendedKalmanFilter GetP.vi					
	X X		X			ExtendedKalmanFilter_GetP_Single.vi					
L											

.abVIEW Trajectory Library – VI Implementatio										
on 2.X 11/12/2021 – State Space Items – (This list is	still mis	ssing one	VI) .	Added	additional columns for test and sample.					
	X		X		ExtendedKalmanFilter_GetXHat.vi					
		X	X		ExtendedKalmanFilter_GetXHat_Single.vi					
	X	X	X		ExtendedKalmanFilter_New.vi					
			X		ExtendedKalmanFilter Predict.vi					
	X		X		ExtendedKalmanFilter Reset.vi					
	X		X		ExtendedKalmanFilter SetP.vi					
		X	X		ExtendedKalmanFilter SetXHat.vi				+	
					ExtendedKalmanFilter_SetXHat_Single.vi					
	X	X	X		ExtendedKaimanFilter_SetXHat_Single.vi					
	mplemented	Documented Not WPILIB	Menu Item	Execution Optimized	Sample Program	Function Prototype	Notes	Sode Review	Fest Program	
KALMAN FILTER			X) i			110.00	$\overline{}$		`
RALIVIAN FILTER									-	+
			X)						
		X	X)					-	-
			Х		KalmanFilter_Reset.vi					
			X		KalmanFilter_GetK					
			X		KalmanFilter_GetK_Single.vi					
	X	X	X		KalmanFilter_SetXHat					
	X	X	X)	KalmanFilter SetXHat Single					
	X	X	X		KalmanFilter GetXHat					
		X	X)						
	_	_		otim	ran			>	2	
KAL MAN EILTER LATENCY COMPENSATOR	Implemented	Documented Not WPILIB	Menu Item	Execution Optim	が、E B の VI Name	Function Prototype	Notes Model in progress	Code Review	Test Program	į
KALMAN FILTER LATENCY COMPENSATOR	ξ X X	Documented Not WPILIB	X Menu Item	ution	できた。		Notes Work in progress.	Code Review	Test Program	;
KALMAN FILTER LATENCY COMPENSATOR	<u> </u>	Documented Not WPILIB	Menu Item	ution	が、E B の VI Name			Code Review	Test Program	
KALMAN FILTER LATENCY COMPENSATOR	ξ X X	Documented Not WPILIB	X Menu Item	ution	できた。	i		Code Review	Test Program	
KALMAN FILTER LATENCY COMPENSATOR	X X	Documented Not WPILIB	X Menu Item	ution	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.	i	Work in progress. Work in progress.	Code Review	Test Program	
KALMAN FILTER LATENCY COMPENSATOR	X X X X	Documented Not WPILIB	X Wenu Item	ution	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi	i	Work in progress.	Code Review	Test Program	
KALMAN FILTER LATENCY COMPENSATOR	X X X X X X	Documented Not WPILIB	X X Wenu Item	ution	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi	i	Work in progress. Work in progress. Work in progress.	Code Review	Test Program	
KALMAN FILTER LATENCY COMPENSATOR	X X X X X X	Documented Not WPILIB	X X X X X X X X X X X X X X X X X X X	ution	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi	i	Work in progress. Work in progress. Work in progress. Work in progress.	Code Review	Test Program	
KALMAN FILTER LATENCY COMPENSATOR	X X X X X X	Documented Not WPILIB	X X Wenu Item	ution	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi	i	Work in progress. Work in progress. Work in progress.	Code Review	Test Program	
KALMAN FILTER LATENCY COMPENSATOR			X X X X X X X X X X X X X X X X X X X	otimized Execution Test Bourie	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi	i	Work in progress. Work in progress. Work in progress. Work in progress.	ew Code Review	w.	
KALMAN FILTER LATENCY COMPENSATOR			X X X X X X X X X X X X X X X X X X X	Optimized Execution Test Bourie	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi	i	Work in progress. Work in progress. Work in progress. Work in progress.	view	w.	
KALMAN FILTER LATENCY COMPENSATOR			X X X X X X X X X X X X X X X X X X X	Optimized Execution Test Bourie	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi	i	Work in progress. Work in progress. Work in progress. Work in progress.	view	w.	
KALMAN FILTER LATENCY COMPENSATOR			X X X X X X X X X X X X X X X X X X X	Optimized Execution Test Bourie	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi	i	Work in progress. Work in progress. Work in progress. Work in progress.	view	w.	
KALMAN FILTER LATENCY COMPENSATOR	X X X X X X	Documented Documented Not WPILIB	X X X X X X X X X X X X X X X X X X X	timized Execution	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi	i	Work in progress. Work in progress. Work in progress. Work in progress.	view	Test Program Test Program	
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KALMAN FILTER LATENCY COMPENSATOR	Implemented X X X X X X X X X X X X X X X X X X X		Menu Item X X X X X X X X X X X X X X X X X X X	Optimized Execution Test Bourie	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_N	i .vi	Work in progress. Notes Haven't started yet	view	w.	
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	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	Optimized Execution Test Bourie	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_VisionCorrect_Callback.vi SwerveDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi SwerveDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi	i .vi	Work in progress. Notes Haven't started yet	view	w.	
	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	Optimized Execution Test Bourie	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_VisionCorrect_Callback.vi SwerveDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi SwerveDrivePoseEst_Kalman_F_Callback.vi	i .vi	Work in progress. Notes Haven't started yet	view	w.	
	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	Optimized Execution Test Bourie	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_VisionCorrect_Callback.vi SwerveDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi	i .vi	Work in progress. Notes Haven't started yet Haven't started yet	view	w.	
	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	Optimized Execution Test Bourie	KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi SalmanFilterLatencyComp_New.vi SalmanFilterLatencyComp_New.vi	i .vi	Work in progress. Notes Haven't started yet Haven't started yet	view	w.	
	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	Optimized Execution Test Bourie	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF. KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_VisionCorrect_Callback.vi SwerveDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi	i .vi	Work in progress. Notes Haven't started yet Haven't started yet	view	w.	

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

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

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STATE SPACE CONTROL

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	Implemented	Documented Not WPILIB	Menu Item	Execution Optimized Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
CONTROL AFFINE PLANT INVERSION FEEDFORWARD											

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR PLANT INVERSION FEEDFORWARD	X	X		Χ			LinearPIntInvFF_Calculate.vi					
	X	Χ		X			LinearPIntInvFF_Calculate_NextR.vi					
	X	X		X			LinearPIntInvFF_GetUff.vi					
	X	Χ		Χ			LinearPIntInvFF_New.vi					
	Χ	Χ		X			LinearPIntInvFF_New_Plant.vi					
	Χ	Χ		Χ			LinearPIntInvFF_Reset_Initial.vi					
	Χ	Χ		X			LinearPIntInvFF_Reset_Zero.vi					
	X	Χ		Χ			LinearPIntInvFF_GetUff_Single.vi					
	Χ	Χ		X			LinearPIntInvFF_GetR.vi					

State Space Items – (This list is s				,						
	XX	X		4-	LinearPIntInvFF_GetR_Single.vi					
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	<i>p p</i>	ω.	Ö	e	gr			×	ш	kin
	ente nte	E E		ij	Progr			evie	grë	٥
	ne ne	/PILII	; iţi	ર્જુ	e			Ř	Program	Š
	Implementec Documentea	ž Z	Execution	Test Routine	μ			Code Rev	st I	Error Checking
	JE 00	Not WPILI	. Š	<u>1</u> e	ຄວ ກາງ ກ່ອງ ກ່ອງ ກາງ ກາງ ກາງ ກາງ ກາງ ກາງ ກາງ ກາງ ກາງ ກາ	Function Prototype	Notes	ပိ	Test	Ĭ,
EAR QUADRATIC REGULATOR	XX	X	(/	LinearQuadraticRegulator_Calculate_NextR.vi					
	XX	X			LinearQuadraticRegulator_Calculate.vi					
	XX	X		<u>/ </u>	LinearQuadraticRegulator_GetK_Single.vi		NOT ORIGINAL			
	XX			Χ	LinearQuadraticRegulator_GetK.vi					
	XX	X		!	LinearQuadraticRegulator_GetR_Single.vi					
	$X \mid X$	X		!	LinearQuadraticRegulator_GetR.vi					
	XX	X		<u>/ </u>	LinearQuadraticRegulator_GetU_Single.vi					
	X X X X X X	X		<u>/ </u>	LinearQuadraticRegulator_GetU.vi					
	/ X	X	1	X	LinearQuadraticRegulator_LatencyCompensate.vi		Routine exists, but it only has			
							interger raise matrix to power.			
	X X	X		4	LinearQuadraticRegulator_New_ELMS.vi					
		$\perp \perp \perp$		4	LinearQuadraticRegulator_New_Raw.vi					
	XX	X		X	LinearQuadraticRegulator_New_SystemELMS.vi					
				4!	LinearQuadraticRegulator_New_N.vi					
	X X X X	X		4!	LinearQuadraticRegulator_New.vi					
	XX	X		4!	LinearQuadraticRegulator_Reset.vi					
	\Box									
	nented nented	JLIB tem	ion Optimize	outine	e Program			Review	rogram	- ci21004
LINEAR SYSTEM		X	Execution	Test Routine	VI Name LinearSystem_CalculateX.vi	Function Prototype	Notes	Code Review	Test Program	Frror Checking
LINEAR SYSTEM	X X X X	X	Execution	Test Routine	LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi	Function Prototype	Notes	Code Review	Test Program	Fror Checking
LINEAR SYSTEM	X X X X X X	X X X	Execution	Test Routine	LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi	Function Prototype	Notes	Code Review	Test Program	Frror Checking
LINEAR SYSTEM	X X X X X X	X X X	Execution	Test Routine	LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi	Function Prototype	Notes	Code Review	Test Program	Fror Checking
LINEAR SYSTEM	X X X X X X X X X X	X X X X	Execution	Test Routine	LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi	Function Prototype	Notes	Code Review	Test Program	Frror Checking
LINEAR SYSTEM	X X X X X X X X X X	X X X X X X	Execution	Test Routine	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	Fror Checking
LINEAR SYSTEM	X X X X X X X X X X	X X X X X X	Execution	Test Routine	LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi	Function Prototype	Notes	Code Review	Test Program	Frror Checking
LINEAR SYSTEM	X X X X X X X X X X	X X X X X X	Execution	Test Routine	LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi	Function Prototype	Notes	Code Review	Test Program	Frror Checking
LINEAR SYSTEM	X X X X X X X X X X	X X X X X X	Execution	Test Routine	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_GetCElement.vi LinearSystem_GetD.vi	Function Prototype	Notes	Code Review	Test Program	Fror Checking
LINEAR SYSTEM	X X X X X X X X X X X X X X X X X X X	X	Execution	Test Routine	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_GetD.vi LinearSystem_GetDElement.vi	Function Prototype	Notes	Code Review	Test Program	Pror Checking
LINEAR SYSTEM	X X X X X X X X X X	X	Execution	Test Routine	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_GetCElement.vi LinearSystem_GetD.vi	Function Prototype	Notes	Code Review	Test Program	Front Chantina
LINEAR SYSTEM	X X X X X X X X X X X X X X X X X X X	X	Execution	Test Routine	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_GetD.vi LinearSystem_GetDElement.vi	Function Prototype	Notes	Code Review	Test Program	
LINEAR SYSTEM	X X X X X X X X X X X X X X X X X X X	X	Execution	Test Routine	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_GetD.vi LinearSystem_GetDElement.vi	Function Prototype	Notes	Code Review	Test Program	:
LINEAR SYSTEM	X X X X X X X X X X X X X X X X X X X	X	Execution	Test Routine	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_GetD.vi LinearSystem_GetDElement.vi	Function Prototype	Notes	Code Review	Test Program	:
LINEAR SYSTEM	X X X X X X X X X X X X X X X X X X X	X	mized		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_GetD.vi LinearSystem_GetDElement.vi	Function Prototype	Notes	Code Review	Test Program	
LINEAR SYSTEM	X X X X X X X X X X X X X X X X X X X	X	Optimized Execution		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_GetD.vi LinearSystem_GetDElement.vi LinearSystem_New.vi	Function Prototype	Notes	Code	Test	
LINEAR SYSTEM	X X X X X X X X X X X X X X X X X X X	X	Optimized Execution		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_GetD.vi LinearSystem_GetDElement.vi LinearSystem_New.vi	Function Prototype	Notes	Code	Test	
LINEAR SYSTEM	X X X X X X X X X X X X X X X X X X X	X	Optimized Execution		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_GetD.vi LinearSystem_GetDElement.vi LinearSystem_New.vi	Function Prototype	Notes	Code	Test	
LINEAR SYSTEM	X X X X X X X X X X X X X X X X X X X	X	Optimized Execution		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_GetD.vi LinearSystem_GetDElement.vi LinearSystem_New.vi			Code	Program Test	200
	Implemented X	Not WPILIB X X X X X X X X X X X X X	Execution Optimized Execution		LinearSystem_CalculateX.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	
LINEAR SYSTEM	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		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_New.vi			Code	Program Test	
	Implemented 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		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_New.vi			Code	Program Test	
	X X X X X X X X X X X X X X 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		LinearSystem_CalculateX.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi LinearSystem_GetDelement.vi LinearSystem_New.vi			Code	Program Test	200
	X X X X X X X X X X X X X X 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		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_New.vi			Code	Program Test	ي المار الما
	X	X X X X X X X X X X X X X X X X X X X	Execution Optimized Execution		LinearSystem_CalculateX.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetCelement.vi LinearSystem_GetD.vi LinearSystem_GetDElement.vi LinearSystem_GetDElement.vi LinearSystem_New.vi			Code	Program Test	Observing
	X	X X X X X X X X X X X X X X X X X X X	Execution Optimized Execution		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_New.vi			Code	Program Test	Frror Checkina

ວແມ ການວວກກຸ	y one	vi) A	ucu a	dutional columns for test and sample.
XX		X		LinearSystemLoop_GetNextR_Single.vi
XX		X		LinearSystemLoop_GetNextR.vi
XX		X		LinearSystemLoop_GetObserver.vi
XX		X		LinearSystemLoop_GetU_Row.vi
XX		X		LinearSystemLoop_GetU.vi
XX		X		LinearSystemLoop_GetXHat_Single.vi
XX		X		LinearSystemLoop_GetXHat.vi
				LinearSystemLoop_New_BBB
				LinearSystemLoop_New_LinearSystem_ClampFunc
$X \mid X$		X		LinearSystemLoop_New_LinearSystem_ClampVal.vi
XX		X		LinearSystemLoop_New.vi
$X \mid X$		X		LinearSystemLoop_Predict.vi
$X \mid X$		X		LinearSystemLoop_Reset.vi
				LinearSystemLoop_SetClampFunction.vi
				LinearSystemLoop_SetNextR_Some.vi
XX		X		LinearSystemLoop_SetNextR.vi
				LinearSystemLoop_SetXHat_Single.vi
				LinearSystemLoop_SetXHat.vi

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

Particle Protetype Particle Particle Protetype Particle Protetype Particle Particle Particle Protetype Particle													
X	CALLBACK HELPER					Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
				X	X								
DISCRETIZATION X X X X X X Discretization DiscretizeA vi X X X X X X Discretization DiscretizeA play of the protection Prototype Notes DISCRETIZATION X X X X X X Discretization DiscretizeA play of the protection DiscretizeA play of the play of the protection DiscretizeA play of the protection DiscretizeA play of the protection DiscretizeA play of the play of the		X		Χ .	X			CallbackHelp_MatrixMult_CoerceSizeB.vi					
DISCRETIZATION X X X X Discretization DiscretizeAvi		X		X .	X			CallbackHelp_MatrixPlus.vi					
DISCRETIZATION X X X X Discretization DiscretizeAvi													
X		(Implemented	Documented						Function Prototype	Notes	Code Review	Test Program	Error Checking
X	DISCRETIZATION	X	X	-	X								
STATE SPACE UTIL X X X X X X X X X X X X X X X X X X X		X											
X X X Discretization_DiscretizeAQTaylor.vi X X X Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi Function Prototype Notes STATE SPACE UTIL X X X X X X StateSpaceUtil_MakeCostMatrix.vi X X X X X StateSpaceUtil_MakeCostMatrix.vi X X X X X StateSpaceUtil_MakeCovarianceMatrix.vi X X X X StateSpaceUtil_MakeCovarianceMatrix.vi X X X X StateSpaceUtil_MakeCovarianceMatrix.vi X X X X StateSpaceUtil_MakeWhiteNoiseVector.vi			\/ \			X							
X X X X Discretization_DiscretizeR.vi DiscretizeR.vi DiscretizeR.vi DiscretizeR.vi DiscretizeR.vi DiscretizeR.vi DiscretizeR.vi DiscretizeR.vi DiscretizeR.vi Disc			X	-	^								
		X				Y		Discretization_DiscretizeAQ.vi					
STATE SPACE UTIL X X X X StateSpaceUtil_MakeCostMatrix.vi X X X X StateSpaceUtil_MakeCovarianceMatrix.vi X X X X X StateSpaceUtil_MakeCovarianceMatrix.vi X X X X X StateSpaceUtil_MakeWhiteNoiseVector.vi		X	X		X	X		Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi					
X X X X StateSpaceUtil_MakeCovarianceMatrix.vi X X X X StateSpaceUtil_MakeWhiteNoiseVector.vi		X	X		X	X		Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi					
X X StateSpaceUtil_MakeWhiteNoiseVector.vi	STATE SPACE LITII	X X X Implemented	Documented X X	NOT WPILIB	Menu Item X X	Test Routine	Sample Program	Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	STATE SPACE UTIL	X X X X X	X Documented	Not WPILIB	X X Wenu Item	X Test Boutine	Sample Program	Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi VI Name StateSpaceUtil_MakeCostMatrix.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	STATE SPACE UTIL	X X X X X X X X X X X X X X X X X X X	X Documented X X	NOT WPILIB	X X Menu Item	X Test Boutine	Sample Program	Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi VI Name StateSpaceUtil_MakeCostMatrix.vi StateSpaceUtil_MakeCovarianceMatrix.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking

		,	,	 		
λ	(X	X		StateSpaceUtil_PoseToVector.vi		
λ	<i>X</i>	X		StateSpaceUtil_ClampInputMaxMagnitude.vi	Routine exists, it is just a shell	
λ	(X	X		StateSpaceUtil_NomalizeInputVector.vi		
λ	<i>X</i>	X		StateSpaceUtil_PoseTo4dVector.vi		
λ	(X	X		StateSpaceUtil_PoseTo3dVector.vi		

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

Implemented	Documented	Not WPILIB Menu Item	Execution Optimized	Test Routine Sample Program <	′I Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
BATTERY SIM X	X	X	SI	B	BatterySim_CalculateDefaultBatteryLoadedVoltage.vi					
X	X	X	SI	В	BatterySim_CalculateLoadedVoltage.vi					

	Implemented	Not WPILIB	Menu Item	Execution Optimi	st Routine	mple Program			de Review	st Program	or Checking
	Ĕ	8 8	Me	Ĕ	Test	VI Name	Function Prototype	Notes	රි	1 L	Em
DIFFERENTIAL DRIVE TRAIN SIM	Χ					DiffDriveTrainSim_ClampInput.vi					
L	X		X			DiffDriveTrainSim_CreateKitbotSim.vi					
	X		X			DiffDriveTrainSim_CreateKitbotSim_EstMass.vi					
	X		X			DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi					
	X		X			DiffDriveTrainSim_GetCurrentDrawAmps.vi					
	Χ		X			DiffDriveTrainSim_GetCurrentGearing.vi					
	Χ		X			DiffDriveTrainSim_GetDynamics.vi					
	Χ		X			DiffDriveTrainSim_GetHeading.vi					
	Χ		X			DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi					
	Χ		X			DiffDriveTrainSim_GetLeftPositionMeters.vi					
	Χ		X			DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi					
	Χ		X			DiffDriveTrainSim_GetOutput_Single.vi					
	Χ		X			DiffDriveTrainSim_GetPose.vi					
	Χ		X			DiffDriveTrainSim_GetRightCurrentDrawAmps.vi					
	X		X			DiffDriveTrainSim_GetRightPositionMeters.vi					
	X		X			DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi					
	Χ		X			DiffDriveTrainSim_GetState.vi					
	X		X			DiffDriveTrainSim_GetState_Single.vi					
<u> </u>	X		X			DiffDriveTrainSim_KitBotWheelSize.vi					
	X		X			DiffDriveTrainSim_New.vi					
	X		X			DiffDriveTrainSim_New_Mass_MOI.vi					
	X		X			DiffDriveTrainSim_SetCurrentGearing.vi					
	X		X			DiffDriveTrainSim_SetInputs.vi					
	X		X			DiffDriveTrainSim_SetPose.vi					
	X		X			DiffDriveTrainSim_SetState.vi					
	X		X			DiffDriveTrainSim_ToughBoxMiniGearRatio.vi					
	X		X			DiffDriveTrainSim_ToughBoxMiniMotor.vi					
	X		X			DiffDriveTrainSim_Update.vi					

FRC LabVIEW Trajectory Library – VI Implementation	n List	t									
Revision 2.X 11/12/2021 – State Space Items – (This list is s	still mi	issing on	ne VI) Ad	ded ad	ditional columns for test and sample.					
				ıize		2					
	75	75		ptin	a)	grar			>	£	ing
	ntec	ntec	<u>α</u>	, d	Test Routine	Prog			vie	Test Program	eck
	Implemente	Documente	NOT WFILIE	Execution	Rol	S VI Name			. Revi	Pro	S
	ηρle	7	010	xec	est	de VINI	Formation Double to a	Nistan	Code	est	ror
ELEVATOR SIM		Q		<u>ч</u>		VI Name ElevatorSim New.vi	Function Prototype	Notes		<u> </u>	
ELLVATOROM	X			(ElevatorSim GetCurrentDraw.vi					
	Χ		\ \ \ \ \ \	(ElevatorSim_GetPositionMeters.vi					
	Χ			(ElevatorSim_GetVelocityMetersPerSecond.vi					
	X			(ElevatorSim_SetInputVoltage.vi					
	X			(ElevatorSim_UpdateX.vi ElevatorSim_WouldHitLowerLimit.vi					
	X		$\frac{1}{\lambda}$			ElevatorSim_WouldHitUpperLimit.vi					
	X	>	XX	(ElevatorSim_Update.vi		Needed because this doesn't			
								extend.			
	X			(ElevatorSim_HasHitLowerLimit.vi					
	X	\	X X			ElevatorSim_HasHitUpperLimit.vi ElevatorSim_RKF45_Func.vi					
		,				ElevatorSim New NoNoise.vi					
						ElevatorSim_New_LinSys.vi					
						ElevatorSim_New_LinSys_NoNoise.vi					
	Implemented	Documented	NOT WPILIB	Execution Optimize	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	error Checking
FLYWHEEL SIM		0 2		<u>е</u> Ш	<u> </u>	FlyWheelSim_GetAngularVelocityRadPerSec.vi	Function Prototype	Notes			Ш
	X			(FlyWheelSim New MOI.vi					
	Χ		\ \ \ \ \ \	(FlyWheelSim_SetInput.vi					
	X			(FlyWheelSim_Update.vi					
	X			(FlyWheelSim_GetCurrentDrawAmps					
	Χ			(FlyWheelSim_GetAngularVelocityRPM.vi		Future			
						FlyWheelSim_New_LinSys_NoNoise FlyWheelSim_New_LinSys		Future			
						FlyWheelSim_New_LinSys_MOI_NoNoise		Future			
	ď	ď		Optimized	ø,	gram			8	٤	ing
	nte	nte	ַב בַּ		utin	Prog			e Viê	gra	ech
	me	ime id	1 4	utio	Rol	e/c			Å.	Progra	S
	əJdι	000	NOT WPILIE	Execution	Test Routine	S VI Name	5 6 5 4	NI 4	oqe	Test	Ď.
LINEAR SYSTEM SIM	<u> </u>	ک ک		<u>Σ</u> <u>Ψ</u>	<u> </u>	ップ VI Name LinearSystemSim_GetOutput.vi	Function Prototype	Notes	8	\	Eu
LINEAR STSTEM SIM	X			(LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi					
	X		7	(LinearSystemSim_New					
	Χ		\ \ \ \ \ \	(LinearSystemSim_SetInput_Single.vi					
	Χ		λ	(LinearSystemSim_Update.vi					
	X		N	0		LinearSystemSim_UpdateX.vi					
	Χ)	X N	U		LinearSystemSim_UpdateY.vi LinearSystemSim_New_NoNoise.vi					
	Х		 	(LinearSystemSim_New_Nonoise.vi LinearSystemSim_SetInput.vi					
	X		λ	(LinearSystemSim_SetInput_Array.vi		Doesn't use clamp ?			
	Χ			(LinearSystemSim_Setstate.vi					
			\perp			LinearSystemSim_GetCurrentDrawAmps.vi		DONT IMPLEMENT			
	Χ					LinearSystemSim_ClampInput.vi					

I INC Labvilly	n Hajecioi	y Library – vi iiri	piemenialion List		
Revision 2.X	11/12/2021 –	State Space Items	- (This list is still missing one VI) Added additional columns for test and sample.	
				~	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Name Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
SINGLE JOINT ARM SIM	Χ	X		Χ			SngJntArmSim_EsitmateMOI.vi					
	Χ	Χ		Χ			SngJntArmSim_GetAngleRads.vi					
	Χ	X		Χ			SngJntArmSim_GetCurrentDraw.vi					
	Χ	Χ		Χ			SngJntArmSim_GetVelocityRadsPerSec.vi					
	Χ	X		Χ			SngJntArmSim_HasHitLowerLimit.vi					
	Χ	X		Χ			SngJntArmSim_HasHitUpperLimit.vi					
	Χ	Χ		Χ			SngJntArmSim_New.vi					
	Χ	X					SngJntArmSim_Rkf45_Func.vi					
	Χ	Χ		Χ			SngJntArmSim_SetInputVoltage.vi					
	Χ			Χ			SngJntArmSim_Update.vi					
	Χ	X		Χ			SngJntArmSim_UpdateX.vi					
	Χ	Χ		Χ			SngJntArmSim_WouldHitLowerLimit.vi					
	Χ	X		Χ			SngJntArmSim_WouldHitUpperLimit.vi					

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

| Notes | Note

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	•	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX	X	X		X	SI		Matrix_AssignBlock.vi					
	Χ	X		Χ	SI		Matrix_Block.vi					
	X	X		Χ	SI		Matrix_Create.vi					
	X	Χ		X	SI		Matrix_Diag.vi					
	Χ	X		Χ	SI		Matrix_ElementSum.vi					
	Χ	Χ		X	1		Matrix_Exp.vi					
	Χ	Χ		Χ	SI		Matrix_ExtractColumnVector.vi					
	Χ	Χ		X	SI		Matrix_ExtractFrom.vi					
	Χ			Χ	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_IsEqual.vi					
	X	X		X	1		Matrix_LItDecompose.vi					
	X	X		X	1		Matrix_Pow.vi					
	X	X		X	SI		Matrix_SetColumn.vi	THERE ARE LOTO OF OTHER MATRIX FUNCTIONS THAT				
	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	Nample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX HELPER	X		X	Χ	SI		MatrixHelper_Zero.vi					
	Х		Χ	Χ	SI		MatrixHelper_CooerceSize.vi					
	X		X	Χ	SI		MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi					

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

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
ANGLE STATISTICS	X_{\perp}	X		X		X	AngleStats_AngleAdd.vi					
	X	X	X	X	X		AngleStats_AngleAdd_CallbackHelp.vi					
	X	X		X	1	X	AngleStats_AngleMean.vi					
	X	X	X	X	X		AngleStats_AngleMean_CallbackHelp.vi					
	X	X		X	1	X	AngleStats_AngleResidual.vi					
	X	X	X	X	X		AngleStats_AngleResidual_CallbackHelp.vi					
					ized							

Implemented Documented Not WPILIB	Menu Item	Execution Optimize	Test Routine	 VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATH UTILITY X X	X	SI		MathUtil_AngleModulus.vi					

FRC LabVIEW Trajectory Library – VI Implementation	List									
Revision 2.X 11/12/2021 – State Space Items – (This list is st	till missi	ing one	e VI)	Adde	ed additional columns for test and sample.					
	$X \mid X$	(X	SI	MathUtil_Clamp.vi					
	X	(X	SI	MathUtil_ApplyDeadband.vi					
	X		X		MathUtil_Clamp_Int.vi					
	X		X		MathUtil InputModulus.vi					
		<		SI	### Book	Function Prototype	Notes	Code Review	Test Program	Error Checking
_	·	·		nized	4					
	lemented	WPILIB	nu Item	ecution Optimiz	it Routine			le Review	t Program	or Checking
	mplemented	Vot WPILIB	Menu Item		Test Routine Sample Prograi	Function Prototype	Notes	Sode Review	Test Program	ror Che
NUMERICAL INTEGRATION	X Implemented	Not WPILIB		Execution Optin	Name Sat Ro	Function Prototype	Notes	Code Review	Test Program	Error Checking
NUMERICAL INTEGRATION	X	Not WPILIB	No		な	Function Prototype	Notes	Code Review	Test Program	ror Che
NUMERICAL INTEGRATION		Not WPILIB	No No		Region Numlntegrate_Func_Ax_Bu_K.vi Numlntegrate_Func_Bs.vi	Function Prototype	Notes	Code Review	Test Program	ror Che
NUMERICAL INTEGRATION	X X	Not WPILIB	No No No		文 も	Function Prototype	Notes	Code Review	Test Program	ror Che
NUMERICAL INTEGRATION	X X X	Not WPILIB	No No No		Record to the control of	Function Prototype		Code Review	Test Program	ror Che
NUMERICAL INTEGRATION	X X X	Not WPILIB	No No No No X		RumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi	Function Prototype	NOT DONE	Code Review	Test Program	ror Che
	X X X X /	Not WPILIB	No No No No X		Record Street VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_LDbl.vi	Function Prototype		Code Review	Test Program	ror Che
	X X X X /	Not WPILIB	No No No No X X X		V E VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_K_Dbl.vi NumIntegrate_Rk4_Mat_X.vi	Function Prototype	NOT DONE	Code Review	Test Program	ror Che
	X X X X Y X X	Not WPILIB	No		VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_K_Dbl.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X_U.vi	Function Prototype	NOT DONE	Code Review	Test Program	ror Che
	X X X X X X X X X	Not WPILIB	No No No No X X X X X X X X X		VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_K_Dbl.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rk45.vi	Function Prototype	NOT DONE	Code Review	Test Program	ror Che
	X X X X / / / X X X X X X	Not WPILIB	No No No No X X X X X X No No		NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ct.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_K_Dbl.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rkf45.vi NumIntegrate_Rkf45Impl.vi	Function Prototype	NOT DONE	Code Review	Test Program	ror Che
	X X X X X Y X X X X X X X X X X X X X X	Not WPILIB	No		VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rk45Impl.vi NumIntegrate_Trap_Dbl.vi NumIntegrate_Trap_Dbl.vi	Function Prototype	NOT DONE	Code Review	Test Program	ror Che
	X X X X / / / X X X X X X	Not WPILIB	No No No No X X X X X X No No		NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ct.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_K_Dbl.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rkf45.vi NumIntegrate_Rkf45Impl.vi	Function Prototype	NOT DONE	Code Review	Test Program	ror Che
	X X X X X Y X X X X X X X X X X X X X X	Not WPILIB	No		VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rk45Impl.vi NumIntegrate_Trap_Dbl.vi NumIntegrate_Trap_Dbl.vi	Function Prototype	NOT DONE	Code Review	Test Program	(
	X		No No No No X X X X X X No X X X X X X X X X	Optimized Execution	Wind the second		NOT DONE NOT DONE	de Review	Program	or Checkina
	X X X X X X X X X X X X X X X X X X X	Not WPILIB	No No No No X X X X X X No X X X X X X X X X	otimized	VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rk45Impl.vi NumIntegrate_Trap_Dbl.vi NumIntegrate_Trap_Dbl.vi	Function Prototype Function Prototype	NOT DONE	Code Review Code Review	ogram	ror Che

NumJacobian_U.vi

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

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

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

> Documented
>
> X Not WPILIB
>
> X Menu Item VI Name **Function Prototype** Notes TypeDef Z ARM FF.CTL X X N/A BICon-Matrix FUNC TYPE.CTL 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 X X N/A DIFF DRIVE Kitbot WheelSize ENUM.ctl Ζ X X N/A DIFF DRIVE POSE EST.ctl Ζ X X N/A DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl Ζ X X N/A DIFF DRIVE ToughBoxMini MotorChoice ENUM.ctl Ζ DIFF_DRIVE_TRAIN SIM.ctl X X N/A Ζ X X N/A ELEVATOR SIM.CTL Ζ X X N/A ELEV FF.CTL Ζ X X N/A EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL Ζ X X N/A EXTENDED KALMAN FILTER.CTL 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 Ζ X X N/A KALMAN FILTER LATENCY COMP.CTL Z X X X N/A LINEAR FILTER.CTL X X N/A Ζ LINEAR PLANT INV FF.ctl X X N/A LINEAR QUADRATIC REGULATOR.ctl Ζ Ζ X X N/A LINEAR SYSTEM LOOP.ctl Ζ 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 Z X X N/A MEDIAN_FILTER.CTL Ζ X X N/A MERWE_SCALED_SIGMA_PTS.ctl Ζ X X N/A OBSERVER SNAPSHOT.CTL X X N/A OBSERVER_SNAP_LIST_ITEM.CTL Z X X X N/A PARAM STACK ITEM.CTL Z X X X N/A PARAM STACK.CTL PID ADV_LIMITS.CTL X X N/A Z X X N/A PID ADV TUNING.CTL

Z	still missing one VI) Added additional columns for test and sample.							
Z			_					
Z								
Z								
Z								
Z		X				POSE2D CTI		
Z								
Z		^						
Z		Y					-	
Z		^					-	
Z		Y					-	
Z		^					-	
Z		V						
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Z		V						
Z		_						
Z								
Z								
Z								
Z		Х	Х					
Z								
Z								
Z								
TRAJ CONSTRAINT DIFF DRIVE VOLTAGE.CTL								
TRAJ CONSTRAINT JERK CTL								
Z	Z	Χ						
Z	1						Routine exists, it is just a shell	
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