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 (/)
CTRL Shell Total (())
CTRL

Doc completed Pct 77.66% Optimization Pct 41.13%

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

'===== BASE

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	Implemented	Documented	ЯПЬ	tem	Execution Optimized	Test Routine	Sample Program		
	plem	uno	Not WPILIB	Menu Item	ecut	st Re	ald m		
		ದ	_≥	_ 🔻				Function Prototype	Notes
LINEAR FILTE		X		X	SI		LinearFilter_Calculate.vi		
	X	X	X	X	Χ		LinearFilter_CutoffFrequency.vi		
	X	X	X	X	I		X LinearFilter_Execute.vi		Labview style helper
	X	X		X	Χ		LinearFilter_HighPass.vi		
	X	X	X	X	Χ		LinearFilter_HighPassBW1.vi		
	X	X	X	X	Χ		LinearFilter_HighPassBW2.vi		
	X	X	X	X	Χ		LinearFilter_LowPassBW1.vi		
	X	X	X	X	Χ		LinearFilter_LowPassBW2.vi		
	X	Χ		X	X		LinearFilter_MovingAverage.vi		
	X	X		X	1		LinearFilter_New.vi		
	X	X		X	SI		LinearFilter_Reset.vi		
	Χ	X	X	X	SI		LinearFilter_ResetToValue.vi		
	X	X		X	Χ		LinearFilter_SinglePoleIIR.vi		
	X	X	X	X	X		LinearFilter_TimeConst.vi		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program ame	Function Prototype	Notes
MEDIAN FILTE		X	$\overline{}$	X	X		MedianFilter Calculate.vi		
	X	X	X	X	1		X MedianFilter Execute.vi		Labview style helper
	X	X	<u> </u>	X	SI		MedianFilter_New.vi		232 213.2
	X	X		X	SI		MedianFilter Reset.vi		

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		
	X	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 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 \	e VI) Added 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										
X X X ProfiledPIDController New.vi X X X X ProfiledPIDController Reset.vi X X X ProfiledPIDController Reset PosOnly.vi X X X ProfiledPIDController Reset PosVel.vi X X X ProfiledPIDController SetConstraints.vi X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal PosOnly.vi X X X ProfiledPIDController SetIntegratorRange.vi										
X X X ProfiledPIDController Reset.vi X X X X ProfiledPIDController Reset PosOnly.vi X X X X ProfiledPIDController Reset PosVel.vi X X X ProfiledPIDController SetConstraints.vi X X X ProfiledPIDController SetGoal.vi X X X ProfiledPIDController SetGoal PosOnly.vi X X X ProfiledPIDController SetIntegratorRange.vi										
X X X X ProfiledPIDController_Reset.vi X X X X X ProfiledPIDController_Reset_PosOnly.vi X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X ProfiledPIDController_SetIntegratorRange.vi									_	
X X X ProfiledPIDController_Reset_PosOnly.vi X X X X ProfiledPIDController_Reset_PosVel.vi X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X ProfiledPIDController_SetIntegratorRange.vi								_		
X X X X ProfiledPIDController_Reset_PosVel.vi X X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi										
X X X X ProfiledPIDController_SetConstraints.vi X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi										
X X X X ProfiledPIDController_SetGoal.vi X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi										
X X X X ProfiledPIDController_SetGoal_PosOnly.vi X X X X ProfiledPIDController_SetIntegratorRange.vi					~					
X X ProfiledPIDController SetIntegratorRange.vi										
		-								
X X X ProfiledPIDController_SetTolerance_PosOnly.vi										
X X X ProfiledPIDController SetTolerance PosVel.vi					X					

Revision 2.X	11/12/2021 - Stat	e Space Items –	(This list is still missi	ng one VI)) Added additional	columns for test and sample.

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
SIMPLE MOTOR FEEDFORWARD	X	X		X	SI			SimpleMotorFF_New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)	
									public SimpleMotorFeedforward(double ks, double kv)	
	X	Χ		X	SI			SimpleMotorFF_Calculate.vi	public double calculate(double velocity, double acceleration)	
	X							SimpleMotorFF_Calculate_NextV_Dt.vi		
	X	X		X	SI			SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)	
			Χ					SimpleMotorFF_Execute.vi		LabVIEW style single call
			X					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		X	X			SimpleMotorFF_MaxAchieveAccel.vi	public double maxAchievableAcceleration(double maxVoltage, double velocity)	
	X	X		X	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	X		X	SI			Pose_New.vi	pose2d new(double x, double y, rotation2d)	
	X	X		X	SI			Pose_Plus.vi	pose2d plus(transform2d other)	
	Χ	Χ		Χ	SI			Pose_Minus.vi	transform2d minus(pose2d other)	
	Χ	Χ		Χ	SI			Pose_getTranslation.vi	translation2d getTranslation()	can also use cluster unpack
	Χ	Χ		Χ	SI			Pose_getRotation.vi	rotation2d getRotation()	can also use cluster unpack

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

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

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

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

FRC LabVIEW Trajectory Library – VI Implementation	n List	t							
Revision 2.X 11/12/2021 – State Space Items – (This list is s			one V	/I)	Add	ed addi	tional columns for test and sample.	_	
, , ,	Χ	X		X	SI		Translation_GetY.VI	double getY()	can use cluster unpack
	X			Χ	SI		Translation_GetXY.VI		
	X			Χ	SI		Translation_GetNorm.VI	double getNorm()	can use cluster unpack
	Χ			Χ	SI		Translation_RotateBy.vi	translation2d rotateBy(rotation2d other)	
	Χ			Χ	SI		Translation_Plus.vi	translation2d plus(translation2d other)	
				Χ	SI		Translation_Minus.vi	translation2d minus(translation2d other)	
	Χ			Χ	SI		Translation_UnaryMinus.vi	translation2d unaryminus()	
	Χ	Χ		Χ	SI		Translation_Times.vi	translation2d times(double scalar)	10: 1 1 1/
		14			0.1			translation2d div(double scalar)	can multiply by 1/scalar
l	X	X		Χ	SI		Translation_Equals.vi	boolean equals(translation other)	
TWIST	X	X		X Menu Item	ଏ ଓ ଓ Execution Optimized	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
'======= KINEMATICS '=========					,				
	ented	nted	9/-	4	n Optimize	tine	oggan B		
CHASSIS SPEEDS	Implementec	Documented	Not WPILIB	Menu Item	Execution	Test Routine	VI Name	Function Prototype chassisspeeds new ()	Notes can use cluster constant
CHASSIS SPEEDS		Docume		X Menu Ite	ত Execution	Test Rou	VI Name ChassisSpeeds_New.vi		
CHASSIS SPEEDS	X	X				Test Rou		chassisspeeds new ()	
CHASSIS SPEEDS	X	X		X	SI	Test Rou	ChassisSpeeds_New.vi	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y,	
CHASSIS SPEEDS	X	X		X X	SI SI	Test Rou	ChassisSpeeds_New.vi ChassisSPeeds_GetXYOmega.vi	chassisspeeds new ()	
CHASSIS SPEEDS DIFFERENTIAL DRIVE KINEMATICS	X X X X X X X X X X X X X X X X X X X	X	Not WPILIB	X X	SI SI	X X Test Routine	ChassisSpeeds_New.vi ChassisSPeeds_GetXYOmega.vi	chassisspeeds new () chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds fromFieldRelativeSpeeds(double x, double y,	
	Implemented X X X Implemented X X X	Documented X X X Documented X	Not WPILIB	X X X X X	Execution Optimized $ \Omega \times - Execution Optimized \Omega $	utine X X X Test Routine	ChassisSpeeds_New.vi ChassisSPeeds_GetXYOmega.vi ChassisSpeeds_FromFieldRelativeSpeeds.VI English VI Name DiffKinematics_New.vi DiffKinematics_toChassisSpeed.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)	Notes Notes incorporated into "update"

rajectory Library – VI Implementatio	n Lis	<u>it</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 Dualet ma	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	itic	<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> X	Ш.	_	MecaOdometry_New.vi		Notes
	X			X	1		MecaOdometry_NewDefaultPose.vi		
	X	X		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
				Χ					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 pose, 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 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 Bus		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 workings was also to be a shown as
	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)

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 $X \mid X$

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X SI

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

poseMeters, double curvatureRadPerMeter, double

Newpublic SwerveDriveKinematicsConstraint(final

SwerveDriveKinematics kinematics, double

getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)

Can use cluster pack for now

velocityMetersPerSecond)

maxSpeedMetersPerSecond)

public MinMax

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		
	Χ	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	X	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		
	X	Χ	X	X				PathfinderUtil_OptimizeTrajectoryStates.vi		
	X	Χ	X	X				PathfinderUtil_ToTrajectory.vi		
	Χ	Χ	Χ	Χ				PathfinderUtil_ToTrajectoryStates.vi		

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STATE SPACE MODEL

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

10 311	11 111133	Jing C) iic vi)	Added addit	ional columns for test and sample.
	X	X	X	SI	DCMotor_GetBanebotsRs775.vi
		X	X	SI	DCMotor_GetCIM.vi
		X	X	SI	DCMotor_GetCurrent.vi
		X	X	SI	DCMotor_GetFalcon500.vi
	X	X	X	SI	DCMotor_GetMiniCIM.vi
		X	X	SI	DCMotor_GetNEO.vi
	X	X	X	SI	DCMotor_GetNEO550.vi
		X	X	SI	DCMotor_GetVex775Pro.vi
		X		SI	DCMotor_GetRomiBuiltIn.vi
		X	X	SI	DCMotor_New.vi
	X	X			DCMotor_PickMotor.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	X		X				LinearSystemId_CreateDriveTrainVelocitySystem.vi	Update to use create matrix			
	Χ	X		X				LinearSystemId_CreateElevatorSystem.vi	Update to use create matrix			
	X	X		X				LinearSystemId_CreateFlywheelSystem.vi	Update to use create matrix			
	Χ	X		Χ				LinearSystemId_CreateSingleJointedArmSystem.vi	Update to use create matrix			
	X	X		X				LinearSystemId_IdentifyDriveTrainSystem.vi	Update to use create matrix			
	Χ	X		Χ				LinearSystemId_IdentifyPositionSystem.vi	Update to use create matrix			
	Χ	X		Χ				LinearSystemId_IdentifyVelocitySystem.vi	Update to use create matrix			

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optim	Test Routine	ง VI Name Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATOR	X	Χ		X			DiffDrivePoseEst_AddVisionMeasurement.vi	Just a shell, not functional!			
	Χ	Χ		X			DiffDrivePoseEst_FillStateVector.vi				
	Χ	Χ		X			DiffDrivePoseEst_GetEstimatedPosition.vi				
	Χ			X			DiffDrivePoseEst_Kalman_F_Callback.vi				
	X			X			DiffDrivePoseEst_Kalman_H_Callback.vi				
	Χ	Χ		X			DiffDrivePoseEst_New.vi				
	X	Χ		X			DiffDrivePoseEst_ResetPosition.vi				
	X	Χ		X			DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi				
	Χ	Χ		X			DiffDrivePoseEst_Update.vi				
	Χ	Χ		X			DiffDrivePoseEst_UpdateWithTime.vi				
	Χ	Χ					DiffDrivePoseEst_VisionCorrect_Callback.vi				
	X			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 X	X				ExtendedKalmanFilter_Correct.vi		Just a shell, not functional!			
XX	X				ExtendedKalmanFilter_Correct_OnlyUY.vi					
XX	\overline{X}				ExtendedKalmanFilter GetP.vi					

C LabVIEW Trajectory Library – VI Implementati	on Lis	t								
rision 2.X 11/12/2021 – State Space Items – (This list is	s still m	issing one		Added a		_				
		X	X		ExtendedKalmanFilter_GetP_Single.vi					
	X	X	X		ExtendedKalmanFilter_GetXHat.vi					
	X	X	X		ExtendedKalmanFilter_GetXHat_Single.vi					
	X	X	X		ExtendedKalmanFilter_New.vi					
	X	X	X		ExtendedKalmanFilter_Predict.vi					
	X	X	X		ExtendedKalmanFilter_Reset.vi					
	X	X	X		ExtendedKalmanFilter_SetP.vi					
	X	X	X		ExtendedKalmanFilter_SetXHat.vi					
	X	X	X		ExtendedKalmanFilter_SetXHat_Single.vi					
	mplemented	Documented Not WPILIB	Menu Item	Execution Optimized Test Routine	Sample Program			de Review	st Program	or Checking
	ju,	No io	Me	Exec Test	S VI Name	Function Prototype	Notes	Ö	Test	J.
KALMAN FILTE		X	X X	X					17	
INCLIMANTILLE	X	X	X	X						
	X	X	X	X						
			X	^	KalmanFilter_Predict.vi KalmanFilter Reset.vi					
	X	X								
	X	X	X		KalmanFilter_GetK					
	X	X	X		KalmanFilter_GetK_Single.vi					
	X	X	X		KalmanFilter_SetXHat					
	X	X	X	X	KalmanFilter_SetXHat_Single					
	X	X	X		KalmanFilter_GetXHat					
	X	X	X	timized X	KalmanFilter_GetXHaT_Single					б
	ď	δ		ution Optimized Routine	KalmanFilter_GetXHaT_Single			le Review	t Program	or Checking
	X	δ		ution Optimized Routine	mple Program	Function Prototyne	Notes	ode Review	est Program	error Checking
KAL MAN EII TER I ATENCY COMPENSATO	Implemented	ď	Menu Item	otimized	Sample Program Name	Function Prototype	Notes Work in progress	Code Review	Test Program	Error Checking
KALMAN FILTER LATENCY COMPENSATO	X Implemented	δ	X Menu Item	ution Optimized Routine	Egy Do La	Function Prototype	Notes Work in progress.	Code Review	Test Program	Error Checking
KALMAN FILTER LATENCY COMPENSATO	Implemented	δ	Menu Item	ution Optimized Routine	Sample Program Name	Function Prototype		Code Review	Test Program	Error Checking
KALMAN FILTER LATENCY COMPENSATO	X Implemented	δ	X Menu Item	ution Optimized Routine	Egy Do La			Code Review	Test Program	Error Checking
KALMAN FILTER LATENCY COMPENSATO	X X Implemented	δ	X Menu Item	ution Optimized Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi		Work in progress. Work in progress.	Code Review	Test Program	Error Checking
KALMAN FILTER LATENCY COMPENSATO	X X Implemented	δ	X Wenu Item	ution Optimized Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi KalmanFilterLatencyComp_FindClosestMeasurement.vi		Work in progress.	Code Review	Test Program	Error Checking
KALMAN FILTER LATENCY COMPENSATO	X X X Implemented	δ	X X Menu Item	ution Optimized Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi		Work in progress. Work in progress. Work in progress.	Code Review	Test Program	Error Checking
KALMAN FILTER LATENCY COMPENSATO	X X Implemented	δ	X Wenu Item	Execution Optimized Test Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi KalmanFilterLatencyComp_FindClosestMeasurement.vi		Work in progress. Work in progress.	Code Review	Test Program	
KALMAN FILTER LATENCY COMPENSATO	Implemented X X X X X Implemented	δ	Menu Item X X X X X X X X X X X X X X X X X X X	ution Optimized Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi WalmanFilterLatencyComp_New.vi SummanFilterLatencyComp_New.vi		Work in progress. Notes Haven't started yet	Code Review	Test Program	or Checking
	May Implemented X X X X X X X X X X X X X X X X X X X	d Documented Not WPILIB	X Wenu Item	Execution Optimized Test Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi		Work in progress.	e Review		or Checkina
	Sa Maplemented X X X X X X X X X	d Documented Not WPILIB	X X Wenu Item	Execution Optimized Test Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_VisionCorrect_Callback.vi		Work in progress. Notes Haven't started yet	e Review		or Checkina
	B X X X X X X X X X X X X X X X X X X X	d Documented Not WPILIB	X X Wenu Item	Execution Optimized Test Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_VisionCorrect_Callback.vi SwerveDrivePoseEst_VisionCorrect_Callback.vi		Work in progress. Notes Haven't started yet	e Review		or Checkina
	X X X X X X X X X X X X X X X X X X X	d Documented Not WPILIB	X X Wenu Item	Execution Optimized Test Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.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		Work in progress. Notes Haven't started yet	e Review		
	B X X X X X X X X X X X X X X X X X X X	d Documented Not WPILIB	X X Wenu Item	Execution Optimized Test Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_VisionCorrect_Callback.vi SwerveDrivePoseEst_VisionCorrect_Callback.vi		Work in progress. Notes Haven't started yet	e Review		or Checking
	X X X X X X X X X X X X X X X X X X X	d Documented Not WPILIB	X X Wenu Item	Execution Optimized Test Routine	VI Name KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.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		Work in progress. Notes Haven't started yet	e Review		or Checking

10 Othi IIII	soming one vi)	, ida	sa additional columno for test and sample.	
X	X		SwerveDrivePoseEst_ResetPosition.vi	Haven't started yet
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 yet

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

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

Function Prototype Notes CONTROL AFFINE PLANT INVERSION FEEDFORWARD

X X Menu Item Function Prototype Notes LINEAR PLANT INVERSION FEEDFORWARD X X LinearPIntInvFF_Calculate.vi LinearPIntInvFF_Calculate_NextR.vi Χ LinearPIntInvFF GetUff.vi Χ LinearPIntInvFF New.vi X LinearPIntInvFF_New_Plant.vi LinearPIntInvFF_Reset_Initial.vi <u>X</u> LinearPIntInvFF Reset Zero.vi X X LinearPIntInvFF GetUff Single.vi X XX

RC LabVIEW Trajectory Library – VI Implementation tevision 2.X 11/12/2021 – State Space Items – (This list is s	List	eeina	one VI	\ Δ	dded a	Iditional columns for test and sample	_				
tevision 2.X 11/12/2021 – State Space Items – (This list is s	X	X) A	uueu a	LinearPintInvFF_GetR.vi					
, <u> </u>	X	X)	X		LinearPIntInvFF_GetR_Single.vi					
ļ											
	Implemented	Documented	Not WPILIB	Menu Item	Lactural Optimized Test Routine	Sample Program			Code Review	Program	Checking
	əJdι	noc	ot V	ent	est.	4			oqe	Test	ror
LINEAR QUARRATIO REQUILATOR	===		Ž)	め VI Name	Function Prototype	Notes	Ŭ	`	Em
LINEAR QUADRATIC REGULATOR	X			X X		LinearQuadraticRegulator_Calculate_NextR.vi LinearQuadraticRegulator_Calculate.vi					
<u> </u>	X	X		X		LinearQuadraticRegulator_Catculate.vi		NOT ORIGINAL			
<u> </u>	X			X	X	LinearQuadraticRegulator GetK.vi		INOT ORIGINAL			
!	X			X	- 1	LinearQuadraticRegulator_GetR_Single.vi					
!	X			X		LinearQuadraticRegulator_GetR.vi					
ļ	X	Χ)	X		LinearQuadraticRegulator_GetU_Single.vi					
ļ	X	Χ		X		LinearQuadraticRegulator_GetU.vi					
· ·	/	X)	X	X	LinearQuadraticRegulator_LatencyCompensate.vi		Routine exists, but it only has			
ł			<u> </u>	V		Li O L C D L L N FINO :		interger raise matrix to power.			
<u> </u>	X	X	/	X		LinearQuadraticRegulator_New_ELMS.vi LinearQuadraticRegulator_New_Raw.vi					
ł	X	· ·	- ,	X	X	LinearQuadraticRegulator_New_Raw.vi LinearQuadraticRegulator_New_SystemELMS.vi		+			
<u> </u>		^		^	^	LinearQuadraticRegulator_New_SystemELini3.vi					
<u> </u>	X	X		X		LinearQuadraticRegulator_New_vi					
<u> </u>	X	X		X		LinearQuadraticRegulator_Reset.vi					
, , , , , , , , , , , , , , , , , , ,											
LINEAR SYSTEM	X X X	X X X X X X)))))	X X X X X X X X X X X X X X X X X X X	Test Routine	VI Name LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi LinearSystem_GetA.vi LinearSystem_GetAElement.vi LinearSystem_GetB.vi LinearSystem_GetBElement.vi LinearSystem_GetBElement.vi LinearSystem_GetC.vi LinearSystem_GetC.vi LinearSystem_GetCElement.vi LinearSystem_GetCElement.vi LinearSystem_GetD.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
<u> </u>	X		- /	X		LinearSystem_GetD.vi LinearSystem_GetDElement.vi					
<u> </u>	X			X		LinearSystem_New.vi					
,											
	Implemented	Documented	Not WPILIB	Menu Item	Lest Routine	Sample Program			Code Review	Test Program	or Checking
	Imp	ρό	Noi	i Ne	Zes 7es	® VI Name	Function Prototype	Notes	Š	7es	Erro
				X		LinearSystemLoop_ClampInput.vi					
LINEAR SYSTEM LOOP						LinearSystemLoop_Correct.vi					
LINEAR SYSTEM LOOP	X		(X							
LINEAR SYSTEM LOOP	X	X)	X		LinearSystemLoop_GetClampFunction.vi					
LINEAR SYSTEM LOOP	X	X)	X		LinearSystemLoop_GetClampFunction.vi LinearSystemLoop_GetController.vi					
LINEAR SYSTEM LOOP	X	X X X)	X		LinearSystemLoop_GetClampFunction.vi					

S Sun i	mssing	j one vi	Au	ueu au	ditional columns for lest and sample.
X	X	X			LinearSystemLoop_GetFeedForward.vi
X		X			LinearSystemLoop_GetNextR_Single.vi
X		X			LinearSystemLoop_GetNextR.vi
X	X	X			LinearSystemLoop_GetObserver.vi
X	X	X			LinearSystemLoop_GetU_Row.vi
X	X	X			LinearSystemLoop_GetU.vi
X	X	X			LinearSystemLoop_GetXHat_Single.vi
X	X	X			LinearSystemLoop_GetXHat.vi
					LinearSystemLoop_New_BBB
					LinearSystemLoop_New_LinearSystem_ClampFunc
X	X	X			LinearSystemLoop_New_LinearSystem_ClampVal.vi
X		X			LinearSystemLoop_New.vi
X	X	X			LinearSystemLoop_Predict.vi
X	X	X			LinearSystemLoop_Reset.vi
					LinearSystemLoop_SetClampFunction.vi
					LinearSystemLoop_SetNextR_Some.vi
X	X	X			LinearSystemLoop_SetNextR.vi
					LinearSystemLoop_SetXHat_Single.vi
					LinearSystemLoop_SetXHat.vi

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

CALLBACK HELPER			X X	X X Menu Item	Execution Optimized Test Routine	Sample Program	VI Name CallbackHelp_MatrixMinus.vi CallbackHelp_MatrixMult.vi CallbackHelp_MatrixMult_CoerceSizeB.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X			X			CallbackHelp_MatrixPlus.vi					
							· <u>-</u>					
	Þ	ď			Optimized ne	ogram	,			>	E	ing
	Implemented	Documentea	Not WPILIB	Menu Item	Execution Op Test Routine	Sample Pro	VI Name	Function Prototype	Notes	Code Revien	Test Program	Error Checking
DISCRETIZATION[X	X		X Menu Item	Execution X Test Routi		VI Name Discretization_DiscretizeA.vi	Function Prototype	Notes	Code Revie	Test Progra	Error Check
DISCRETIZATION	X	X		X X Menu Iten	Execution X X Test Routi		Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi	Function Prototype	Notes	Code Revie	Test Progra	Error Check
DISCRETIZATION	X	X		X Menu Item	Execution X Test Routi		Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi	Function Prototype	Notes	Code Revie	Test Progra	Error Check
DISCRETIZATION	X X X	X X X		X X Menu Item	Execution X X X Test Routi		Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi	Function Prototype	Notes	Code Revie	Test Progra	Error Check
DISCRETIZATION	X X X	X X X		X Wenu Item	Execution X X Test Routi		Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi	Function Prototype	Notes	Code Revie	Test Progra	Error Check
DISCRETIZATION	X X X	X X X		X X Menu Item	Execution X X X Test Routi		Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi	Function Prototype	Notes	Code Revie	Test Progra	Error Check
DISCRETIZATION	X X X X	X X X X	m	X Wenu Item	otimized Execution X X X X Test Routi	ram	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi					Checking
	X	X X X X X	Not WPILIB	Menu Item X X X X Menu Item	Execution Optimized Execution Test Routine X X X X Test Routi	Sample Program	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi VI Name	Function Prototype Function Prototype	Notes	Code Review Code Revie	Test Program	Error
DISCRETIZATION	X X X X X X X X X X X X X X X X X X X	X X X X	Not WPILIB	X Wenu Item	otimized Execution X X X X Test Routi	Sample Program	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi					Checking

 	٠ع		,	 and of the control of			
/	X			StateSpaceUtil_IsStabalizable.vi			1
Χ .	Χ	X		StateSpaceUtil_PoseToVector.vi			
Χ .	X	X		StateSpaceUtil_ClampInputMaxMagnitude.vi	Routine exists, it is just a shell		
Χ .	X	X		StateSpaceUtil_NomalizeInputVector.vi			
Χ .	X	X		StateSpaceUtil_PoseTo4dVector.vi			
Χ .	X	X		StateSpaceUtil_PoseTo3dVector.vi			1

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

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

	Implemented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE TRAIN SIM						DiffDriveTrainSim ClampInput.vi	71		Ī	·	
	X		X			DiffDriveTrainSim_CreateKitbotSim.vi					
	X		X			DiffDriveTrainSim CreateKitbotSim EstMass.vi					
	X		X			DiffDriveTrainSim CreateKitbotSim EstMassMOI.vi					
	X		X			DiffDriveTrainSim_GetCurrentDrawAmps.vi					
	X		X			DiffDriveTrainSim_GetCurrentGearing.vi					
	Х		X			DiffDriveTrainSim_GetDynamics.vi					
	X		X			DiffDriveTrainSim_GetHeading.vi					
	X		X			DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi					
	X		X			DiffDriveTrainSim_GetLeftPositionMeters.vi					
	X		X			DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi					
	X		X			DiffDriveTrainSim_GetOutput_Single.vi					
	X		X			DiffDriveTrainSim_GetPose.vi					
	X		X			DiffDriveTrainSim_GetRightCurrentDrawAmps.vi					
	X		X			DiffDriveTrainSim_GetRightPositionMeters.vi					
	X		X			DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi					
	X		X			DiffDriveTrainSim_GetState.vi					
	X		X			DiffDriveTrainSim_GetState_Single.vi					
	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					

	2 11110011	.9 5110	· v1) -	g raded a	dditional columns for test and sample.					
	ited	.c.	:	ı Optımıze ine	rogram			iew	ram	
	Implemented	Not WPILIB	Menu Item	Execution Op Test Routine	mple F			de Reı	Test Program	
	<u>E</u> C	<u>₁ ≥</u>		7e Tx	δ VI Name	Function Prototype	Notes	8		
ELEVATOR SI			X	 _	ElevatorSim_New.vi ElevatorSim_GetCurrentDraw.vi					
	X	_	X		ElevatorSim_GetCurrentDraw.vi ElevatorSim_GetPositionMeters.vi	-				_
	X	_	X		ElevatorSim_GetVelocityMetersPerSecond.vi				+	
	X				ElevatorSim_SetState.vi					_
	X		X		ElevatorSim_SetInputVoltage.vi					_
	X		X		ElevatorSim_UpdateX.vi					
	Χ		X		ElevatorSim_WouldHitLowerLimit.vi					
	X		X		ElevatorSim_WouldHitUpperLimit.vi					
	X	X	X		ElevatorSim_Update.vi		Needed because this doesn't extend.			
	X		X		ElevatorSim_HasHitLowerLimit.vi					_
	X	<u> </u>	X		ElevatorSim_HasHitUpperLimit.vi					_
	X	Χ		<u> </u>	ElevatorSim_RKF45_Func.vi					_
		_			ElevatorSim_New_NoNoise.vi ElevatorSim_New_LinSys.vi				+	_
		_	_		ElevatorSim_New_LinSys_NoNoise.vi					_
	Implementec	Not WPILIB	Menu Item	Execution Op Test Routine	ample Prog	5	N. c	ode Reviev	Test Program	
		<u>` ≥</u>		T P	ος VI Name	Function Prototype	Notes	ပ		
FLYWHEEL SI		_	X		FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_New_MOI.vi					_
	X	_	X		FlyWheelSim SetInput.vi					_
	X	_	X	_	FlyWheelSim_Update.vi					_
	X		X		FlyWheelSim_GetCurrentDrawAmps					_
	Х		X		FlyWheelSim_GetAngularVelocityRPM.vi					
	/				FlyWhoolSim Now LinSyn NoNoice		Future			Ξ
					FlyWheelSim_New_LinSys_NoNoise					
					FlyWheelSim New LinSys		Future			_
										_
				D S S S S S S S S S S S S S S S S S S S	FlyWheelSim New LinSys		Future			_ _ _
	emented	WPILIB	u ttem	ution Optimized Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise		Future	e Review	Program	
	nplemented	ot WPILIB	lenu Item	xecution Optimized	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise	Function Dratature	Future Future	ode Review	est Program	
LINEAR SYSTEM SIN	Implemented Documented	Not WPILIB	Menu Item	Execution Optimized Test Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise English English	Function Prototype	Future	Code Review	Test Program	
LINEAR SYSTEM SI	M X	Not WPILIB	X Menu Item	Execution Optimized Test Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise English VI Name LinearSystemSim_GetOutput.vi	Function Prototype	Future Future	Code Review	Test Program	
LINEAR SYSTEM SI	M X X	Not WPILIB	X Menu Item	Execution Optimized Test Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise ED O VI Name LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi	Function Prototype	Future Future	Code Review	Test Program	
LINEAR SYSTEM SI	M X X X X	Not WPILIB	X Menu Item	Execution Optimized Test Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise ED O O VI Name LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New	Function Prototype	Future Future	Code Review	Test Program	
LINEAR SYSTEM SI	M X X	Not WPILIB	X Wenu Item	Execution Optimized Test Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise VI Name LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_Update.vi	Function Prototype	Future Future	Code Review	Test Program	
LINEAR SYSTEM SII	M X X X X X		X X X No	Execution Optimized Test Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise VI Name LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New LinearSystemSim_SetInput_Single.vi LinearSystemSim_Update.vi LinearSystemSim_Update.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi	Function Prototype	Future Future	Code Review	Test Program	
LINEAR SYSTEM SII	M		X Wenu Item	Execution Optimized Test Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise VI Name LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New LinearSystemSim_SetInput_Single.vi LinearSystemSim_Update.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi LinearSystemSim_UpdateY.vi	Function Prototype	Future Future	Code Review	Test Program	
LINEAR SYSTEM SII	M		X X X No No No	Execution Optimized Test Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise VI Name LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New LinearSystemSim_SetInput_Single.vi LinearSystemSim_Update.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi LinearSystemSim_UpdateY.vi LinearSystemSim_UpdateY.vi LinearSystemSim_UpdateY.vi LinearSystemSim_UpdateY.vi LinearSystemSim_New_NoNoise.vi	Function Prototype	Future Future	Code Review	Test Program	
LINEAR SYSTEM SII	M		X X X No No No	Execution Optimized Test Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise VI Name LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New LinearSystemSim_SetInput_Single.vi LinearSystemSim_Update.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi LinearSystemSim_UpdateY.vi LinearSystemSim_UpdateY.vi LinearSystemSim_UpdateY.vi LinearSystemSim_New_NoNoise.vi LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput.vi	Function Prototype	Future Future Notes	Code Review	Test Program	
LINEAR SYSTEM SII	M		X X X No No No	Execution Optimized Test Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise VI Name LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New LinearSystemSim_SetInput_Single.vi LinearSystemSim_Update.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi LinearSystemSim_UpdateY.vi LinearSystemSim_UpdateY.vi LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput_vi LinearSystemSim_SetInput_Array.vi	Function Prototype	Future Future	Code Review	Test Program	
LINEAR SYSTEM SII	M		X X X No No No	Execution Optimized Test Routine	FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise VI Name LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New LinearSystemSim_SetInput_Single.vi LinearSystemSim_Update.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi LinearSystemSim_UpdateY.vi LinearSystemSim_UpdateY.vi LinearSystemSim_UpdateY.vi LinearSystemSim_New_NoNoise.vi LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput.vi	Function Prototype	Future Future Notes	Code Review	Test Program	

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

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

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

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

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

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

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

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

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

	100 10 00111 111	lissing or	ne vi	.) Auc	ied addilli	onal columns for test and sample.					
	Implemented	ented	Not WPILIB Menu Item	ion Optimizec	Test Routine Sample Program				Review	Program	;
	nelc	cum	Not WPILI Menu Item	Execution	Test Rou Sample				de F	st Pr	
					7e. Sa		Function Prototype	Notes	ಟ	Test	
MATH UT	TILITY X		X	SI		MathUtil_AngleModulus.vi MathUtil_Clamp.vi					
	X			SI		MathUtil_ApplyDeadband.vi					
	X		X	SI		MathUtil_Clamp_Int.vi					
	X	X	X	SI		MathUtil_InputModulus.vi					
MERWE SCALED SIGMA PO	STNICE X X X X X X X X X X X X X X X X X X X	X X X X	X X X			VI Name MerweScSigPts_ComputeWeights.vi MerweScSigPts_GetNumSigmas.vi MerweScSigPts_GetWc.vi MerweScSigPts_GetWc_Single.vi MerweScSigPts_GetWm.vi MerweScSigPts_GetWm_Single.vi	Function Prototype	Notes	Code Review	Test Program	
	X			1		MerweScSigPts_New.vi					
	X	X	X	1		MerweScSigPts_New_Default.vi					
	X	X	X	1		MerweScSigPts_SigmaPoints.vi					
				pez							
		umented	wPILIB u Item	cution Optimized	Routine Iple Program				e Review	Program	
		Documented Not Will Ib	Not WPILIB Menu Item	Execution Optimized	Test Routine Sample Program		Function Prototype	Notes	Code Review	Test Program	
NUMERICAL INTEGRA	NOITY Mplemented		1 1 1 0	Execution	Test Routine Sample Program	VI Name NumIntegrate_Func_Ax_Bu_K.vi	Function Prototype	Notes	Code Review	Test Program	
NUMERICAL INTEGRA	X / Implemented		No	Execution	Test Routine Sample Program	VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi	Function Prototype	Notes	Code Review	Test Program	
NUMERICAL INTEGRA	X X Implemented		No No	Execution	Test Routine Sample Program	VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi	Function Prototype	Notes	Code Review	Test Program	
NUMERICAL INTEGRA	X / Implemented		No No	Execution	Test Routine Sample Program	VI Name NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi	Function Prototype		Code Review	Test Program	
NUMERICAL INTEGRA	X X Implemented		No No No X	Execution	Test Routine Sample Program	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_Dbl.vi	Function Prototype	Notes NOT DONE NOT DONE	Code Review	Test Program	
NUMERICAL INTEGRA	X Moltwelled X X X Y Y X X X X X		No No No X X	Execution	Test Routine Sample Program	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	
NUMERICAL INTEGRA	X Walemented X X X X X X X X X		No No No X X X	Execution	Test Routine Sample Program	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 NumIntegrate_Rk4_Mat_X_U.vi	Function Prototype	NOT DONE	Code Review	Test Program	
NUMERICAL INTEGRA	X Walemented X X X X X X X X X		No No No X X X X	Execution	Test Routine Sample Program	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 NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi	Function Prototype	NOT DONE	Code Review	Test Program	
NUMERICAL INTEGRA	X Walemented X X X X X X X X X		No No No X X X X X X	Execution	Test Routine Sample Program	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 NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rkf45Impl.vi	Function Prototype	NOT DONE	Code Review	Test Program	
NUMERICAL INTEGRA	X Walemented X X X X X X X X X		No N	Execution	Test Routine Sample Program	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 NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rkf45.vi NumIntegrate_Rkf45Impl.vi NumIntegrate_Trap_Dbl.vi	Function Prototype	NOT DONE	Code Review	Test Program	
NUMERICAL INTEGRA	X Walemented X X X X X X X X X		No No No X X X X X X	Execution	Test Routine Sample Program	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 NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rkf45Impl.vi	Function Prototype	NOT DONE	Code Review	Test Program	
NUMERICAL INTEGRA	X Walemented X X X X X X X X X		No N	Execution	Test Routine Sample Program	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 NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rkf45.vi NumIntegrate_Rkf45Impl.vi NumIntegrate_Trap_Dbl.vi	Function Prototype	NOT DONE	Code Review	Test Program	
NUMERICAL INTEGRA	ATION X X X X X X X X X X X X X X X X X X X	7	No No No No No X X X X No X	Optimized	ne 76	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 NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rk45Impl.vi NumIntegrate_Trap_Dbl.vi NumIntegrate_Trap_Mat.vi	Function Prototype	NOT DONE	iew Code Review		
NUMERICAL INTEGRA	ATION X X X X X X X X X X X X X X X X X X X	7	No No No No No X X X X No X	Optimized	ne 76	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 NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rk45Impl.vi NumIntegrate_Trap_Dbl.vi NumIntegrate_Trap_Mat.vi	Function Prototype	NOT DONE	Review Code Review		
NUMERICAL INTEGRA	ATION X X X X X X X X X X X X X X X X X X X	7	No No No No No X X X X No X	Optimized	ne 76	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 NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rk45Impl.vi NumIntegrate_Trap_Dbl.vi NumIntegrate_Trap_Mat.vi		NOT DONE NOT DONE	e Review		
NUMERICAL INTEGRA	Implemented Maplemented M	Documented NA Will Ib	No N	Execution Optimized Execution	Test Routine Sample Program Sample Program	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 NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk45.vi NumIntegrate_Rk45Impl.vi NumIntegrate_Trap_Dbl.vi NumIntegrate_Trap_Mat.vi	Function Prototype	NOT DONE	Code Review Code Review	Test Program	

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

Ot 10 Otili 11	0110	, ,	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	oa aaaiiioi	iai colaitillo foi toot aria campio.		
X		Χ			NumJacobian_U.vi		

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

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

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

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