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 (I)
CTRL Shell Total (I)
CTRL Shell Total (I)
2

VI Shell Total (I)
CTRL Shell Total (I)
2

VI Shell Total (I)
CTRL Shell Total (I)
2

VI Shell Total (I)
2

VI Shell Total (I)
2

MEDIAN FILTER X X X

XX

XX

X X X X I

X X X X SI

X SI X SI Doc completed Pct 88.52% Optimization Pct 45.29%

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

MedianFilter_Calculate.vi

X MedianFilter_Execute.vi

MedianFilter_New.vi

MedianFilter_Reset.vi

MedianFilter ResetToValue.vi

'===== BASE

'========

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
LINEAR FILTER		X		X	SI			LinearFilter_Calculate.vi		
	Χ	Χ	Х		Χ			LinearFilter_CutoffFrequency.vi		
	Χ	Χ	X		I			LinearFilter_Execute.vi		Labview style helper
	Χ	Χ		X	X			LinearFilter_HighPass.vi		
	Χ	X	Χ		X			LinearFilter_HighPassBW1.vi		
	Χ	X	Χ		X			LinearFilter_HighPassBW2.vi		
	Χ	Χ	X		Χ			LinearFilter_LowPassBW1.vi		
	Χ	Χ	X		Χ			LinearFilter_LowPassBW2.vi		
	Χ	Χ		X	X			LinearFilter_MovingAverage.vi		
	Χ	Χ		X	- 1			LinearFilter_New.vi		
	Χ	Χ		X	SI			LinearFilter_Reset.vi		
_	Χ	Χ	X	_	SI			LinearFilter_ResetToValue.vi		
_	Χ	Χ		X	Χ			LinearFilter_SinglePoleIIR.vi		
	Χ	X	X	X	X			LinearFilter_TimeConst.vi		
	nted	nted	1/8	4	n Optimized	tine	Program			

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

Function Prototype

Notes

Labview style helper

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program ample Program	Function Prototype	Notes
SLEW RATE FILTER	Χ	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		
	Χ	X		X	1		SlewRateLimiter_NewInitialZero.vi		
	X	Χ		X	I		SlewRateLimiter_Reset.vi		
	X	X		X	SI		SlewRateLimiter_SetRate.vi		

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

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

ARM FF	Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes
AKWIFF							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
	Χ	Χ		X			ArmFF_MaxAchieveAccel.vi		
	X	X		X			ArmFF_MaxAchieveVelocity.vi		
	X	X		X			ArmFF_MinAchieveAccel.vi		
	X	X		X			ArmFF_MinAchieveVelocity.vi		
	X	X		X			ArmFF_New_ZeroGravity.vi		
	X	X		X			ArmFF New.vi		

Revision 2.X 11/12/2021 - State Space Items - (This list is	on List	sing on	ne VI	.) Ad	ded a	dditional columns for test and sample.		
		3		eq				
	~	_		Optimiz	_	yram		
	Implementea	nted	3 6	0		Sample Prog		
	эше	Documented	Menu Item	Execution	Rol	ole I		
	эΙди)0CL	len.	xec Xec	est	ິ <u>ມ</u> ຮ VI Name	Function Prototype	Notes
CONTROLLER UT	IL X	$\frac{\Box}{X}$	< <u> </u>			ControllerUtil_GetModulusError.vi	T unction i Tototype	This was short lived in WPILIB, but
						_		still useful here.
				þ				
				Execution Optimized		Ē		
	þ	<i>p</i> ~	n	Opti	e	ogra		
	Implementec	Documente	Menu Item	ion (Test Routine	Sample Prog		
	nem	unc	l nu	scut	st R	лр <i>і</i>		
							Function Prototype	Notes
ELEV F		X	X			ElevFF_Calculate.vi		
	X	X	<i>X</i>			ElevFF_CalculateVelocityOnly.vi ElevFF_Execute.vi		LabVIEW style single call
		<i>\</i>	(ElevFF_ExecuteVelocityOnly.vi		LabVIEW style single call
		X X	X			ElevFF_MaxAchieveAccel.vi		
		X	X			ElevFF_MaxAchieveVelocity.vi ElevFF MinAchieveAccel.vi		
	X	Χ	X			ElevFF_MinAchieveVelocity.vi		
	X	X	X			ElevFF_New_ZeroAccel.vi ElevFF New.vi		
		^	X					
	ted	ted B	<u> </u>	Optimized		rogram		
HOL_DRV_CTR	RL X	X Documented	X	S Execution	Test Routi	VI Name HolDrvCtrl_AtReference.vi	Function Prototype	Notes Added 1/26/21
HOL_DRV_CTR	RL X	X X	X	Secution	Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi	Function Prototype	Added 1/26/21 Added 1/26/21
HOL_DRV_CTF	RL X	X X X	X	Secution	Test Routi	HolDrvCtrl_AtReference.vi	Function Prototype	Added 1/26/21
HOL_DRV_CTF	RL X X X	X X X	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future
HOL_DRV_CTF	RL X X X	X X X X	X X X	IS Execution	Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21
HOL_DRV_CTF	RL X X X	X X X X X	X		Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future
HOL_DRV_CTF	X X X X X X	X X X X X	X	IS Execution	Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21 Added 1/26/21
HOL_DRV_CTF	X X X X X X	X X X X X	X	IS Execution	Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21 Added 1/26/21
HOL_DRV_CTF	X X X X X X	X X X X X	X	IS Execution	Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21 Added 1/26/21
HOL_DRV_CTF	RL X X X X X	X	X	Optimized 9 9 9 9 10 Execution	ne Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21 Added 1/26/21
HOL_DRV_CTF	RL X X X X X	X	X	Optimized 9 9 9 9 10 Execution	ne Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21 Added 1/26/21
HOL_DRV_CTF	RL X X X X X	X	X	Optimized 9 9 9 9 10 Execution	ne Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi		Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21
	X	X X X X X X X X X X X X X X 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 999999999999999999999999999999999999	ne Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute_Vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi	Function Prototype Function Prototype	Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21
HOL_DRV_CTR	X	X X X X X X X X X X X X X X 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 99999	ne Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi		Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21
	X	X X X X X X X X X X X X X X 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 99999	ne Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi		Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Labview style helper. Advanced
	RL X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X 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 19 19 19 Execution	ne Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi		Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21
	RL X X X X X X X X X X X X X X X 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 99 99 9	ne Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi		Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Labview style helper. Advanced
	RL X X X X X X X X X X X X X X X 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 99 99 9	ne Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute_Vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi		Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Labview style helper. Advanced
	RL X X X X X X X X X X X X X X X 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 9999	ne Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute_Vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi ### VI Name PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvExecute.vi ### PIDController_AdvExecute.vi ### PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi PIDController_EnableContinousInput.vi		Added 1/26/21 Added 1/26/21 Euture Future Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Labview style helper. Advanced PID
	RL X X X X X X X X X X X X X X X 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 9999	ne Test Routi	HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_Execute_Vi HolDrvCtrl_Execute.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi		Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Added 1/26/21 Labview style helper. Advanced

s still m	issing	one '	VI) Added additional columns for test and sample.								
X	X		Χ		PIDController_GetPID.vi						
X	X		X		PIDController_GetPositionError.vi						
X	X		X		PIDController_GetSetpoint.vi						
X	Χ		X		PIDController_GetVelocityError.vi						
X	X		X		PIDController_IsContinuousInputEnabled.vi						
X	X		X		PIDController_New.vi						
X	X		X		PIDController_NewPeriod.vi						
X	X	X	X	SI	PIDController_Pack_AdvLimits.vi						
X	Χ	X	X	SI	PIDController_Pack_AdvTuning.vi						
X	Χ	X	X	SI	PIDController_Pack_ErrorTolerance.vi						
X	Χ	X	X	SI	PIDController_Pack_InputLimits.vi						
X	X	X	X	SI	PIDController_Pack_Tuning.vi						
X	X		X		PIDController_Reset.vi						
X	X		X		PIDController_SetD.vi						
X	X	X	X		PIDController_SetDerivativeFilter.vi	Advanced PID					
X	X	X	No		PIDController_SetFeedForward_OBSOLETE_DELETE.vi	Advanced PID, Obsolete –					
						DELETE					
X	X	X	No		PIDController_SetFFGain_OBSOLETE_DELETE.vi	Advanced PID, Obsolete – DELETE					
X	X		Х		PIDController Setl.vi	DELETE					
^	^		^		PIDController_SetInputRange.vi	OBSOLETE – Removed					
Х	Х		Х		PIDController_SetIntegratorRange.vi	OBCOLL TE TREMOVED					
X	X	X	X		PIDController SetOutputLimits.vi	Advanced PID					
X	X		X		PIDController SetP.vi	/ dvariour 15					
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						
X	X		X		PIDController_SetTolerance.vi						
X	X		X		PIDController SetTolerancePandV.vi						

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name Function Prototype	Notes
PROFILED PID CONTROLLER	$\mathbf{R}[X]$			X		T		ProfiledPIDController AtGoal.vi	
	X	Χ		Х				ProfiledPIDController AtSetpoint.vi	
	X	Χ		X				ProfiledPIDController_Calculate_Meas_Goal.vi	
	X	Χ		Х				ProfiledPIDController Calculate Meas StateGoal TrapCnsrt.vi	
	X	Χ		X				ProfiledPIDController Calculate Meas StateGoal.vi	
	X	Χ		X				ProfiledPIDController Calculate Meas.vi	
	Χ	Χ		X				ProfiledPIDController_DisableContInput.vi	
	Χ	Χ		X				ProfiledPIDController_EnableContInput.vi	
	Χ	Χ		X				ProfiledPIDController_GetGoal.vi	
	Χ	Χ		Χ				ProfiledPIDController_GetPeriod.vi	
	Χ	Χ	X	Χ				ProfiledPIDController_GetPID.vi	WPILIB has separate getters.
	X	Χ		Χ				ProfiledPIDController_GetPositionError.vi	
	X	Χ		X				ProfiledPIDController_GetSetpoint.vi	
	X	Χ		X				ProfiledPIDController_GetVelocityError.vi	
	X	Χ		Χ				ProfiledPIDController_New.vi	
	X	X		X				ProfiledPIDController_NewPeriod.vi	
	Χ	Χ		Χ		-		ProfiledPIDController_Reset_PosOnly.vi	
	X	Χ		X				ProfiledPIDController_Reset_PosVel.vi	
	X	Χ		Χ				ProfiledPIDController_Reset.vi	
	X	X		X				ProfiledPIDController_SetConstraints.vi	
	X	X		X				ProfiledPIDController_SetGoal_PosOnly.vi	
	X	X		X		-		ProfiledPIDController_SetGoal.vi	
	X	X				-		ProfiledPIDController_SetIntegratorRange.vi	
	X	X		X		-		ProfiledPIDController_SetPID.vi	
	X	X		X		+		ProfiledPIDController_SetTolerance_PosOnly.vi ProfiledPIDController_SetTolerance_PosVel.vi	
	X	Χ		_ X				ProlitedPiDController_Setrolerance_Posvet.vi	

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	VI Name	Function Prototype	Notes
SIMPLE MOTOR FEEDFORWARD	Χ			Χ			SimpleMotorFF_Calculate_NextV_Dt.vi		
	Χ	X		Χ	SI		SimpleMotorFF_Calculate.vi	public double calculate(double velocity, double acceleration)	
	Χ	X		Χ	SI		SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)	
			Χ				SimpleMotorFF_Execute.vi		LabVIEW style single call
			Χ				SimpleMotorFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	X	X		X	X		SimpleMotorFF_MaxAchieveAccel.vi	<pre>public double maxAchievableAcceleration(double maxVoltage, double velocity)</pre>	
	X	X		X	X		SimpleMotorFF_MaxAchieveVel.vi	public double maxAchievableVelocity(double maxVoltage, double acceleration)	
	X	X		X	X		SimpleMotorFF_MinAchieveAccel.vi	public double minAchievableAcceleration(double maxVoltage, double velocity)	
	X	X		X	X		SimpleMotorFF_MinAchieveVel.vi	public double minAchievableVelocity(double maxVoltage, double acceleration)	
	X	X		X	SI		SimpleMotorFF_New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)	
								public SimpleMotorFeedforward(double ks, double kv)	

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	lest Koutine Sample Program		Function Prototype	Notes
POSE	X	X		X	SI		Pose_Equals.VI	boolean equals(other obj)	
	Χ	Χ		Χ	X		Pose_Exp.vi	pose2d exp(twist2d twist)	
	X	Χ		Χ	SI		Pose_getRotation.vi	rotation2d getRotation()	can also use cluster unpack
	X	Χ		Χ	SI		Pose_getTranslation.vi	translation2d getTranslation()	can also use cluster unpack
	Χ	Χ	Χ	Χ	SI		Pose_getXY.vi		
	Χ	Χ	Χ	Χ	SI		Pose_getXYAngle.vi		
	Χ	Χ		Χ	X		Pose_Log.vi	twist2d log(pose2d end)	

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ms – (i nis list is s		_	one v			ed ac		nai columns for test and sample.		
		X		Χ				Pose_Minus.vi	transform2d minus(pose2d other)	
	Χ	Χ		Χ	SI			Pose_New_TRRO.vi	pose2d new(translation2d, rotation2d)	
	X	X		Χ	SI			Pose_New.vi	pose2d new(double x, double y, rotation2d)	
	X	X		Χ	SI			Pose_Plus.vi	pose2d plus(transform2d other)	
	Χ	Χ		Χ	SI			Pose_RelativeTo.vi	pose2d relativeto(pose2d other)	
	Χ	X		Χ	SI			Pose TransformBy.vi	pose2d transformby(transform2d other)	
									pose2d new()	can use cluster constant
ROTATION	X X X X X X X X X X X X X X X X X X X	N	X Not WPILIB	X	S S S S S S S S S S	Test Routine		VI Name Rotation_CreateAngle.vi Rotation_CreateAngleDegrees.vi Rotation_CreateXY.vi Rotation_Equals.vi Rotation_GetAngleCosSin.vi Rotation_GetCos.VI Rotation_GetDegrees.VI Rotation_GetRadians.VI Rotation_GetSin.VI Rotation_GetSin.VI Rotation_GetTan.VI Rotation_Minus.vi Rotation_Plus.vi	Function Prototype rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees() double getRadians() double getSin() double getTan() rotation2d minus(rotation2d other) rotation2d plus(rotation2d other)	Notes convert to radians then create New 1/26/21 use cluster unpack use cluster unpack, then convert to degree use cluster unpack use cluster unpack use cluster unpack can calculate
	X	X		X	SI SI			Rotation_RotateBy.vi Rotation_Times.vi	rotation2d rotateby(rotation2d other) rotation2d times(double scalar)	
}	X	\hat{x}		\hat{x}	SI			Rotation UnaryMinus.vi	rotation2d unaryminus()	
	^	^			O,			rtotation_onarywiinas.vi	rotation2d and ymmas()	can use cluster constant
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
TRANSFORM		$\frac{1}{X}$		X	SI			Transform Create PosePose.vi	transform2d new(pose2d, pose2d)	110.00
TICATOL OLIVI		X		Y	SI			Transform_Create_TransRot.vi	transform2d new(posezd, posezd) transform2d new(translation2d, rotation2d)	
}	X	\hat{X}		X	SI			Transform Equals.VI	boolean equals(other transform2d)	
-										use cluster unpack
-	X	X		X				Transform_GetRotation.VI Transform GetTranslation.VI	rotation2d getRotation()	
-	X	X	V	X	SI				translation2d getTranslation()	use cluster unpack
	X	X	X	X				Transform_GetXY.vi		
	X		Χ	Χ	SI			Transform_GetXYAngle.vi		
	Χ	X		Χ				Transform_Inverse.vi	transform inverse()	new
	Χ	Χ			Si			Transform_Plus.vi		
	Χ	Χ		Χ	SI			Transform_Times.vi	transform2d times(double scalar)	
									transform2d new()	can use cluster constant

Translation_GetDistance.vi

VI Name Function Prototype Notes TRANSLATION X X X SI Translation_Create_DistAng.vi Translation_Create.vi translation2d new(double x, double y) Translation_Equals.vi boolean equals(translation other)

double getDistance(translation2d other)

evision 2.X 11/12/2021 – State Space Items – (This lis			sing on	۰ ۱/۱) Add	led add	itional columns for test and sample		
evision 2.74 Thrizizozi Glate opace tems (This it		Υ .		X			Translation_GetNorm.VI	double getNorm()	can use cluster unpack
	X	X .	X	$\frac{1}{X}$	SI		Translation_GetX.VI	double getX()	can use cluster unpack
	X	X .	$X \mid X$	<i>x</i>	SI		Translation GetXY.VI	3 ()	1
		Υ .	X	X	SI		Translation_GetY.VI	double getY()	can use cluster unpack
		Χ.	X	X	SI		Translation_Minus.vi	translation2d minus(translation2d other)	
	X	Χ.	X	X	SI		Translation_Plus.vi	translation2d plus(translation2d other)	
		Υ .	X	X			Translation_RotateBy.vi	translation2d rotateBy(rotation2d other)	
		Υ .		X	SI		Translation_Times.vi	translation2d times(double scalar)	
		Υ .		X	SI		Translation_UnaryMinus.vi	translation2d unaryminus()	
								translation2d new()	can use cluster constant
								translation2d div(double scalar)	can multiply by 1/scalar
TV	VIST X	Χ . Χ .	X X Documented X X X X X X X X X X X X X X X X X X X	X	SI		VI Name Twist_Create.vi Twist_Equals.VI Twist_GetAll.VI	Function Prototype twist new(x, y, theta) boolean equals(obj other)	Notes
NEMATICS ========					Optimized		un.		
CHASSIS SPE	EDS X	Χ .	X X	X	IS IS Execution		VI Name ChassisSpeeds_FromFieldRelativeSpeeds.VI ChassisSPeeds_GetXYOmega.vi ChassisSpeeds_New.vi	Function Prototype chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds new ()	Notes can use cluster constant
DIFFERENTIAL DRIVE KINEMA	λ	X X X	X	X	1	X X Test Routine	VI Name DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi DiffKinematics_toWheelSpeed.vi	Function Prototype diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) diffDriveWheelSpeed toWheelSpeeds (chassisSpeeds)	Notes
DIFFERENTIAL DRIVE ODOME	TRY		X Not WPI IB		X Execution Optimized	Test Routine	VI Name DiffOdometry_Execute.vi DiffOdometry_Update.vi	Function Prototype pose2d update(rotation2d gyro, double leftdist, double right dist) diffDrOdom new(rotation gyro, pose initial) diffDrOdom new(rotation gyro) void resetPosition(pose2d, rotation2d)	Notes Incorporates enhanced reset incorporated into "update"

Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample. pose2d getPoseMeters() Notes Function Prototype DIFFERENTIAL DRIVE WHEEL SPEEDS diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) XX X DiffWheel Normalize.vi void normalize(double maxVel) X Menu Item Function Prototype Notes MECANUM DRIVE KINEMATICS X X MecaKinematics New.vi XX X MecaKinematics SetInverseKinematics.vi $\frac{X}{X}$ XX MecaKinematics_ToChassisSpeeds.vi X X Χ MecaKinematics_ToWheelSpeeds.vi XX Χ MecaKinematics ToWheelSpeedsZeroCenter.vi Vlenu Item VI Name **Function Prototype** Notes MECANUM DRIVE MOTOR VOLTAGE nothing done **Function Prototype** Notes **MECANUM DRIVE ODOMETRY** MecaOdometry Execute.vi MecaOdometry GetPose.vi XX Χ XX MecaOdometry_New.vi Χ XX MecaOdometry_NewDefaultPose.vi Χ MecaOdometry_Reset.VI XX X XX MecaOdometry_Update.vi Χ XX MecaOdometry_UpdateWithTime.vi Χ VI Name Function Prototype Notes public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, MECANUM DRIVE WHEEL SPEEDS X Χ MecaWheel New.Vi double rearLeftMetersPerSecond, double rearRightMetersPerSecond)

Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample. MecaWheel Normalize.vi public void normalize(double attainableMaxSpeedMetersPerSecond) Execution Optimized rest Routine Vot WPILIB Vlenu Item **Function Prototype** Notes SWERVE DRIVE KINEMATICS X X $X \mid X$ SwerveKinematics New4.VI For 4 module drives $X \mid X \mid X \mid X$ SwerveKinematics NewX.VI uses array as input $X \mid X \mid X \mid X$ SwerveKinematics NormalizeWheelSpeeds.vi public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) X X X X SwerveKinematics ToChassisSpeeds4.VI For 4 module drives X X X X SwerveKinematics ToChassisSpeedsX.VI uses array as input $X \mid X$ SwerveKinematics ToSwerveModuleStates.VI public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[] SwerveKinematics ToSwerveModuleStatesZeroCenter.VI $X \mid X$ Χ toSwerveModuleStates(ChassisSpeeds chassisSpeeds) public SwerveDriveKinematics(Translation2d... wheelsMeters) variable parameters (replace with array and "4" calls) public ChassisSpeeds toChassisSpeeds(SwerveModuleState... variable parameters (replace with array and "4" calls) Vot WPILIB Wenu Item Function Prototype Notes **SWERVE DRIVE ODOMETRY** SwerveOdometry Execute4.vi SwerveOdometry ExecuteX.vi $X \mid X$ Χ SwerveOdometry GetPosition.VI public Pose2d getPoseMeters() $X \mid X$ Χ public SwerveDriveOdometry(SwerveDriveKinematics kinematics, SwerveOdometry New.VI Rotation2d gyroAngle, Pose2d initialPose) public SwerveDriveOdometry(SwerveDriveKinematics kinematics. $X \mid X$ SwerveOdometry_NewZeroCenter.VI Χ Rotation2d gyroAngle) XX Χ SwerveOdometry ResetPosition.VI public void resetPosition(Pose2d pose, Rotation2d gyroAngle) X X X X SwerveOdometry Update4.VI For 4 module drives X X X X SwerveOdometry_UpdateWithTime4.VI For 4 module drives X X X XSwerveOdometry UpdateWithTimeX.VI uses array as input $X \mid X \mid X \mid X$ SwerveOdometry UpdateX.VI uses array as input public Pose2d updateWithTime(double currentTimeSeconds, variable parameters (replace with Rotation2d gyroAngle, SwerveModuleState... moduleStates) array and "4" calls) variable parameters (replace with public Pose2d update(Rotation2d gyroAngle, SwerveModuleState... moduleStates) array and "4" calls) Menu Item **Function Prototype** Notes Χ SWERVE DRIVE MODULE STATE $X \mid X$ SI SwerveModuleState_CompareTo.vi public int compareTo(SwerveModuleState o) SI SwerveModuleState Get.vi $X \mid X$ Χ SI SwerveModuleState_New.vi public SwerveModuleState(double speedMetersPerSecond, Rotation2d angle) public SwerveModuleState optimize(SwerveModuleState desired, XX SI SwerveModuleState_Optimize.vi Χ Rotation2d angle)

'====== SPLINE

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

State Space items – (This list is	Sun m	issing	one	VI)	Add	ed ad	iailio	nal columns for test and sample.		
CUBIC HERMITE SPLINE	X Implemented	X	Not WPILIB	X Menu Item	Execution Optimized	Test Routine		VI Name CubicHermiteSpline_getControlVectorFromArrays.vi	Function Prototype protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays(double[]	Notes not needed, use cluster unpack
								. =-	initialVector, double[] finalVector)	
	X	X		X				CubicHermiteSpline_makeHermiteBasis.vi CubicHermiteSpline_New.vi	private SimpleMatrix makeHermiteBasis() public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)	
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		VI Name	Function Prototype	Notes
POSE WITH CURVATURE	X	X		X	SI			PoseWithCurve_New.vi	public PoseWithCurvature(Pose2d poseMeters, double	
									curvatureRadPerMeter) public PoseWithCurvature()	can use cluster constant
									public Pose2d poseMeters	not needed, use cluster unpack
									public double curvatureRadPerMeter	not needed, use cluster unpack
QUINTIC HERMITE SPLINE	X Implemented	X	Not WPILIB	X X Menu Item	Execution Optimized	Test Routine		VI Name QuinticHermiteSpline_getControlVectorFromArrays.vi QuinticHermiteSpline_makeHermiteBasis.vi QuinticHermiteSpline_New.vi	Function Prototype private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis() public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yFinalControlVector) protected SimpleMatrix getCoefficients()	Notes not needed, use cluster unpack
SPLINE (Abstract class)	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine		VI Name Spline_getPoint.vi	Function Prototype public PoseWithCurvature getPoint(double t) Spline(int degree) 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 X

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
SPLINE PARAMETERIZER	X	X		X				SplineParam_Spline_T0_T1.vi	public static List <posewithcurvature> parameterize(Spline spline, double t0, double t1)</posewithcurvature>	
	X	X		X		Χ		SplineParam_Spline.vi	public static List <posewithcurvature> parameterize(Spline spline)</posewithcurvature>	
	X	Χ	Χ	No				SplineParam_StackGet.vi		internal
	X	X	X	No				SplineParam_StackPop.vi		internal
	X	X	X	No				SplineParam_StackPush.vi		internal

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

TRAJECTOR

	Imple	Роси	Not I	Men	Exec	Test	ଞ୍ଚି ଓ VI Name	Function Prototype	Notes
ORY	X	X		X			Trajectory_Concatenate.vi		
	X	Χ		X			Trajectory_equals.vi	boolean equals(other obj)	FUTURE
	Χ			X	SI		Trajectory_GetStates.vi	public List <state> getStates()</state>	not needed, use unpack
	Χ			X	SI		Trajectory_GetTotalTime.vi	public double getTotalTimeSeconds()	not needed, use unpack
	X	X		No	SI		Trajectory_lerp_double.vi	private static double lerp(double startValue, double endValue, double t)	internal
	X	X		No	SI		Trajectory_lerp_Pose.vi	private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t)	internal
	Χ	Χ		X	SI		Trajectory_New_Empty.vi	,	
	Χ	Χ		X	SI		Trajectory_New.vi	public Trajectory(final List <state> states)</state>	
	Χ	Χ		X			Trajectory_RelativeTo.vi	public Trajectory relativeTo(Pose2d pose)	
	Χ	X		X			Trajectory_Sample.vi	public State sample(double timeSeconds)	
	X	X	X	X			Trajectory_SampleReverse.vi		Sample in reverse order. Negate sample.
	Χ	Χ		X			Trajectory_TransformBy.vi	public Trajectory transformBy(Transform2d transform)	·
								public Pose2d getInitialPose()	can use cluster unpack, array index

Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample. nple Program rest Routine Not WPILIB ltem. Menu Function Prototype Notes TRAJECTORY_STATE X X X SI TrajectoryState Equals.vi boolean equals(other obj) X X X TrajectoryState GetAll.vi SI XX TrajectoryState GetPose.vi SI Χ XX State interpolate(State endValue, double i) TrajectoryState Interpolate.vi SI $X \mid X$ Χ TrajectoryState New.vi public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter) public State() Execution Optimized Routine ple Progr Not WPILIB Menu Item **Function Prototype** Notes TRAJECTORY CONFIG X Χ FrajectoryConfig Create.vi public TrajectoryConfig(double maxVelocityMetersPerSecond, Χ SI double maxAccelerationMetersPerSecondSq) XX X SI TrajectoryConfig_setCentripetalAccel.vi SI TrajectoryConfig setKinematicsDiffDrive.vi public TrajectoryConfig setKinematics(DifferentialDriveKinematics X Χ kinematics) XX X SI TrajectoryConfig setKinematicsMecanumfDrive.vi public TrajectoryConfig setKinematics(MecanumDriveKinematics kinematics) XX TrajectoryConfig setKinematicsSwerveDrive.vi public TrajectoryConfig setKinematics(SwerveDriveKinematics Χ SI kinematics) XX public TrajectoryConfig setReversed(boolean reversed) X SI TrajectoryConfig setReversed.vi $X \mid X \mid X \mid X \mid SI$ TrajectoryConfig setVoltageDiffDrive.vi public TrajectoryConfig addConstraint(TrajectoryConstraint Implemented differently, can't constraint) duplicate. public TrajectoryConfig addConstraints(List<? extends Implemented differently, can't TrajectoryConstraint> constraints) duplicate. public double getStartVelocity() can use cluster unpack public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond) can use cluster unpack public double getEndVelocity() public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond) public double getMaxVelocity() can use cluster unpack public double getMaxAcceleration() can use cluster unpack public List<TrajectoryConstraint> getConstraints() Implemented differently, can't public boolean isReversed() can use cluster unpack NOTE ADD OTHER "SET" ROUTINES FOR OTHER CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC. Execution Optimized Sample Program Routine Not WPILIB Menu Item Notes TRAJECTORY GENERATE X X public static Trajectory generateTrajectory(Spline.ControlVector uses cubic splines TrajectoryGenerate Make Cubic CtrlVect.vi initial, List<Translation2d> interiorWaypoints, Spline.ControlVector

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

end, TrajectoryConfig config)

		one		Add€	ed ad			
X	X		X			TrajectoryGenerate_Make_Cubic.vi	List <translation2d> interiorWaypoints, Pose2d end,</translation2d>	uses cubic splines
X	X	X	X	\rightarrow	-	TrajectoryGenerate Make Generic vi	Helper to bring these all together	Use this one!!!
X	X		X			TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory(ControlVectorList	uses quintic splines
X	X		X			TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(List <pose2d></pose2d>	uses quintic splines
X	X		X			TrajectoryGenerate_splinePointsFromSplines.vi	public static List <posewithcurvature></posewithcurvature>	
ented	Documented	ILIB Not WPILIB	em Menu Item		utine Test Routine	Program Sample Program I 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
mpleme	Оосите	Vot WPII	Venu Ite	Executio	rest Rou	and the second of the second o	Function Prototype	Notes
			No.	—	$\overline{}$			Notes
X	X	, A	No			TrajectoryParam_enforceAccel.vi	private static void enforceAccelerationLimits(boolean reverse, List <trajectoryconstraint> constraints. ConstrainedState state)</trajectoryconstraint>	This routines needs to be changed when new constraints are added.
X	X	X	No			TrajectoryParam_enforceVelocity.vi		This routines needs to be changed when new constraints are added.
X	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)</trajectoryconstraint></posewithcurvature>	
mplemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes
)	still minimum X X X X X X X X X X X X X X X X X X	still missing X X X X X X X X X X X X X X X X X X X	still missing one Not WPILIB Not WPILIB Still missing one Not WPILIB Not WPILIB	ed Implemented Implemented Implemented Not WPILIB Not WPILIB Menu Item Menu Item	ed Still missing one N. X.	ed A X X X	still missing one VI) Added additional columns for test and sample. X	Still missing one VI) Added additional columns for test and sample. X

FRC LabVIEW Trajectory Library – VI Implementation	n List	t						_	
Revision 2.X 11/12/2021 – State Space Items – (This list is s	till mi	ssing	one V	/l)	Added	d add	ditional columns for test and sample.		
TRAJECTORY UTIL	Χ	Χ	X X X	X Wenu Item	X	Test Routine	VI Name TrajectoryUtil_fromPathWeaverJSON.vi TrajectoryUtil_MakeWeightedWayPoint_ENG.vi TrajectoryUtil_MakeWeightedWayPoint.vi TrajectoryUtil_toPathWeaverJSON.vi	Function Prototype public static Trajectory fromPathweaverJson(Path path) public static void toPathweaverJson(Trajectory trajectory, Path path) public static Trajectory deserializeTrajectory(String json)	Notes
								public static String serializeTrajectory(Trajectory trajectory)	
	X X X X X X X X	X X X 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	VI Name TrapProfConstraint_New.vi TrapProfile_Calculate.vi TrapProfile_Direct.vi TrapProfile_Execute.vi TrapProfile_IsFinished.vi TrapProfile_New_DefInitial.vi TrapProfile_New.vi TrapProfile_ShouldFlipAcceleration.vi TrapProfile_TimeLeftUntil.vi TrapProfState_Equals.vi TrapProfState_New.vi	Function Prototype	Private, remove from menu Private, remove from menu
'======== TDA (5070D)/ 00N0TDAINT									
TRAJECTORY CONSTRAINT '========	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype	Notes
CENTRIPETAL ACCELERATION CONSTRAINT	X	X		X			CentripetalAccelConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double	
	X	X		X			CentripetalAccelConstraint_getMinMaxAccel.vi	velocityMetersPerSecond) public MinMax 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	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes

					<i>)</i> Auu	cu auu	ional columns for test and sample.		
DIFF DRIVE KINEMATIC CONSTRAINT		X		X			DiffDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	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)	
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	VI Name	Curation Destature	Notes
DIFF DRIVE VOLTAGE CONSTRAINT				X		<u> </u>	DiffDriveVoltageConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double	Notes
	X	X		X			DiffDriveVoltageConstraint_getMinMaxAccel.vi	velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI		DiffDriveVoltageConstraint_New.vi	public DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)	
JERK CONSTRAINT	Implementea	Documented	X Not WPILIB	Menu Item	Execution Op	Test Routine	VI Name JerkConstraint_getMaxVelocity.vi	<u> </u>	Notes FUTURE
	/		X		SI		JerkConstraint_getMinMaxAccel.vi JerkConstraint_New.vi	Routine exists, it is just a shell	FUTURE FUTURE
	Implemented		Not WPILIB		Execution Optimized	Test Routine	VI Name	Function Prototype	Notes
ANUM DRIVE KINEMATICS CONSTRAINT				X			MecaDriveKinematicsConstraint_getMaxVelocity.vi		
	X	X		X	SI		MecaDriveKinematicsConstraint_getMinMaxAccel.vi MecaDriveKinematicsConstraint_New.vi		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	VI Name	Evention Devictors	Notes
VERVE DRIVE KINEMATICS CONSTRAINT		_		X	<u> </u>	F	SwerveDriveKinematicsConstraint_getMaxVelocity.vi	Function Prototype public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	Notes
	X	X		X	_		SwerveDriveKinematicsConstraint_getMinMaxAccel.vi	public MinMax	1

	001119	0110	*,	, laaca a	aaitio	nar columno for toot and cample.		
Χ	X		Χ	SI		SwerveDriveKinematicsConstraint_New.vi	Newpublic SwerveDriveKinematicsConstraint(final	Can use cluster pack for now
							SwerveDriveKinematics kinematics, double	·
							maxSpeedMetersPerSecond)	

TRAJECTORY CONSTRAINT

Interface class - nothing done (not needed)

Function Prototype VI Name Notes TRAJECTORY CONSTRAINT (Min Max) X X Constraint_MinMax_New.vi Constraint MinMax New X SI Constraint MinMax NewMinMax.VI Constraint MinMax New XX X SI

'=========

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	Execution Optimized	Test Routine	Name Arogram	Function Prototype	Notes
UTIL		X	X	X			Util_ApproxEqual.vi	71	
	X	Χ	X	X			Util_Array_PoseWCurv_to_XY.vi		
	X	Χ	X	X	SI		Util CalcDist.vi		
	X	X	X	X	SI		Util_GetLibraryVersion.vi		
	X	Χ	X	X	SI		Util_GetLibUsage.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.
	X	Χ	Χ	X			Util_Trajectory_Absolute_To_Relative.vi		
	X	X	X	X			Util_Trajectory_ReadFile.vi		
	X	Χ	X	X			Util_Trajectory_to_XY.vi		
	X	X	X	No			Util_Trajectory_WriteFile_Config.vi		internal
	X	X	X				Util_Trajectory_WriteFile_OneState.vi		internal
	X	Χ	X	X			Util_Trajectory_WriteFile_PathFinder.vi		
	X	Χ	X	No			Util_Trajectory_WriteFile_PathFinderConfig.vi		internal
	X	X	X	X			Util_Trajectory_WriteFile_Pathweaver.vi		
	X	Χ	X	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	X	X	X			Util_TrajectoryState_Meters_To_Inches.vi		
	X	X	X	X			Util_TrajState_to_DiffDrive_WheelPos.vi		
	X	X	X	X			Util_Waypoint_Eng_To_SI.vi		
	X	X	X	X			Util_Waypoint_To_CubicInput.vi		
	X	X	X	X			Util_Waypoint_To_QuinticInput.vi		
	X	X	X	X	-		Util_WeightedWaypiont_Eng_To_WeightedWaypoint		O a manual and the area of rain.
	X	X	X	No			Util_WeightedWayPoint_To_WeightedWayPoint.vi		Sorry about the confusing name

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CONVERSIONS

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

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

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PATHFINDER UTIL

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

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

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STATE SPACE MODEL

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

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	Implemented	Documented	Not WPILIB	Menu Item	၁ဓ	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DC MOTOR	Χ	X		Χ	SI		DCMotor_GetAndymark9015.vi					
	Χ	Χ		X	SI		DCMotor_GetAndymarkRs775_125.vi					
	Χ	Χ		X	SI		DCMotor_GetBag.vi					
	Χ	Χ		X	SI		DCMotor_GetBanebotsRs550.vi					
	Χ	Χ		X	SI		DCMotor_GetBanebotsRs775.vi					
	X	Χ		X	SI		DCMotor_GetCIM.vi					
	Χ	Χ		X	SI		DCMotor_GetCurrent.vi					
	X	Χ		X	SI		DCMotor_GetFalcon500.vi					
	Χ	Χ		X	SI		DCMotor_GetMiniCIM.vi					
	Χ	Χ		X	SI		DCMotor_GetNEO.vi					
	X	Χ		X	SI		DCMotor_GetNEO550.vi					
	X	Χ		X	SI		DCMotor_GetRomiBuiltIn.vi					
	Χ	Χ		X	SI		DCMotor_GetVex775Pro.vi					
	X	Χ		X	SI		DCMotor_New.vi					
	X	Χ		X	SI		DCMotor_PickMotor.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optim	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			
	X	X		X				LinearSystemId_CreateElevatorSystem.vi		Update to use create matrix			
	X	X		X				LinearSystemId_CreateFlywheelSystem.vi		Update to use create matrix			
	X	Χ		X				LinearSystemId_CreateSingleJointedArmSystem.vi		Update to use create matrix			
	X	Χ		X				LinearSystemId_IdentifyDriveTrainSystem.vi		Update to use create matrix			
	X	X		X				LinearSystemId_IdentifyPositionSystem.vi		Update to use create matrix			
	X	Χ		X				LinearSystemId_IdentifyVelocitySystem.vi		Update to use create matrix			

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

> Function Prototype Notes DIFFERENTIAL DRIVE POSE ESTIMATOR X X X DiffDrivePoseEst_AddVisionMeasurement.vi X X X X X X DiffDrivePoseEst_FillStateVector.vi Χ DiffDrivePoseEst GetEstimatedPosition.vi Χ DiffDrivePoseEst Kalman F Callback.vi Χ Χ DiffDrivePoseEst Kalman H Callback.vi X X X X Χ DiffDrivePoseEst New.vi Χ DiffDrivePoseEst ResetPosition.vi XX DiffDrivePoseEst SetVisionMeasurementStdDevs.vi Х DiffDrivePoseEst_Update.vi XX X DiffDrivePoseEst_UpdateWithTime.vi XX Χ XX Χ DiffDrivePoseEst_VisionCorrect_Callback.vi

DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi

	Implemented	Documented	Not WPILIB	Menu Item Execution Ontimized	Execution Optimized Test Routine	Sample Program	VI Name Function Prototype Notes	Code Review	est Program	
EXTENDED KALMAN FILTER		X		<u>Χ</u>	1	· 0	ExtendedKalmanFilter_Correct_OnlyUY.vi			Τ
EXTENDED NACIMANTIETEN		X		X			ExtendedKalmanFilter_Correct.vi Just a shell, not functiona	ill		
	X	X		X			ExtendedKalmanFilter_GetP_Single.vi			
		X		X			ExtendedKalmanFilter GetP.vi			
	X	X	 	X			ExtendedKalmanFilter_GetXHat_Single.vi			
	X	X		X			ExtendedKalmanFilter GetXHat.vi			
	X	X		X			ExtendedKalmanFilter New.vi			
	X	X		X			ExtendedKalmanFilter Predict.vi			
		X		X			ExtendedKalmanFilter Reset.vi			
	X	X		X			ExtendedKalmanFilter SetP.vi			
		X		X			ExtendedKalmanFilter_SetXHat_Single.vi			
	X	X		X			ExtendedKalmanFilter_SetXHat.vi			
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KALMAN FILTER		X		X	X	(KalmanFilter_Correct.vi			
		X		X X	_		KalmanFilter_GetK KalmanFilter_GetK_Single.vi			+
		\hat{X}		X			KalmanFilter_GetXHat KalmanFilter_GetXHat			
		X		<i>x</i>	X	,	KalmanFilter_GetXHaT_Single			
		X		X	X		Kalman Filter_New.vi			
		X		X	X		KalmanFilter Predict.vi			
				X			KalmanFilter_Reset.vi			
	X	X		X			KalmanFilter_SetXHat			T
		X		X	Х	(KalmanFilter_SetXHat_Single			
			工							
	mplemented	Documented	Not WPILIB		Execution Optimized Test Routine	Sample Program	VI Nama	Code Review	Test Program	
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	1 1	\rightarrow	-+	X			KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi			\top
	X	X	'	^						
	X	X			_		KalmanFilterLatencyComp FindClosestMeasurement.vi			
	X	X)	X			KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_New.vi			\vdash
	X)				KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_New.vi KalmanFllterLatencyComp_Observer_New.vi			

FRC LabVIEW Trajectory Library – VI Implementation	n List									
Revision 2.X 11/12/2021 – State Space Items – (This list is s	till miss	ing one	e VI)) Adde	ed add	tional columns for test and sample.				
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	lmp	š š	Me	Exe	7es	VI Name Function Prototype	Notes	<u>Š</u>	Test	Em.
SWERVE DRIVE POSE ESTIMATOR						SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi				
	X .	X X	X			SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi				
		\hat{x}	$\frac{1}{X}$			SwerveDriveFoseEst_Gettstillfatedrosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi				
	X .	X	X			SwerveDrivePoseEst_Kalman_H_Callback.vi				
		X	X			SwerveDrivePoseEst_New.vi				
		X X	X			SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi				
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		X	X			SwerveDrivePoseEst_UpdateWithTime.vi				
		X	X			SwerveDrivePoseEst_VisionCorrect_Callback.vi				
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UNSCENTED KALMAN FILTER		7 <	<u><</u>			UnscentedKalmanFilter Correct FuncGroup.vi	Notes			
	X		X			UnscentedKalmanFilter_Correct_OnlyUY.vi				
	X		X			UnscentedKalmanFilter_Correct_OnlyUYR.vi				
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STATE SPACE CONTROL	X	X X X X X X X	X		ine	UnscentedKalmanFilter_Correct_OnlyUYR.vi UnscentedKalmanFilter_GetP_Single.vi UnscentedKalmanFilter_GetP_Vi UnscentedKalmanFilter_GetXHat_Single.vi UnscentedKalmanFilter_GetXHat.vi UnscentedKalmanFilter_New_Default.vi UnscentedKalmanFilter_New_FuncGroup.vi UnscentedKalmanFilter_New.vi UnscentedKalmanFilter_New.vi UnscentedKalmanFilter_Predict.vi UnscentedKalmanFilter_Reset.vi UnscentedKalmanFilter_SetP.vi UnscentedKalmanFilter_SetYHat_Single.vi UnscentedKalmanFilter_SetXHat_Single.vi UnscentedKalmanFilter_SetXHat_vi		iew	am	sking
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STATE SPACE CONTROL	X X X X X X X X X X X X X X X X X X X	umented X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		st Routine	UnscentedKalmanFilter_Correct_OnlyUYR.vi UnscentedKalmanFilter_GetP_Single.vi UnscentedKalmanFilter_GetP_Vi UnscentedKalmanFilter_GetXHat_Single.vi UnscentedKalmanFilter_GetXHat.vi UnscentedKalmanFilter_New_Default.vi UnscentedKalmanFilter_New_FuncGroup.vi UnscentedKalmanFilter_New.vi UnscentedKalmanFilter_New.vi UnscentedKalmanFilter_Predict.vi UnscentedKalmanFilter_Reset.vi UnscentedKalmanFilter_SetP.vi UnscentedKalmanFilter_SetYHat_Single.vi UnscentedKalmanFilter_SetXHat_Single.vi UnscentedKalmanFilter_SetXHat_vi		de Review	P	or Checking
STATE SPACE CONTROL	X X X X X X X X X X X X X X X X X X X	X X X X X X X	X X X X X X X X X X X X X X X X X X X	Optimized	Test Routine	UnscentedKalmanFilter_Correct_OnlyUYR.vi UnscentedKalmanFilter_GetP_Single.vi UnscentedKalmanFilter_GetP_Vi UnscentedKalmanFilter_GetXHat_Single.vi UnscentedKalmanFilter_GetXHat.vi UnscentedKalmanFilter_New_Default.vi UnscentedKalmanFilter_New_FuncGroup.vi UnscentedKalmanFilter_New.vi UnscentedKalmanFilter_New.vi UnscentedKalmanFilter_Predict.vi UnscentedKalmanFilter_Reset.vi UnscentedKalmanFilter_SetP.vi UnscentedKalmanFilter_SetYHat_Single.vi UnscentedKalmanFilter_SetXHat_Single.vi UnscentedKalmanFilter_SetXHat_vi	Notes	Code Review	Test Program	Error Checking

Company Comp	FRC LabVIEW Trajectory Library – VI Implementatio	n Lis	st									
LINEAR QUADRATIC REGULATOR X	Revision 2.X 11/12/2021 – State Space Items – (This list is	still m	issing o	one VI.) Ac	dded a	lditional columns for test and sample.					
LINEAR QUADRATIC REGULATOR X					P.	3						
LINEAR QUADRATIC REGULATOR X					j.	1	ξ					
LINEAR QUADRATIC REGULATOR X		Ø	75		nti.		gra			>	8	ing
LINEAR QUADRATIC REGULATOR X		ıte(ıte(. B			200			<i>vi</i> el	Irai	ck
LINEAR QUADRATIC REGULATOR X		Je.	Jer.	PIL "401		70	9			Se.	709	γ
LINEAR QUADRATIC REGULATOR		len	in:	\geq	2 2	# 54	Jdu				<i>t</i>	70
LINEAR QUADRATIC REGULATOR		пр	00	dot 181	<u> </u>	နို မို	VI Name	Function Prototyne	Notes	õ	ခ်	inc.
A	LINEAR PLANT INVERSION FEEDFORWARD	N X			<u> </u>			dilottotive	Notes	$\overline{}$		
No. No.	LINEAR FEATURE LOSON FEED ORWARD									+	+'	
				+	/					+	+'	
				+	/		Linear Platlay FF CotP vi			+	+	
				+	/		Linear Platlay E.F. Cott Iff. Cingle vi			+	+	
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Unear Politic Process											 '	
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LINEAR QUADRATIC REGULATOR X											 '	
LINEAR QUADRATIC REGULATOR X X X				_ X	(<u></u> '	
LINEAR QUADRATIC REGULATOR		X	$\perp X \perp$				LinearPIntInvFF_Reset_Zero.vi				<u> </u>	
LINEAR QUADRATIC REGULATOR												
LINEAR QUADRATIC REGULATOR												
LINEAR QUADRATIC REGULATOR					P	3						
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X	LINEAR QUADRATIC REGULATOR	$\mathbf{R} X$	X	λ	(LinearQuadraticRegulator Calculate NextR.vi					
X		X	X	7	(
X									NOT ORIGINAL			
X					(X				+		
X				7						+		
X				——————————————————————————————————————	,					+	+	
X				+	/					+	+	
Comparation				\rightarrow	/					+	+	
LinearQuadraticRegulator, New, ELMS.vi LinearQuadraticRegulator, New, Ni LinearQuadraticRegulator, New, Ni LinearQuadraticRegulator, New, Ni LinearQuadraticRegulator, New, Ni LinearQuadraticRegulator, New Rawvi LinearQuadraticRegulator, New SystemELMS.vi LinearQuadraticRegulator, New Vi LinearQuadraticRegulator,						V	LinearQuadraticRegulator LetencyCommenceto vi		Douting spirits, but it only has			
Linear System X X X Linear Quadratis Regulator New Ny		/	^	^	`	^	LinearQuadraticRegulator_LatericyCompensate.vi				'	
LinearQuadraticRegulator New Nav		V	+_+	-+	,		LimanyOverdretic Demyloten, Novy, ELMC vi		interger raise matrix to power.		 '	
LinearQuadraticRegulator New SystemELMS.vi		X	 ^ 		(LinearQuadraticRegulator_New_ELIVIS.VI			+	+'	
X			4									
LinearQuadraticRegulator_Reset.vi			4		_		LinearQuadraticRegulator_New_Raw.vi				<u></u> '	
LinearQuadraticRegulator_Reset.vi		X	$\perp X \perp$		(X	LinearQuadraticRegulator_New_SystemELMS.vi					
		X	X	>	(LinearQuadraticRegulator_New.vi					
LINEAR SYSTEM		X	X	>	(LinearQuadraticRegulator_Reset.vi					
LINEAR SYSTEM											'	
LINEAR SYSTEM					•			•				
LINEAR SYSTEM					D.	3						
LINEAR SYSTEM					Ž	1	2					
LINEAR SYSTEM					tin		ğ			_	_	ρι
LINEAR SYSTEM		ρə	pə	ω.	Č	, e	Ø 0			e.	än	Ķ
LINEAR SYSTEM		ent.	ent	7		ŧ į	<u>a</u>			eV.	ıga	je
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LINEAR SYSTEM		Ыe	כת	7 7	2 0	st	Ĕ			ge	st	Ď
LINEAR SYSTEM X X X I LinearSystem_CalculateX.vi X X X X I LinearSystem_CetA.vi X X X SI LinearSystem_GetA.vi X X X SI LinearSystem_GetB.vi X X X SI LinearSystem_GetBelment.vi X X X SI LinearSystem_GetC.vi X X X SI LinearSystem_GetCelment.vi X X X SI LinearSystem_GetD.vi X X X SI LinearSystem_GetDelment.vi		Ľ.	Po	N Z	ž ž	Ţe Ţ	წ VI Name	Function Prototype	Notes	ပိ	7 e	En
X X X I LinearSystem_CalculateY.vi X X X X SI LinearSystem_GetA.vi X X X SI LinearSystem_GetAElement.vi X X X SI LinearSystem_GetBellement.vi X X X SI LinearSystem_GetC.vi X X X SI LinearSystem_GetCElement.vi X X X SI LinearSystem_GetD.vi X X X SI LinearSystem_GetDElement.vi	LINEAR SYSTEM	1 X	X	λ	(1	1	LinearSystem_CalculateX.vi				1	
X X SI LinearSystem_GetA.vi X X X SI LinearSystem_GetAElement.vi X X X SI LinearSystem_GetB.vi X X X SI LinearSystem_GetBelement.vi X X X SI LinearSystem_GetC.vi X X X SI LinearSystem_GetCElement.vi X X X SI LinearSystem_GetD.vi X X X SI LinearSystem_GetDElement.vi)	(1							
X X SI LinearSystem_GetAElement.vi X X X SI LinearSystem_GetB.vi X X X SI LinearSystem_GetBelment.vi X X X SI LinearSystem_GetC.vi X X X SI LinearSystem_GetCElement.vi X X X SI LinearSystem_GetD.vi X X X SI LinearSystem_GetDElement.vi										1		
X X SI LinearSystem_GetB.vi X X X SI LinearSystem_GetC.vi X X X SI LinearSystem_GetCelement.vi X X X SI LinearSystem_GetD.vi X X X SI LinearSystem_GetD.vi X X X SI LinearSystem_GetDelement.vi				7	(5	1				+		
X X SI LinearSystem_GetBElement.vi X X X SI LinearSystem_GetC.vi X X X SI LinearSystem_GetCElement.vi X X X SI LinearSystem_GetD.vi X X X SI LinearSystem_GetDelement.vi										+		
X X SI LinearSystem_GetC.vi X X X SI LinearSystem_GetCElement.vi X X X SI LinearSystem_GetD.vi X X X SI LinearSystem_GetDElement.vi										+	+'	
X X SI LinearSystem_GetCElement.vi X X SI LinearSystem_GetD.vi X X SI LinearSystem_GetDElement.vi				+	<u> </u>	1				+	+'	
X X SI LinearSystem_GetD.vi X X SI LinearSystem_GetDElement.vi										+	+'	
X X X S/ LinearSystem_GetDElement.vi											+'	
											 '	
X X SI LinearSystem_New.vi											 '	
		X	X	\	(S	1	LinearSystem_New.vi					

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

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

CALLBACK HELPER	X X Implemented	Documented	X X X X	X X Wenu Item	Execution Optimized	Test Routine	C: C:	I Name allbackHelp_MatrixMinus.vi allbackHelp_MatrixMult_CoerceSizeB.vi allbackHelp_MatrixMult.vi allbackHelp_MatrixPlus.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	σ	þ			ptimized	Φ	gram				>	E	ing
	 Implementea	Documented	Not WPILIB	Menu Item	Execution C	-		I Name	Function Prototype	Notes	Code Revie	Test Progra	Error Check
DISCRETIZATION	X	X		X		X		iscretization_DiscretizeA.vi iscretization_DiscretizeAB.vi					
	X			X		X		iscretization_DiscretizeABTaylor.vi					

) L 13 3	idii iiilissii ig	One vi)	, Auduc	a additi	onal columns for test and sample.			
					Discretization_DiscretizeAQ.vi			
	XX	X		X	Discretization_DiscretizeAQTaylor.vi			
	XX	X			Discretization_DiscretizeR.vi			

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
STATE SPACE UTIL	. X	Χ		Χ			StateSpaceUtil_ClampInputMaxMagnitude.vi		Routine exists, it is just a shell			
	/	Χ		Χ			StateSpaceUtil_IsStabalizable.vi					
	X	X		Χ		Χ	StateSpaceUtil_MakeCostMatrix.vi					
	X	Χ		Χ		X	StateSpaceUtil_MakeCovarianceMatrix.vi					
	X	X		Χ			StateSpaceUtil_MakeWhiteNoiseVector.vi					
	X	X		Χ			StateSpaceUtil_NomalizeInputVector.vi					
	X	Χ		Χ			StateSpaceUtil_PoseTo3dVector.vi					
	X	X		Χ			StateSpaceUtil_PoseTo4dVector.vi					
	X	X		Χ			StateSpaceUtil_PoseToVector.vi					
	1	1								1	1	

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

> X X Menu Item 公 空 Execution Optimized Function Prototype Notes BatterySim_CalculateDefaultBatteryLoadedVoltage.vi
> BatterySim_CalculateLoadedVoltage.vi BATTERY SIM X X XX

DIFFERENTIAL DRIVE TRAIN SI

	Imple	Досі	Not I	Men	Ехес	Test	ର VI Name	Function Prototype	Notes	Code	Test	Errol
SIM	X	Χ		Χ			DiffDriveTrainSim_ClampInput.vi					
	Χ	X		Χ			DiffDriveTrainSim_CreateKitbotSim_EstMass.vi					
	Χ	X		Χ			DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi					
	X	X		Χ			DiffDriveTrainSim_CreateKitbotSim.vi					
	X	X		Χ			DiffDriveTrainSim_GetCurrentDrawAmps.vi					
	Χ	X		Χ			DiffDriveTrainSim_GetCurrentGearing.vi					
	Χ	X		Χ			DiffDriveTrainSim_GetDynamics.vi					
	Χ	X		Χ			DiffDriveTrainSim_GetHeading.vi					
	Χ	X		Χ			DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi					
	Χ	X		Χ			DiffDriveTrainSim_GetLeftPositionMeters.vi					
	Χ	X		Χ			DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi					
	Χ	X		Χ			DiffDriveTrainSim_GetOutput_Single.vi					
	Χ	Χ		Χ			DiffDriveTrainSim_GetPose.vi					
	Χ	X		Χ			DiffDriveTrainSim_GetRightCurrentDrawAmps.vi					
	Χ	Χ		Χ			DiffDriveTrainSim_GetRightPositionMeters.vi					
	X	X		Χ			DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi					
	Χ	X		Χ			DiffDriveTrainSim_GetState_Single.vi					
	Χ	Χ		Χ			DiffDriveTrainSim_GetState.vi					
	X	X		Χ			DiffDriveTrainSim_KitBotWheelSize vi					

	ı List								
n 2.X 11/12/2021 – State Space Items – (This list is s	till missin	g one VI)) Added	additional columns for test and sample.					
	X X	X		DiffDriveTrainSim_New_Mass_MOI.vi					
	X X	X		DiffDriveTrainSim_New.vi					
	X X			DiffDriveTrainSim_SetCurrentGearing.vi					
	X X			DiffDriveTrainSim_SetInputs.vi					
	X X			DiffDriveTrainSim_SetPose.vi					
	X X			DiffDriveTrainSim_SetState.vi					
	X X	X		DiffDriveTrainSim_ToughBoxMiniGearRatio.vi					
	X X			DiffDriveTrainSim_ToughBoxMiniMotor.vi					
	X X	X		DiffDriveTrainSim_Update.vi					
	Implemented Documented	Not WPILIB Menu Item	Execution Optimized Test Routine	Sample Program ample Program	Function Dratching	Notae	ode Review	Test Program	Frror Checkina
=1 =1/4 = 0 = 0 = 0					Function Prototype	Notes		<u> </u>	Щ
ELEVATOR SIM				ElevatorSim_GetCurrentDraw.vi					
	X X	X		ElevatorSim_GetPositionMeters.vi					
	XX			ElevatorSim_GetVelocityMetersPerSecond.vi					
	X X			ElevatorSim_HasHitLowerLimit.vi					
	X X	X		ElevatorSim_HasHitUpperLimit.vi					
				ElevatorSim_New_LinSys_NoNoise.vi					
				ElevatorSim_New_LinSys.vi					
				ElevatorSim_New_NoNoise.vi					
	XX	X		ElevatorSim_New.vi					
	Χ	X No		ElevatorSim RKF45 Func.vi					
	X X	X		ElevatorSim_SetInputVoltage.vi					
	XX			ElevatorSim SetState.vi					
	XX	XX		ElevatorSim_Update.vi		Needed because this doesn't			
		1				extend.			
	XX	X		ElevatorSim_UpdateX.vi					
	XX	X		ElevatorSim WouldHitLowerLimit.vi					
	XX	X		ElevatorSim_WouldHitUpperLimit.vi					
	XX	, , , , , , , , , , , , , , , , , , ,		Elevatore in _vvodiar into per Elimit.vi					
	Implemented Documented	Not WPILIB Menu Item	Execution Optimized Test Routine	Sample Program			ode Review	sst Program	
		Not			Function Prototype	Notes	<u> </u>		Ĺ
FLYWHEEL SIM		X		FlyWheelSim_GetAngularVelocityRadPerSec.vi					
	$X \mid X$			FlyWheelSim_GetAngularVelocityRPM.vi					
	XX	X		FlyWheelSim GetCurrentDrawAmps					
				FlyWheelSim_New_LinSys		Future			
				FlyWheelSim New LinSys MOI NoNoise		Future			
				FlyWheelSim_New_LinSys_NoNoise		Future			
	XX	X		FlyWheelSim_New_MOI.vi		. 3.3.3			
	X X			FlyWheelSim_SetInput.vi					
	$\begin{array}{c c} X & X \\ \hline X & X \end{array}$			FlyWheelSim_SetInput.vi					
	XX								
	X X	X		FlyWheelSim_Update.vi					

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Recution Optimize

Execution Optimize

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Wenu Item

Execution Optimize

In Sample Program

FinearSystemSim_ClampInput.vi LINEAR SYSTEM SIM X X FRC_LabVIEW_Trajectory_Library_Routines.xlsx Page 24 / 29

Function Prototype

Notes

3 31111	IIIIooiiii	y One	v 1)	Aut	ucu auui	tional columns for test and sample.		
						LinearSystemSim_GetCurrentDrawAmps.vi	DONT IMPLEMENT	
	$X \mid X$		X			LinearSystemSim_GetOutput_Single.vi		
	XX		X			LinearSystemSim_GetOutput.vi		
	XX		X			LinearSystemSim_New		
						LinearSystemSim_New_NoNoise.vi		
	XX		X			LinearSystemSim_SetInput_Array.vi	Doesn't use clamp ?	
	XX		X			LinearSystemSim_SetInput_Single.vi		
	XX		X			LinearSystemSim_SetInput.vi		
	XX		X			LinearSystemSim_Setstate.vi		
	XX		X			LinearSystemSim_Update.vi		
	X X		No			LinearSystemSim_UpdateX.vi		
	XX	X	No			LinearSystemSim_UpdateY.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimizea Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
SINGLE JOINT ARM SIM	I X	X		Χ		SngJntArmSim_EsitmateMOI.vi					
	X	Χ		Χ		SngJntArmSim_GetAngleRads.vi					
	X	Χ		Χ		SngJntArmSim_GetCurrentDraw.vi					
	X	Χ		Χ		SngJntArmSim_GetVelocityRadsPerSec.vi					
	X	Χ		Χ		SngJntArmSim_HasHitLowerLimit.vi					
	X	Χ		Χ		SngJntArmSim_HasHitUpperLimit.vi					
	X	Χ		Χ		SngJntArmSim_New.vi					
	X	Χ		No		SngJntArmSim_Rkf45_Func.vi					
	X	X		Χ		SngJntArmSim_SetInputVoltage.vi					
	X	Χ		Χ		SngJntArmSim_SetState.vi					
	X	Χ		Χ		SngJntArmSim_Update.vi					
	X	X		Χ		SngJntArmSim_UpdateX.vi					
	X	Χ		Χ		SngJntArmSim_WouldHitLowerLimit.vi					
	X	X		Χ		SngJntArmSim_WouldHitUpperLimit.vi					

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

	Implement	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
MAT BUILDER	X		X	SI		MatBuilder_Create.vi					
	X		X	SI		MatBuilder_Fill.vi					
,					•						

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized Test Routine	Sample Program IN Mark Indiana Samble Program	ne	Function	n Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX	X	X		X	SI	Matrix_	_AssignBlock.vi						
	X	X		X	SI	Matrix_	_Block.vi						
	Χ	X		X	SI		_Create.vi						
	Χ	X		X	SI	Matrix_	_Diag.vi						
	Χ	X		X	SI	Matrix	_ElementSum.vi						

s stil	missing	j one VI) Add	ded additional col	lumns for test and sample.			
	XX	X	1	Matrix	x_Exp.vi			
	$X \mid X$	X	SI	Matrix	x_ExtractColumnVector.vi			
	$X \mid X$	X	SI	Matrix	x_ExtractFrom.vi			
	X	X	SI	Matrix	x_ExtractMatrix.vi			
	$X \mid X$	X	SI	Matrix	x_ExtractRowVector.vi			
	$X \mid X$	X	SI	Matrix	x_Fill.vi			
	$X \mid X$	X	1	Matrix	x_Ident.vi			
	$X \mid X$	X	SI	Matrix	x_lsEqual.vi			
	$X \mid X$	X	1	Matrix	x_LltDecompose.vi			
	XX	X	1	Matrix	x_Pow.vi			
	XX	X	SI	Matrix	x_SetColumn.vi			
	XX	X	SI	Matrix	x_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 Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX HELPER	Χ		X	X	SI		MatrixHelper_CooerceSize.vi					
	Χ		X	X	SI		MatrixHelper_MultCooerceBSize.vi					
	Χ		Χ	X	SI		MatrixHelper_Zero.vi					

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

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
ANGLE STATISTICS	X	X	X	Χ	Χ			AngleStats_AngleAdd_CallbackHelp.vi					
	X	X		X	I	X		AngleStats_AngleAdd.vi					
	X	X	X	X	Χ			AngleStats_AngleMean_CallbackHelp.vi					
	Χ	Χ		Χ	I	X		AngleStats_AngleMean.vi					

bVIEW Trajectory Library – VI Implementa										
2.X 11/12/2021 - State Space Items - (This lis	t is still m	issing c	ne VI) Adde	l additional columns for test and sample.					
,	X	X	$X \mid X$	X	AngleStats_AngleResidual_CallbackHelp.vi					\top
	X	X	X	<i>[]</i>	X AngleStats_AngleResidual.vi					
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	Implemente	noc	Not WPILIB Menu Item	Execution	Sample Koutine Routine Prog			әрс	Test Progr	
						Function Prototype	Notes	ပိ		_
MATH UTIL		X	X		MathUtil_AngleModulus.vi					_
	X	X	$\frac{X}{X}$	SI	MathUtil_ApplyDeadband.vi					+
	X	X	$\frac{X}{X}$	SI	MathUtil_Clamp_Int.vi					+
	X	X		SI SI	MathUtil_Clamp.vi					+
	X	 X 		- 31	MathUtil_InputModulus.vi					+
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MERWE SCALED SIGMA POI		X	< < X		MerweScSigPts_ComputeWeights.vi	T difetion i Tototype	Notes			\top
	X	X		SI	MerweScSigPts_GetNumSigmas.vi					+
	X	X	\perp	SI	MerweScSigPts_GetWc_Single.vi					\top
	X	X	\perp_X	' SI	MerweScSigPts_GetWc.vi					\top
	X	X	X	SI	MerweScSigPts_GetWm_Single.vi					
	X	X	X	SI	MerweScSigPts_GetWm.vi					T
	X	X		1	MerweScSigPts_New_Default.vi					T
	X	X	X	1	MerweScSigPts_New.vi					
	X	X	X	1	MerweScSigPts_SigmaPoints.vi					Т
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	P	, o	~	Optimiz	ogram			Me	W.	
	nted	nted	LIB m	Optimiz	Program			eview	gram	
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	plemented	ocumented	or WPILIB enu Item	Optimiz	mple Program			ide Review	st Program	
	Implemented	Documented	Not WPILIB Menu Item	Execution Optimiz	S S SI Name	Function Prototype	Notes	Code Review	Test Program	
NUMERICAL INTEGRAT	ION X	Documented	No	Execution Optimiz	NumIntegrate_Func_Ax_Bu_K.vi	Function Prototype	Notes	Code Review	Test Program	I
NUMERICAL INTEGRAT	ION X	Documented	No No	Execution Optimiz	NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi	Function Prototype	Notes	Code Review	Test Program	<u></u>
NUMERICAL INTEGRAT	TION X X X	Documented	No No No	Execution Optimiz	NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi	Function Prototype	Notes	Code Review	Test Program	<u> </u>
NUMERICAL INTEGRAT	ION X	Documented	No No No	Execution Optimiz	NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi	Function Prototype		Code Review	Test Program	<u></u>
NUMERICAL INTEGRAT	TION X X X	Documented	No No No No X	Execution Optimiz	NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi NumIntegrate_Rk4_Dbl.vi	Function Prototype	NOT DONE	Code Review	Test Program	
NUMERICAL INTEGRAT	X X X X / /	Documented	No No No No X	Execution Optimiz	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	Function Prototype		Code Review	Test Program	
NUMERICAL INTEGRAT	X X X X / / X	Documented	No No No X X X	Execution Optimiz	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_U.vi	Function Prototype	NOT DONE	Code Review	Test Program	
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NUMERICAL INTEGRAT	X X X X X X X X X X X X X X X X X X X	Documented	No No No No X X X X	Execution Optimiz	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_U.vi NumIntegrate_Rk4_Mat_X.vi NumIntegrate_Rkf45.vi	Function Prototype	NOT DONE	Code Review	Test Program	
NUMERICAL INTEGRAT	X X X X X X X X X X X X X X X X X X X		No No No No X X X	Execution Optimiz	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_U.vi NumIntegrate_Rk4_Mat_X.vi	Function Prototype	NOT DONE	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.
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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optin	Test Routine	Sample Prograi	Function Prototype	Notes	Code Review	Test Program	Error Checking
NUMERICAL JACOBIAN	X			Χ			NumJacobian_U.vi					
	X	X		Χ			NumJacobian_X.vi					

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

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized Test Routine	N Name Program	Function Prototype	Notes
TypeDef			X		N/A	ARM_FF.CTL		
	Z		X		N/A N/A	BICon-Matrix_FUNC_TYPE.CTL CALLBACK FUNC TYPE.CTL		
	Z	Χ	X		N/A N/A	CHASSIS SPEEDS.CTL		
	Z	\hat{X}	X		N/A	CONTRAINED STATE.CTL		
	Z	^	X		N/A	DCMOTOR.CTL		
	Z		X		N/A	DCMOTOR TYPES ENUM.CTL		
	Z	Χ	X		N/A	DIFF DRIVE KINEMATICS.CTL		
	Ζ		Х	Χ		DIFF DRIVE Kitbot WheelSize ENUM.ctl		
	Ζ		Х		N/A	DiFF_DRIVE_POSE_EST.ctl		
	Ζ		Х	X	N/A	DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl		
	Ζ		Χ		N/A	DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl		
	Ζ		Χ		N/A	DIFF_DRIVE_TRAIN_SIM.ctl		
	Ζ				N/A	DIFF_DRIVE_TRAIN_SIM_STATE_ENUM.CTL		
	Ζ		Χ		N/A	ELEV_FF.CTL		
	Ζ		Χ	Χ		ELEVATOR_SIM.CTL		
	Ζ		Χ		N/A	EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL		
	Ζ		Χ		N/A	EXTENDED_KALMAN_FILTER.CTL		
	Z		X		N/A	FLYWHEEL_SIM.ctl		1,00,00
	Z		X		N/A	HOLONOMIC_DRV_CTRL.CTL		New 1/26/21
	Z		X		N/A	KALMAN_FILTER_LATENCY_COMP.CTL		
	Z		X		N/A	KALMAN_FILTER_LATENCY_COMP_FUNC_GROUP.CTL		
	Ζ		X	Χ	N/A	KALMAN_FILTER.ctl		

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s still mi	till missing one VI) Added additional columns for test and sample.									
Z	X	X	XI	V/A	LINEAR FILTER.CTL					
Z			X		LINEAR PLANT INV FF.ctl					
Z				V/A	LINEAR QUADRATIC REGULATOR.ctl					
Z				V/A	LINEAR SYSTEM LOOP.ctl					
Z				V/A	LINEAR_SYSTEM_SIM.ctl					
Z				V/A	LINEAR_SYSTEM.ctl					
Z	Χ			V/A	MECA_DRIVE_KINEMATICS.CTL					
Z	Χ	X	$X \mid I$	V/A	MECA_DRIVE_ODOMETRY.CTL					
Z	Χ	X	X	V/A	MECA WHEEL SPEEDS.CTL					
Z				V/A	MEDIAN FILTER.CTL					
Z				V/A	MERWE SCALED SIGMA PTS.ctl					
				V/A	OBSERVER SNAP LIST ITEM.CTL					
Z										
Z				V/A	OBSERVER_SNAPSHOT.CTL					
Z	Χ			V/A	PARAM_STACK_ITEM.CTL					
Z	Χ	X	X	V/A	PARAM_STACK.CTL					
Z		X	X	V/A	PID ADV LIMITS.CTL					
Z				V/A	PID_ADV_TUNING.CTL					
Z				V/A	PID CONTROLLER.CTL					
Z				V/A	PID ERROR TOLERANCE.CTL					
Z				V/A	PID_INPUT_LIMITS.CTL					
Z				V/A	PID_TUNING.CTL					
Z	Χ			V/A	POSE2D.CTL					
Z	Χ	X	X	V/A	POSEwCURVATURE.CTL					
Z		Χ	X	V/A	PROFILED_PID_CONTROLLER.CTL					
Z				V/A	RAMSETE_EXE_TUNING.CTL					
Z	Х			V/A	RAMSETE.CTL					
Z	X			V/A	ROTATION2D.CTL					
	X									
Z	Χ			V/A	SIMPLE_MOTOR_FF.CTL					
Z				V/A	SINGLE_JOINT_ARM_SIM.CTL					
Z				V/A	SLEW_RATE_LIMITER.CTL					
Z	Χ			V/A	SPLINE_CTRL_VECTOR.CTL					
Z	Χ	X	$X \mid I$	V/A	SPLINE.CTL					
Z	Χ	X	X	V/A	SWERVE DRIVE KINEMATICS.CTL					
Z	Χ			V/A	SWERVE DRIVE MODULE STATE.CTL					
Z	X			V/A	SWERVE DRIVE ODOMETRY.CTL					
Z				V/A	SWERVE DRIVE POSE EST.CTL					
Z				V/A	TIMER.CTL					
	X			V/A V/A	TRAJ CONFIG.CTL					
Z										
Z				V/A	TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL					
Z	Χ			V/A	TRAJ_CONSTRAINT_DIIF_DRIVE_KINEMATICS.CTL					
Z	Χ			V/A	TRAJ_CONSTRAINT_DIIF_DRIVE_VOLTAGE.CTL					
1		Χ	I	V/A	TRAJ_CONSTRAINT_JERK.CTL		Routine exists, it is just a shell			
Z	Χ		X		TRAJ CONSTRAINT MECA DRIVE KINEMATICS.CTL		j			
Z	X			V/A	TRAJ CONSTRAINT MINMAX.CTL					
Z	X		$\frac{x}{x}$		TRAJ CONSTRAINT SWERVE DRIVE KINEMATICS.CTL					
Z	X			V/A	TRAJ STATE.CTL					
	^									
Z				V/A	TRAJECTORY_SPLINE_TYPE_ENUM.CTL					
Z	Χ			V/A	TRAJECTORY.CTL					
Z				V/A	TRANSFORM2D.CTL					
Z	Χ	X	X	V/A	TRANSLATION2D.CTL					
Z				V/A	TRAPEZOID PROFILE CONSTRAINT.CTL					
Z				V/A	TRAPEZOID PROFILE STATE.CTL					
Z				V/A	TRAPEZOID PROFILE.CTL					
Z	Х			V/A	TWIST2D.CTL					
	^									
Z				V/A	UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL					
Z				V/A	UNSCENTED_KALMAN_FILTER.ctl					
Z				V/A	UNSCENTED_KALMAN_NEW_FUNC_GROUP.CTL					
Z	Χ			V/A	UTIL_PATHFINDER_CONFIG.CTL					
Z	Χ	Χ	X	NA	UTIL_WAYPOINT.ctl					
Z				NA	UTIL WEIGHTED WAYPOINT.ctl		New V1.5			
N/A		N/A		V/A	WAYPOINTS.CTL		Delete – obsolete			
Z			X		WEIGHTED WAYPOINT.CTL		New V1.5			
N/A		N/A		V/A	X Y HEADINGS.CTL		Delete – obsolete			
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