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 (/)
TRL Shell Total (\)

3

Doc completed Pct 79.17% Optimization Pct 31.05%

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

'======== BASE

'=========

								,		
LINEAR FILTER		X Documented	Not WPILIB	X Menu Item	প্ৰ Execution Optimized	Test Routine	Sample Program	LinearFilter_Calculate.vi	Function Prototype	Notes
	X	Χ	X		Χ			LinearFilter_CutoffFrequency.vi		
	X	Χ	Χ	Χ	1		X	LinearFilter_Execute.vi		Labview style helper
	X	Χ		Χ	Χ			LinearFilter_HighPass.vi		
	X	X	X	Χ	Χ			LinearFilter_HighPassBW1.vi		
	X	X	Χ	X	Χ			LinearFilter_HighPassBW2.vi		
	Χ	X	Χ	X	Χ			LinearFilter_LowPassBW1.vi		
	X		X	X	Χ			LinearFilter_LowPassBW2.vi		
	X	X		X	Χ			LinearFilter_MovingAverage.vi		
	X	X		X	1			LinearFilter_New.vi		
	X	X		X	SI			LinearFilter_Reset.vi		
	X	X	X	X	SI			LinearFilter_ResetToValue.vi		
	X	X		X	Χ			LinearFilter_SinglePoleIIR.vi		
	X	Χ	X	Χ	X			LinearFilter_TimeConst.vi		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
MEDIAN FILTER		X		X	X		, 	MedianFilter Calculate.vi		
	X	X	X	X			X	MedianFilter Execute.vi		Labview style helper
	X	X		X	SI			MedianFilter_New.vi		
	X	X		X	SI			MedianFilter_Reset.vi		
	X	X	X	X	SI			MedianFilter ResetToValue.vi		
	<u> </u>									I

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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.
	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				SlewRateLimiter_Calculate.vi		
	X	X	X	X				SlewRateLimiter_Close.vi		
	X	X	X	X			X	SlewRateLimiter_Execute.vi		Labview style helper
	X	X	X	X	SI			SlewRateLimiter_GetRate.vi		
	X	X		X				SlewRateLimiter_New.vi		
	X	X		X				SlewRateLimiter_NewInitialZero.vi		
	Χ	X		X				SlewRateLimiter_Reset.vi		
	X	X		X	SI			SlewRateLimiter_SetRate.vi		

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

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

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

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orary – VI Implementatior	n List								_	
e Space Items – (This list is s	till mi	ssing	one √	/l)		ed ad	ditior	nal columns for test and sample.		
CONTROLLER UTIL	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine		VI Name ControllerUtil_GetModulusError.vi	Function Prototype	Notes This was short lived in WPILIB, but still useful here.
					g					
ELEV FF	X X X X X	X X X X X X X X X X X X X X X X X X X	Not WPILIB	X X X X X X X X X X X X X X X X X X X	Execution Optimized	Test Routine		VI Name ElevFF_Calculate.vi ElevFF_CalculateVelocityOnly.vi ElevFF_Execute.vi ElevFF_ExecuteVelocityOnly.vi ElevFF_MaxAchieveAccel.vi ElevFF_MinAchieveAccel.vi ElevFF_MinAchieveVelocity.vi ElevFF_MinAchieveVelocity.vi ElevFF_MinAchieveVelocity.vi ElevFF_New.vi	Function Prototype	Notes LabVIEW style single call LabVIEW style single call
	Χ	Χ		Χ				ElevFF_New_ZeroAccel.vi		
HOL_DRV_CTRL	X X	X X Documented	X X X	X X X X X X X X X X X X X X X X X X X	Execution Optimized	Test Routine		VI Name HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.vi HolDrvCtrl_SetTolerance.vi	Function Prototype	Notes 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
PID CONTROLLER	X X X X X	X X X X	X X Not WPILIB	X X X X X X X X X X X X X X X X X X X	Execution Optimized	Test Routine	X	VI Name PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvCalculate_FF_Sp_Pv_Per.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi	Function Prototype	Notes Advanced PID Advanced PID Labview style helper. Advanced PID
	X	X	X	X				PIDController_EnableContinousInput.vi PIDController Execute.vi		Labview style helper
			^					PIDController_GetContinuousError.vi		OBSOLETE – Removed
	X	Χ		Χ				PIDController_GetPeriod.vi		

s still m	issing	one \	VI)											
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					

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DAMOSTS	(Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	 VI Name	Function Prototype	Notes
RAMSETE	Χ	Χ		X	SI		Ramsete_New.vi	new	
	Χ	Χ		Χ	SI		Ramsete_New_B_Z.vi	new(b, zeta)	
	Χ	Χ		Χ	Χ		Ramsete_Calculate.vi	calculate	
	Χ	Χ		Χ	Χ		Ramsete_Calculate_Trajectory.vi	calculate_trajectory	
	Χ	X		Χ	SI		Ramsete_AtReference.vi	AtReference	
	Χ	Χ		Χ	SI		Ramsete_SetEnabled.vi	SetEnabled	
	Χ	Χ		Χ	SI		Ramsete_SetTolerance.vi	SetTolerance	
	Χ	Χ		Χ	X		Ramsete_SINC.vi	sinc	internal
	Χ	X	X	Χ	X		Ramsete_Diff_DO_Eng.vi		
	Χ	X	X	Χ	X		Ramsete_Diff_DO_SI.vi		

	Implemented	Oocumented	Not WPILIB	Menu Item	Execution Optimized	est Routine	sample Program	VI Name	Function Prototype	Notes
SIMPLE MOTOR FEEDFORWARD		X		\ <u></u>	SI			SimpleMotorFF New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)	Notes
OIMI EE MOTORT EEDI ORWARD				^	0,			Ompleword 1_Ivew.vi	public diriple violetti dedioi ward (dedible ka, dedible kv, dedible ka)	
									public SimpleMotorFeedforward(double ks, double kv)	
	Χ	Χ		X	SI			SimpleMotorFF_Calculate.vi	public double calculate(double velocity, double acceleration)	
	Χ	Χ		X	SI			SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)	
			Χ					SimpleMotorFF_Execute.vi		LabVIEW style single call
			Χ					SimpleMotorFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	X	X		X	X			SimpleMotorFF_MaxAchieveVel.vi	public double maxAchievableVelocity(double maxVoltage, double acceleration)	
	X	Χ		X	X			SimpleMotorFF_MinAchieveVel.vi	public double minAchievableVelocity(double maxVoltage, double acceleration)	
	X	Χ		X	Х			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 '======

Function Prototype Notes pose2d new() can use cluster constant Pose New TRRO.vi pose2d new(translation2d, rotation2d) $X \mid X \mid$ X SI X SI Pose New.vi XX pose2d new(double x, double y, rotation2d) XX X SI Pose Plus.vi pose2d plus(transform2d other) Pose Minus.vi XX X SI transform2d minus(pose2d other) Pose_getTranslation.vi XX X SI translation2d getTranslation() can also use cluster unpack XX X SI Pose_getRotation.vi rotation2d getRotation() can also use cluster unpack X X X X SI Pose_getXY.vi X X X X SI Pose_getXYAngle.vi pose2d transformby(transform2d other) XX X SI Pose_TransformBy.vi X SI Pose_RelativeTo.vi XX pose2d relativeto(pose2d other) XX XX Pose_Exp.vi pose2d exp(twist2d twist)

X	- X	X	X	Pose_Log.vi	twist2d log(pose2d end)	
X	- X	X	SI		boolean equals(other obj)	

ROTATION	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	N Name	Function Prototype	Notes can use cluster constant
RUTATION	Χ	Χ		Χ	SI		Detetion Create Angle vi	rotation2d new()	can use cluster constant
	X	X		X	SI		Rotation_CreateAngle.vi Rotation_CreateXY.vi	rotation2d new(double value) rotation2d new(double x, double y)	
	X	X		X	SI		Rotation_CreateAngleDegrees.vi	rotation2d fromDegrees(double y)	convert to radians then create
	X			X	SI		Rotation Plus.vi		convert to radians their create
		X		X	_		-	rotation2d plus(rotation2d other)	
	X	X			SI		Rotation_Minus.vi	rotation2d minus(rotation2d other)	
	X	X		X	SI		Rotation_UnaryMinus.vi	rotation2d unaryminus()	
	X	X		X	SI		Rotation_Times.vi	rotation2d times(double scalar)	
	X	Χ		X	SI		Rotation_RotateBy.vi	rotation2d rotateby(rotation2d other)	1/00/04
	Χ	Χ	Χ	Χ	SI		Rotation_GetAngleCosSin.vi		New 1/26/21
	X	Χ		X	SI		Rotation_GetRadians.VI	double getRadians()	use cluster unpack
	X	X		X	SI			double getDegrees()	use cluster unpack, then convert to
							5 () 0 (0) 1		degree
	Χ	Χ		Χ	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
	X	Χ		Χ	SI		Rotation_Equals.vi	boolean equals(rotation2d other)	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program IA awe IA		Function Prototype	Notes
TRANSFORM	X	X		Χ	SI		Transform	_Create_PosePose.vi	transform2d new(pose2d, pose2d)	
	X	Χ		Χ	SI		Transform	_Create_TransRot.vi	transform2d new(translation2d, rotation2d)	
									transform2d new()	can use cluster constant
	Χ	Χ		Χ	SI		Transform	_Times.vi	transform2d times(double scalar)	
	Χ	Χ		Χ	SI		Transform	_GetTranslation.VI	translation2d getTranslation()	use cluster unpack
	Χ	Χ		Χ	SI		Transform	_GetRotation.VI	rotation2d getRotation()	use cluster unpack
	Χ	Χ	Χ	Χ	SI		Transform __	_GetXY.vi		
	X	X	Χ	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)	

TRANSLATION	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program emple Program	Function Prototype translation2d new()	Notes can use cluster constant
IKANSLATION								V	can use ciustei constant
	Χ	Χ		X	SI		Translation_Create.vi	translation2d new(double x, double y)	
	Χ	X		X	SI		Translation_Create_DistAng.vi		
	Χ	Χ		X	SI		Translation_GetDistance.vi	double getDistance(translation2d other)	
	Χ	Χ		X	SI		Translation_GetX.VI	double getX()	can use cluster unpack
	X	X		X	SI		Translation_GetY.VI	double getY()	can use cluster unpack
	Χ	Χ	Χ	Χ	SI		Translation_GetXY.VI		
	Χ	X		X	SI		Translation_GetNorm.VI	double getNorm()	can use cluster unpack
	Χ	X		X	SI		Translation_RotateBy.vi	translation2d rotateBy(rotation2d other)	
	Χ	X		X	SI		Translation_Plus.vi	translation2d plus(translation2d other)	

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1								
	X	X		(SI		Translation_Minus.vi	translation2d minus(translation2d other)	
	X	X		(SI		Translation_UnaryMinus.vi	translation2d unaryminus()	
	X	Χ	,	(SI		Translation_Times.vi	translation2d times(double scalar)	
				(0)		- I	translation2d div(double scalar)	can multiply by 1/scalar
	X	X		(SI		Translation_Equals.vi	boolean equals(translation other)	
TV	X Implemented		7	S S Execution Optimized		VI Name Twist_Create.vi Twist_Equals.VI Twist_GetAll.VI	Function Prototype twist new(x, y, theta) boolean equals(obj other)	Notes
====== MATICS =======			·	·				
CHASSIS SPE		Documented		Execution Optimized	Test Routine	Sample Program	Function Prototype chassisspeeds new ()	Notes can use cluster constant
		Χ	((SI		ChassisSpeeds_New.vi	chassisspeeds new (double xvel, double yvel, double angvel)	
	X					ChassisSPeeds_GetXYOmega.vi		
	X	X	,	(SI		ChassisSpeeds_FromFieldRelativeSpeeds.VI	chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle)	
DIFFERENTIAL DRIVE KINEMAT	SDICS X Implemented	X Documented	Not WPILIB	X - Execution Optimized	X Test Routine	ChassisSpeeds_FromFieldRelativeSpeeds.VI By Do Williams DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi DiffKinematics_toWheelSpeed.vi	chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) Function Prototype diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds)	Notes
DIFFERENTIAL DRIVE KINEMAT	Implemented X X X Implemented	X X Documented	B Not WPILIB	X - Execution Optimized	X X Test Routine	VI Name DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi	Function Prototype diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds)	Notes Notes incorporated into "update"

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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		
	X	X		X	X		MecaKinematics_SetInverseKinematics.vi MecaKinematics_ToChassisSpeeds.vi MecaKinematics_ToWheelSpeeds.vi		
	X	Χ		X					
	X	X		X	X		MecaKinematics_ToWheelSpeeds.vi		
	X	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 M	Menu	ĕ	Test F	Name	Function Prototype	Notes
MECANUM DRIVE ODOMETRY		X		<u> </u>	Ш.	_	MecaOdometry_New.vi		Notes
	X			X	1		MecaOdometry_NewDefaultPose.vi		
	X	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

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

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

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- 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	<			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	

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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)

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X

FRC LabVIEW Trajectory Library – VI Implementation Revision 2.X 11/12/2021 – State Space Items – (This list is s			one '	VI)	Adde	ed add	ditional columns for test and sample.		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype	Notes
TRAJECTORY_STATE	Х	Χ		X	SI		TrajectoryState_New.vi	public State() public State(double timeSeconds, double	
								velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter)	
	X	X		X			TrajectoryState_Interpolate.vi	State interpolate(State endValue, double i)	FUTURE

TrajectoryState_Interpolate.vi
TrajectoryState_Equals.vi

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

NOTE ADD OTHER "SET" ROUTINES FOR OTHER CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC.

boolean equals(other obj)

FUTURE

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	√I Name	Function Prototype	Notes
TRAJECTORY GENERATE	X	X		X			-	TrajectoryGenerate_Make_Cubic_CtrlVect.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config)</translation2d>	uses cubic splines
	X	X		X			-	TrajectoryGenerate_Make_Cubic.vi		uses cubic splines

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

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TRAJECTORY UTIL	Χ	X		X			TrajectoryUtil_fromPathWeaverJSON.vi	public static Trajectory fromPathweaverJson(Path path)	
	X	X		X			TrajectoryUtil_toPathWeaverJSON.vi	public static void toPathweaverJson(Trajectory trajectory, Path	
								path)	
								public static Trajectory deserializeTrajectory(String json) public static String serializeTrajectory(Trajectory trajectory)	
l								public static offing serialize frajectory (frajectory trajectory)	
TRAPEZOID PROFILE	X X X X X X X X X X X X X X X X X X X	X X X X 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	Sample Program	VI Name TrapProfConstraint_New.vi TrapProfile_Calculate.vi TrapProfile_Direct.vi TrapProfile_Execute.vi TrapProfile_IsFinished.vi TrapProfile_New.vi TrapProfile_New_DefInitial.vi TrapProfile_ShouldFlipAcceleration.vi TrapProfile_TimeLeftUntil.vi TrapProfile_TotalTime.vi TrapProfState_Equals.vi TrapProfState_New.vi	Function Prototype	Notes Private, remove from menu Private, remove from menu
'========= TDA (5070D) (0010TDAN)T									
TRAJECTORY CONSTRAINT '========									
					pə				
CENTRIPETAL ACCELERATION CONSTRAINT	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimi	Sample Program	VI Name CentripetalAccelConstraint_getMaxVelocity.vi	Function Prototype public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double	Notes
								velocityMetersPerSecond)	
	X	X		X			CentripetalAccelConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	Χ	Χ		X	SI		CentripetalAccelConstraint_New.vi	public CentripetalAccelerationConstraint(double maxCentripetalAccelerationMetersPerSecondSq)	Can use cluster pack for now
DIFF DRIVE KINEMATIC CONSTRAINT	X Implemented	X X Documented	Not WPILIB	X Menu Item		Sample Program	DiffDriveKinematicsConstraint_getMaxVelocity.vi DiffDriveKinematicsConstraint_getMinMaxAccel.vi	Function Prototype public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	Notes
	X	X		X	SI		DiffDriveKinematicsConstraint_New.vi	public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond)	

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

SwerveDriveKinematicsConstraint_getMinMaxAccel.vi

SwerveDriveKinematicsConstraint New.vi

TRAJECTORY CONSTRAINT

Interface class - nothing done (not needed)

XX

 $X \mid X$

Χ

X SI

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

poseMeters, double curvatureRadPerMeter, double

Newpublic SwerveDriveKinematicsConstraint(final

SwerveDriveKinematics kinematics, double

getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)

Can use cluster pack for now

velocityMetersPerSecond)

maxSpeedMetersPerSecond)

public MinMax

nple Program Not WPILIB

VI Name Function Prototype Notes Constraint MinMax New TRAJECTORY CONSTRAINT (Min Max) X X X SI X SI Constraint MinMax New.vi XX 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	Execution Optimized	Test Routine	Name Program	Function Prototype	Notes
UTIL	X	Χ	X	X			Util_Array_PoseWCurv_to_XY.vi		
	Χ	X	X	X	SI		Util_CalcDist.vi		
	Χ	X	X	X			Util_GetLibraryVersion.vi		
	X	X	X	X	SI		Util_GetLibraryUsage.vi		
	Χ	X	X	X			Util_GetTime.vi		Once tested completely, this should be optimized!
	X	Χ	X	No	N/A		Util_LibraryGlobals.vi		Global Variables – no block diag.
	Χ	X	X	X			Util_Trajectory_Absolute_To_Relative.vi		•
	Χ	X	X	X			Util_Trajectory_ReadFile.vi		
	Χ	X	X	X			Util_Trajectory_to_XY.vi		
	Χ	X	X	X			Util_Trajectory_WriteFile.vi		
	Χ	X	Χ	No			Util_Trajectory_WriteFile_Config.vi		internal
	Χ	Χ	X	No			Util_Trajectory_WriteFile_OneState.vi		internal
	Χ	Χ	X	X			Util_Trajectory_WriteFile_PathFinder.vi		
	Χ	Χ	X	No			Util_Trajectory_WriteFile_PathFinderConfig.vi		internal
	Χ	X	X	X			Util_Trajectory_WriteFile_Pathweaver.vi		
	X	X	X	No			Util_Trajectory_WriteFile_States.vi		internal
	X	Χ	Χ	No			Util_Trajectory_WriteFile_WayPoints.vi		internal
	X	X	X	X			Util_TrajectoryState_Meters_To_Inches.vi		
	X	Χ	Χ	Χ			Util_TrajState_to_DiffDrive_WheelPos.vi		
	X	X	Χ	X			Util_Waypoint_Eng_To_SI.vi		
	Χ	X	X	X			Util_Waypoint_To_CubicInput.vi		
	Χ	X	Χ	Χ			Util_Waypoint_To_QuinticInput.vi		
	Χ	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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
CONV	Χ	Χ	Χ	X	SI			Conv_AngleDegrees_Heading.vi		
	Χ	Χ	Х	X	SI			Conv_AngleRadians_Heading.vi		
	Χ	Χ	Χ	Χ	SI			Conv_Centimeters_Meters.vi		

s still	miss	sing	one v	٧١)	Ada	ed additio	nai columns for test and sample.
	Χ.	X	Χ	X	SI		Conv_Deg_Radians.vi
	Χ.	X	Χ	X	SI		Conv_Feet_Meters.vi
	Χ.	X	Χ	Χ	SI		Conv_GyroDegrees_Heading.vi
	Χ.	X	Χ	Χ	SI		Conv_Heading_AngleRadians.vi
	Χ.	X	Χ	Χ	SI		Conv_Inches_Meters.vi
	Χ.	X	Χ	X	SI		Conv_Kilograms_Pounds.vi
	Χ.	X	Χ	X	SI		Conv_Meters_Feet.vi
	Χ.	X	X	X	SI		Conv_Meters_Inches.vi
	Χ.	X	X	X	SI		Conv_POSE_SI_Eng.vi
	Χ.	X	X	X	SI		Conv_Pounds_Kilograms.vi
	Χ.	X	Χ	X	SI		Conv_Radians_Deg.vi
	Χ.	X	Χ	Χ	SI		Conv_Yards_Meters.vi

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

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PATHFINDER UTIL '========

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	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 amen IV	Function Prototype	Notes	Code Review	Test Program	Error Checking
DC MOTOR	Χ	X		Χ		DCMotor_GetAndymark9015.vi					
	Χ	Χ		Χ		DCMotor_GetAndymarkRs775_125.vi					
	Χ	X		Χ		DCMotor_GetBag.vi					
	Χ	X		Χ		DCMotor_GetBanebotsRs550.vi					
	Χ	Χ		Χ		DCMotor_GetBanebotsRs775.vi					

1133		, one vi)	, Auu	cu auuili	onal columns for test and sample.
	XX	X			DCMotor_GetCIM.vi
	XX	X			DCMotor_GetCurrent.vi
	XX	X			DCMotor_GetFalcon500.vi
	XX	X			DCMotor_GetMiniCIM.vi
	XX	X			DCMotor_GetNEO.vi
	XX	X			DCMotor_GetNEO550.vi
	XX	X			DCMotor_GetVex775Pro.vi
	XX				DCMotor_GetRomiBuiltIn.vi
	XX	X			DCMotor_New.vi

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

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STATE SPACE ESTIMATION

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATOR	X	X		X			DiffDrivePoseEst_AddVisionMeasurement.vi	7,	Just a shell, not functional!			
	X						DiffDrivePoseEst_VisionCorrect_Callback.vi					
	Χ						DiffDrivePoseEst_Kalman_F_Callback.vi					
	Χ						DiffDrivePoseEst_Kalman_H_Callback.vi					
	X	X		Χ			DiffDrivePoseEst_FillStateVector.vi					
	X	X		Χ			DiffDrivePoseEst_GetEstimatedPosition.vi					
	X	X		Χ			DiffDrivePoseEst_New.vi					
	X	Χ		Χ			DiffDrivePoseEst_ResetPosition.vi					
	X	X		Χ			DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi					
	X	X		Χ			DiffDrivePoseEst_Update.vi					
	X	X		X			DiffDrivePoseEst_UpdateWithTime.vi					
					Ø							

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	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!			
	X	X		Χ				ExtendedKalmanFilter_Correct_OnlyUY.vi					
	X	X		X				ExtendedKalmanFilter_GetP.vi					
	X	X		Χ				ExtendedKalmanFilter_GetP_Single.vi					
	X	Χ		Χ				ExtendedKalmanFilter_GetXHat.vi					
	X	X		Χ				ExtendedKalmanFilter GetXHat Single.vi					

KALMAN FILTER LATENCY COMPENSATOR KALMAN FILTER LATENCY COMPENSATOR X KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi X KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi Work in progress. X KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Deserver_New.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_Reset.vi KalmanFilterLatencyComp_New.vi KalmanFilterLatencyComp_New.vi Work in progress. KalmanFilterLatencyComp_New.vi Work in progress. KalmanFilterLatencyComp_New.vi Work in progress.	_abVIEW Trajectory Library – VI Implementa	ation Li				14444	addition	nal columns for test and sample.					
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Final Section Final Sectio													
X													
KALMAN FILTER LATENCY COMPENSATOR X													
RALMAN FILTER LATENCY COMPENIATOR X													
Nation Protection Protect		X	X		X			ExtendedKalmanFilter_SetXHat_Single.vi					
National Process National Pr													
National Process National Pr						nizea	5						
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									Function Prototype	Notes		76	
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		X	X		X	,	X I	KalmanFilter_New.vi					
		X	X		Х	,	X I	KalmanFilter Predict.vi					
RALMAN FILTER LATENCY COMPENSATOR Supplies Suppli		X	X					KalmanFilter Reset.vi					
		X											
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KalmanFilterLatencyComp_ApplyPastGlobalMeas_Functiorup_Vi Work in progress.		plemented	ocumented	ot WPILIB	enu Item	ecution Optimized	est Koutine ample Program				ode Review	sst Program	o chocking
Kalman Filter Latency Comp_ApplyPast GlobalMeasurement_UKF-vi Work in progress.				Not WPILIB	Menu Item	Execution Optimized			Function Prototype		Code Review	Test Program	Error Checking
X KalmanFilterLatencyComp_FindClosestMeasurement.vi Work in progress.	KALMAN FILTER LATENCY COMPENSAT	TOR X		Not WPILIB	Menu Item	Execution Optimized		KalmanFilterLatencyComp_AddObserverState.vi	Function Prototype		Code Review	Test Program	
X KalmanFilterLatencyComp_FindClosestMeasurement.vi Work in progress.	KALMAN FILTER LATENCY COMPENSAT	TOR X		Not WPILIB	Menu Item	Execution Optimized		KalmanFilterLatencyComp_AddObserverState.vi	Function Prototype		Code Review	Test Program	
KalmanFilterLatencyComp_New vi Work in progress.	KALMAN FILTER LATENCY COMPENSAT	TOR X		Not WPILIB	Menu Item	Execution Optimized		KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi		Work in progress.	Code Review	Test Program	
KalmanFilterLatencyComp_New.vi Work in progress.	KALMAN FILTER LATENCY COMPENSAT	TOR X		Not WPILIB	Menu Item	Execution Optimized		KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi		Work in progress.	Code Review	Test Program	
KalmanFilterLatencyComp_New.vi Work in progress.	KALMAN FILTER LATENCY COMPENSAT	TOR X		Not WPILIB	Menu Item	Execution Optimized		KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.v		Work in progress. Work in progress.	Code Review	Test Program	
SWERVE DRIVE POSE ESTIMATOR SwerveDrivePoseEst Kalman F. Callback vi SwerveDrivePoseEst Kalman F. Callback	KALMAN FILTER LATENCY COMPENSAT	TOR X		Not WPILIB	Menu Item	Execution Optimized		KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.v KalmanFilterLatencyComp_FindClosestMeasurement.vi		Work in progress. Work in progress.	Code Review	Test Program	
SWERVE DRIVE POSE ESTIMATOR Swerve Drive Pose ESTIMATOR Swerve Drive Pose Est Vision Measurement StdDev.vi Swerve Drive Pose Est Vision Measurement Vi Haven't started yet Swerve Drive Pose Est Vision Measurement Vi Haven't started yet Swerve Drive Pose Est Vision Measurement Vi Haven't started yet Swerve Drive Pose Est Vision Measurement Vi Haven't started yet Swerve Drive Pose Est Vision Measurement Vi Haven't started yet Swerve Drive Pose Est Vision Measurement Vi Haven't started yet Swerve Drive Pose Est Vision Measurement Vi Haven't started yet Swerve Drive Pose Est Vision Measurement Vi Haven't started yet Swerve Drive Pose Est Vision Measurement Vi Haven't started yet Swerve Drive Pose Est Vision Measurement Vi Haven't started yet Swerve Drive Pose Est Vision Measurement Viv Haven't started yet Haven't started yet	KALMAN FILTER LATENCY COMPENSAT	TOR X X X X		Not WPILIB	Menu Item	Execution Optimized		KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.v KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi		Work in progress. Work in progress. Work in progress.	Code Review	Test Program	
SWERVE DRIVE POSE ESTIMATOR SWERVED PRIVE POSE ESTIMATOR SWERVED PRIVE POSE EST MAD SWERVED PRIVE POSE EST. AddVisionMeasurement_StdDev.vi SWERVED PRIVE POSE EST. AddVisionMeasurement.vi Haven't started yet SWERVED PRIVE POSE EST. AddVisionMeasurement.vi Haven't started yet SWERVED PRIVE POSE EST. AddVisionMeasurement.vi SWERVED PRIVE POSE EST. AddVisionMeasurement.vi Haven't started yet SWERVED PRIVE POSE EST. AddVisionMeasurement.stdDevs.vi SWERVED PRIVE POSE EST. AddVisionMeasurement.stdDevs.vi Haven't started yet SWERVED PRIVE POSE EST. AddVisionMeasurement.stdDevs.vi Haven't started yet SWERVED PRIVE POSE EST. AddVisionMeasurement.stdDevs.vi Haven't started yet SWERVED PRIVE POSE EST. AddVisionMeasurement.stdDevs.vi Haven't started yet SWERVED PRIVE POSE EST. AddVisionMeasurement.stdDevs.vi	KALMAN FILTER LATENCY COMPENSAT	TOR X X X X X X		Not WPILIB	Menu Item	Execution Optimized		KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.v KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi		Work in progress. Work in progress. Work in progress. Work in progress.	Code Review	Test Program	
SWERVE DRIVE POSE ESTIMATOR SWERVE DRIVE POSE ESTIMATOR X SwerveDrivePoseEst AddVisionMeasurement_StdDev.vi X SwerveDrivePoseEst AddVisionMeasurement.vi X SwerveDrivePoseEst VisionCorrect_Callback.vi X SwerveDrivePoseEst Kalman_F_Callback.vi X SwerveDrivePoseEst ResetPosition.vi X SwerveDrivePoseEst SetVisionMeasurementStdDevs.vi X SwerveDrivePoseEst ResetPosition.vi X SwerveDrivePoseEst ResetPosition.vi X SwerveDrivePoseEst SetVisionMeasurementStdDevs.vi	KALMAN FILTER LATENCY COMPENSAT	TOR X X X X X X		Not WPILIB	Menu Item	Execution Optimized		KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.v KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi		Work in progress. Work in progress. Work in progress. Work in progress.	Code Review	Test Program	
SWERVE DRIVE POSE ESTIMATOR SWERVE DRIVE POSE ESTIMATOR X SwerveDrivePoseEst AddVisionMeasurement_StdDev.vi X SwerveDrivePoseEst AddVisionMeasurement.vi X SwerveDrivePoseEst VisionCorrect_Callback.vi X SwerveDrivePoseEst Kalman_F_Callback.vi X SwerveDrivePoseEst ResetPosition.vi X SwerveDrivePoseEst SetVisionMeasurementStdDevs.vi Haven't started yet	KALMAN FILTER LATENCY COMPENSAT	TOR X X X X X X		Not WPILIB	Menu Item	Execution Optimized		KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.v KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi		Work in progress. Work in progress. Work in progress. Work in progress.	Code Review	Test Program	
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SWERVE DRIVE POSE ESTIMATOR SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_VisionCorrect_Callback.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_SestEvision.vi SwerveDrivePoseEst_SestIposition.vi Haven't started yet X SwerveDrivePoseEst_SestIposition.vi Haven't started yet X SwerveDrivePoseEst_SestIvisionMeasurementStdDevs.vi X SwerveDrivePoseEst_Update.vi	KALMAN FILTER LATENCY COMPENSAT	TOR X X X X X X	<i>p</i>			Optimized	ram	KalmanFilterLatencyComp_AddObserverState.vi KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.v KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi		Work in progress. Work in progress. Work in progress. Work in progress.	ew Code Review	am Test Program	
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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	rest 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.			
	X			X			UnscentedKalmanFilter_Correct_FuncGroup.vi					
	Х			Χ			UnscentedKalmanFilter_Correct_OnlyUY.vi					
	Х			Χ			UnscentedKalmanFilter_Correct_OnlyUYR.vi					
	Χ	Χ		Χ			UnscentedKalmanFilter_GetP.vi					
	X	Χ		Χ			UnscentedKalmanFilter_GetP_Single.vi					
	X	X		Х			UnscentedKalmanFilter_GetXHat.vi					
	X	Χ		Χ			UnscentedKalmanFilter_GetXHat_Single.vi					
	X			Χ			UnscentedKalmanFilter New.vi					
	Х			Х			UnscentedKalmanFilter_New_Default.vi					
	Х			Χ			UnscentedKalmanFilter_New_FuncGroup.vi					
	X	Χ		Χ			UnscentedKalmanFilter_Predict.vi					
	Χ	Χ		Χ			UnscentedKalmanFilter_Reset.vi					
	X	X		X			UnscentedKalmanFilter_SetP.vi					
	X	X		Χ			UnscentedKalmanFilter_SetXHat.vi					
	X	X		Χ			UnscentedKalmanFilter_SetXHat_Single.vi					
	X			Χ			UnscentedKalmanFilter_Transform.vi					

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

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimit	Sample Program		Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR PLANT INVERSION FEEDFORWARD		_		X			LinearPIntInvFF_Calculate.vi					
	X	X		X			LinearPIntInvFF_Calculate_NextR.vi					
	X	X		X			LinearPIntInvFF_GetUff.vi					
	Χ	X		X			LinearPIntInvFF_New.vi					
	Χ	X		X			LinearPIntInvFF_New_Plant.vi					
	Χ	X		X			LinearPIntInvFF_Reset_Initial.vi					
	Χ	Χ		Х			LinearPIntInvFF_Reset_Zero.vi					
	X	X		Х			LinearPIntInvFF_GetUff_Single.vi					
	Χ	Χ		Х			LinearPIntInvFF_GetR.vi					
	X	X		Х			LinearPIntInvFF_GetR_Single.vi					

FRC LabVIEW Trajectory Library - VI Implementatio	n Lis	t									
Revision 2.X 11/12/2021 – State Space Items – (This list is	still m	issing	one VI) Add	ded ac	ditional columns for test and sample.					
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	nplemente	cni	Not WPILIE	2 2	st F	$\dot{q}\mu$			de	Test Program	
	Jul.	Documente	Not WPILIE	Execution	Test	Osample VI Name	Function Prototype	Notes	Š	<u>7</u> 68	Error
LINEAR QUADRATIC REGULATOR	RX	X	X			LinearQuadraticRegulator_Calculate_NextR.vi					
		Χ	λ	(LinearQuadraticRegulator Calculate.vi					
		Χ	λ	(LinearQuadraticRegulator_GetK_Single.vi		NOT ORIGINAL			
	X	Х	λ	(Χ	LinearQuadraticRegulator_GetK.vi					
	X		λ	(LinearQuadraticRegulator_GetR_Single.vi					
		X		(LinearQuadraticRegulator_GetR.vi					
	X	Χ	λ	(LinearQuadraticRegulator_GetU_Single.vi					
	X	X	X	(LinearQuadraticRegulator_GetU.vi					
	/	X	λ	(Χ	LinearQuadraticRegulator_LatencyCompensate.vi		Routine exists, but it only has			
								interger raise matrix to power.			
	X	X	λ	(LinearQuadraticRegulator_New_ELMS.vi					
						LinearQuadraticRegulator_New_Raw.vi					
	X	X	λ	(Χ	LinearQuadraticRegulator_New_SystemELMS.vi					
						LinearQuadraticRegulator_New_N.vi					
	X			(LinearQuadraticRegulator_New.vi					
	X	X	\ \ \ \ \ \	(LinearQuadraticRegulator_Reset.vi					
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	_		Not WPILIB	Execution	<u>1</u>	NI Name	Function Prototype	Notes	ပိ	<u>1</u>	Erro
LINEAR SYSTEM			λ	(LinearSystem_CalculateX.vi					
	X	X	λ	(LinearSystem_CalculateY.vi					
		Χ		(LinearSystem_GetA.vi					
	X		\ \ \ \ \	(LinearSystem_GetAElement.vi					
		X		(LinearSystem_GetB.vi					
	X		\ \ \ \ \	(LinearSystem_GetBElement.vi					
	X	X	\ X	(LinearSystem_GetC.vi					
	X	X	X	(LinearSystem_GetCElement.vi					
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	<u>t</u>	ρo	8 8	Ĭ	Ģ	δ VI Name	Function Prototype	Notes	Code	Ţe	Error
LINEAR SYSTEM LOOF		X	X			LinearSystemLoop_ClampInput.vi					_
		X		(LinearSystemLoop_Correct.vi					
						LinearSystemLoop_GetClampFunction.vi					
	X	Χ		(LinearSystemLoop_GetController.vi					
	X	Χ	X	(LinearSystemLoop_GetError_Single.vi					
	X	X	X	(LinearSystemLoop_GetError.vi					
	X	X	X	(LinearSystemLoop_GetFeedForward.vi					
	X	X	λ	(LinearSystemLoop_GetNextR_Single.vi					
	X	X	X	(LinearSystemLoop_GetNextR.vi					
	X	X	<i>\</i>	(LinearSystemLoop_GetObserver.vi					

o ouii	mooni	J OHE VI) Auc	Added additional columns for test and sample.		
)	(X	X		LinearSystemLoop_GetU_Row.vi		
((X	X		LinearSystemLoop_GetU.vi		
((X	X		LinearSystemLoop_GetXHat_Single.vi		
	(X	X		LinearSystemLoop_GetXHat.vi		
				LinearSystemLoop_New_BBB		
				LinearSystemLoop_New_LinearSystem_ClampFunc		
((X	X		LinearSystemLoop_New_LinearSystem_ClampVal.vi		
((X	X		LinearSystemLoop_New.vi		
	(X	X		LinearSystemLoop_Predict.vi		
	(X	X		LinearSystemLoop_Reset.vi		
				LinearSystemLoop_SetClampFunction.vi		
				LinearSystemLoop_SetNextR_Some.vi		
((X	X		LinearSystemLoop_SetNextR.vi		
				LinearSystemLoop_SetXHat_Single.vi		
				LinearSystemLoop_SetXHat.vi		

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

CALLBACK HELPER	X X Implemented	Documented	X X X	Menu Item	Execution Optimized	Test Routine	VI Name CallbackHelp_MatrixMinus.vi CallbackHelp_MatrixMult.vi CallbackHelp_MatrixMult_CoerceSizeB.vi CallbackHelp_MatrixPlus.vi	Function Prototype	Notes	Code Review	Test Program	Frror Checkina
DISCRETIZATION	X X Implemented	X X	Not WPILIB	X X Menu Item		X X X	VI Name Discretized.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
STATE SPACE UTIL	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	X Test Routine	VI Name StateSpaceUtil MakeCostMatrix.vi	Function Prototype	Notes	Code Review	Test Program	Two Chacking
STATE OF AGE OTIL	X	X		X		X	StateSpaceUtil_MakeCovarianceMatrix.vi			+	+	+
	X	X		X			StateSpaceUtil_MakeWhiteNoiseVector.vi			+		+
	/	X					StateSpaceUtil_IsStabalizable.vi					1
	Χ	Χ		X			StateSpaceUtil_PoseToVector.vi					
	X	X		X			StateSpaceUtil_ClampInputMaxMagnitude.vi StateSpaceUtil_NomalizeInputVector.vi		Routine exists, it is just a shell			

XX	X		StateSpaceUtil_PoseTo4dVector.vi		
XX	X		StateSpaceUtil_PoseTo3dVector.vi		

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11/12/2021 – State Space Items – (This list i					ded add				
	X			X		ElevatorSim_GetCurrentDraw.vi			
	X			X X		ElevatorSim_GetPositionMeters.vi			
	X			X		ElevatorSim_GetVelocityMetersPerSecond.vi ElevatorSim_SetInputVoltage.vi			
	X			X		ElevatorSim_UpdateX.vi			_
	X			X		ElevatorSim WouldHitLowerLimit.vi			
	X			X		ElevatorSim_WouldHitUpperLimit.vi			
	X			X		ElevatorSim_Update.vi Needed because this doesn't extend.			
	X		7	X		ElevatorSim_HasHitLowerLimit.vi			
	X			X		ElevatorSim_HasHitUpperLimit.vi			
	X		X			ElevatorSim_RKF45_Func.vi			
						ElevatorSim_New_NoNoise.vi			
						ElevatorSim_New_LinSys.vi			
						ElevatorSim_New_LinSys_NoNoise.vi			
	mplemented	Documented	Not WPILIB	Menu Item Execution Optimized	Ŧ	ହିଁ VI Name Function Prototype Notes	de Review	st Program	
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FLYWHEEL S	IM X		7	X		FlyWheelSim_GetAngularVelocityRadPerSec.vi			
	X			X		FlyWheelSim_New_MOI.vi			
	X		7	X		FlyWheelSim_SetInput.vi			
	X			X		FlyWheelSim_Update.vi			
	X)	X		FlyWheelSim_GetCurrentDrawAmps			
	X)	X		FlyWheelSim_GetAngularVelocityRPM.vi			
						FlyWheelSim_New_LinSys_NoNoise Future			
						FlyWheelSim_New_LinSys Future			
						FlyWheelSim_New_LinSys_MOI_NoNoise Future			
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	nplemented	ocumented	ot WPILIB	Secution Optimized	est Routine	ample Program	de Reı		
LINEAR CYCTEM C	Implemented	Documented	Not WPILIB	Menu Item Execution	Test Routine	ଞ୍ଚି VI Name Function Prototype Notes	_		
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LINEAR SYSTEM S	IM X X	Documented))	X X Menu Iter	Test Routine	Eg VI Name Function Prototype Notes LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi	de Reı	est Progr	
LINEAR SYSTEM S	IM X X X	Documented))	X X Menu Item Execution	Test Routine	Kg VI Name Function Prototype Notes LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New LinearSystemSim_New	de Reı	est Progr	
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LINEAR SYSTEM S	X X X X X	Documented))))	X X X Menu Item Execution	Test Routine	VI Name Function Prototype Notes LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New LinearSystemSim_SetInput_Single.vi LinearSystemSim_SetInput_Single.vi LinearSystemSim_Update.vi	de Reı	est Progr	
LINEAR SYSTEM S	X X X X X X)))) N	oy X X X Menu Item Execution	Test Routine	VI Name Function Prototype Notes LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New LinearSystemSim_SetInput_Single.vi LinearSystemSim_Update.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi	de Reı	est Progr	
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LINEAR SYSTEM S	M)))) N X N	Optimized State of the State of	Test Routi	VI Name Function Prototype Notes LinearSystemSim_GetOutput.vi LinearSystemSim_GetOutput_Single.vi LinearSystemSim_New LinearSystemSim_SetInput_Single.vi LinearSystemSim_Update.vi LinearSystemSim_UpdateX.vi LinearSystemSim_UpdateY.vi LinearSystemSim_New_NoNoise.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetInput_Array.vi LinearSystemSim_SetState.vi LinearSystemSim_SetState.vi LinearSystemSim_GetCurrentDrawAmps.vi DONT IMPLEMENT	de Reı	est Progr	
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XX

Matrix_SetRow.vi

S Sun i	mssme	j one vi) Auc	ded additional columns for test and sample.		
X	X	X		SngJntArmSim_GetAngleRads.vi		
X		X		SngJntArmSim_GetCurrentDraw.vi		
X		X		SngJntArmSim_GetVelocityRadsPerSec.vi		
X		X		SngJntArmSim_HasHitLowerLimit.vi		
X		X		SngJntArmSim_HasHitUpperLimit.vi		
X		X		SngJntArmSim_New.vi		
X				SngJntArmSim_Rkf45_Func.vi		
X	X	X		SngJntArmSim_SetInputVoltage.vi		
X		X		SngJntArmSim_Update.vi		
X		X		SngJntArmSim_UpdateX.vi		
X	X	X		SngJntArmSim_WouldHitLowerLimit.vi		
X		X		SngJntArmSim_WouldHitUpperLimit.vi		

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

### BULDER X X X Marity ElementSum vi Marity ElementSum vi								•				
Matrix X X Matrix Ma		Implemented	Documented	Menu Item	Execution Optimized	rest Routine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX	MAT BUILDER	RX		X								
Notes Note		X		X			MatBuilder_Create.vi					
X X X Matrix_Block.vi Block.vi Block.vi<					Execution Optim	rest Koutine Samble Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X X X Matrix_Create.vi X X X Matrix_ElementSum.vi X X X Matrix_ElementSum.vi X X X Matrix_ExtractColumnVector.vi X X X Matrix_ExtractColumnVector.vi X X X Matrix_ExtractGov.vi X X X Matrix_Extract	MATRIX			X								
X X X X Matrix_ElementSum.vi X X X Matrix_ExtractColumnVector.vi X X X X Matrix_ExtractColumnVector.vi X X X <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>Matrix_Block.vi</td><td></td><td></td><td></td><td></td><td></td></td<>							Matrix_Block.vi					
X X X Matrix_ElementSum.vi X X X X Matrix_Exp.vi X X X Matrix_ExtractColumnVector.vi Image: Matrix_ExtractFrom.vi X X X Matrix_ExtractRatrix.vi X X X Matrix_ExtractRowVector.vi X X X Matrix_Fill.vi X X X Matrix_Ident.vi X X X		X	X	\								
X X X Matrix_ExtractColumnVector.vi X X X X Matrix_ExtractFrom.vi X X X Matrix_ExtractMatrix.vi X X X Matrix_ExtractRowVector.vi X X X Matrix_Fill.vi X X X Matrix_Ident.vi				X								
X X X X Matrix_ExtractColumnVector.vi X X X X Matrix_ExtractFrom.vi X X X X Matrix_ExtractRowVector.vi X X X X Matrix_Fill.vi X X X Matrix_Interpretact Matrix_Interpretact				X			Matrix_Diag.vi					
X X X Matrix_ExtractFrom.vi X X Matrix_ExtractMatrix.vi		X	X	X			Matrix_Diag.vi Matrix_ElementSum.vi					
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X X X Matrix_ExtractRowVector.vi X X X X Matrix_Fill.vi X X X Matrix_Ident.vi Image: Control of the property of the		X X X	X X X	X X X X			Matrix_Diag.vi Matrix_ElementSum.vi Matrix_Exp.vi Matrix_ExtractColumnVector.vi					
X X		X X X	X X X	X X X X			Matrix_Diag.vi Matrix_ElementSum.vi Matrix_Exp.vi Matrix_ExtractColumnVector.vi Matrix_ExtractFrom.vi					
X X X X Matrix_Ident.vi X X X X Matrix_IsEqual.vi X X X Matrix_LltDecompose.vi X X X Matrix_Pow.vi X X X Matrix_SetColumn.vi		X X X X X	X X X	X X X X			Matrix_Diag.vi Matrix_ElementSum.vi Matrix_Exp.vi Matrix_ExtractColumnVector.vi Matrix_ExtractFrom.vi Matrix_ExtractMatrix.vi					
X X		X X X X X	X X X X	X X X X X			Matrix_Diag.vi Matrix_ElementSum.vi Matrix_Exp.vi Matrix_ExtractColumnVector.vi Matrix_ExtractFrom.vi Matrix_ExtractMatrix.vi Matrix_ExtractRowVector.vi					
X X X Matrix_LltDecompose.vi X X X Matrix_Pow.vi X X X Matrix_SetColumn.vi		X X X X X X	X X X X	X X X X X X			Matrix_Diag.vi Matrix_ElementSum.vi Matrix_Exp.vi Matrix_ExtractColumnVector.vi Matrix_ExtractFrom.vi Matrix_ExtractMatrix.vi Matrix_ExtractRowVector.vi Matrix_Fill.vi					
X X X Matrix_Pow.vi X X X X Matrix_SetColumn.vi		X X X X X X X	X X X X X	X			Matrix_Diag.vi Matrix_ElementSum.vi Matrix_Exp.vi Matrix_ExtractColumnVector.vi Matrix_ExtractFrom.vi Matrix_ExtractMatrix.vi Matrix_ExtractRowVector.vi Matrix_Fill.vi Matrix_Ident.vi					
X X X Matrix_SetColumn.vi		X X X X X X X X	X X X X X X	X			Matrix_Diag.vi Matrix_ElementSum.vi Matrix_Exp.vi Matrix_ExtractColumnVector.vi Matrix_ExtractFrom.vi Matrix_ExtractMatrix.vi Matrix_ExtractRowVector.vi Matrix_Fill.vi Matrix_Ident.vi Matrix_Ident.vi Matrix_ISEqual.vi					
		X X X X X X X X X	X X X X X X X	X			Matrix_Diag.vi Matrix_ElementSum.vi Matrix_Exp.vi Matrix_ExtractColumnVector.vi Matrix_ExtractFrom.vi Matrix_ExtractMatrix.vi Matrix_ExtractRowVector.vi Matrix_Fill.vi Matrix_Ident.vi Matrix_IsEqual.vi Matrix_LItDecompose.vi					
		X X X X X X X X X	X X X X X X X X X X	X			Matrix_Diag.vi Matrix_ElementSum.vi Matrix_Exp.vi Matrix_ExtractColumnVector.vi Matrix_ExtractFrom.vi Matrix_ExtractMatrix.vi Matrix_ExtractRowVector.vi Matrix_Fill.vi Matrix_Ident.vi Matrix_IsEqual.vi Matrix_LltDecompose.vi Matrix_Pow.vi					

THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT SHOULD BE INCLUDED HERE FOR ISOLATION.

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

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

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

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

	Implemented Documented	Not WPILIB	Menu Item	Execution Optimized	Sample Program emborer	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATH UTILITY	XX		Χ		MathUtil_AngleModulus.vi					
	XX		X		MathUtil_Clamp.vi					
	XX				MathUtil_ApplyDeadband.vi					
	XX		Χ		MathUtil_Clamp_Int.vi					

Revision 2.X 11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample. XX Χ MathUtil InputModulus.vi Vot WPILIB Menu Item VI Name **Function Prototype** Notes MERWE SCALED SIGMA POINTS X X MerweScSigPts_ComputeWeights.vi MerweScSigPts_GetNumSigmas.vi MerweScSigPts GetWc.vi MerweScSigPts GetWc Single.vi MerweScSigPts GetWm.vi MerweScSigPts_GetWm_Single.vi MerweScSigPts New.vi XX MerweScSigPts_New_Default.vi XX MerweScSigPts_SigmaPoints.vi Execution Optimized Sample Program Test Routine S Menu Item VI Name Function Prototype Notes NUMERICAL INTEGRATION X NumIntegrate_Func_Ax_Bu_K.vi X X NumIntegrate Func Bs.vi No No NumIntegrate_Func_Ch.vi Χ No NumIntegrate Func Ct.vi NumIntegrate_Rk4_Dbl.vi NOT DONE NumIntegrate_Rk4_K_Dbl.vi NOT DONE X X X Χ NumIntegrate Rk4 Mat X.vi X NumIntegrate Rk4 Mat X U.vi NumIntegrate Rkf45.vi Χ No NumIntegrate Rkf45Impl.vi Χ Χ NumIntegrate_Trap_Dbl.vi Χ Χ NumIntegrate Trap Mat.vi Sample Program Code Review Test Routine Vot WPILIB Menu Item VI Name **Function Prototype** Notes NUMERICAL JACOBIAN X X NumJacobian X.vi There are others that may need implemented. Χ NumJacobian U.vi

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	· VI Name	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	X		X		X		Riccati_DARE.vi					
	X			X		X		Riccati_DARE_Iterate.vi					
	X	X						Riccati_DARE_N.vi					
	X			Χ				Riccati_Input_Check.vi					

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

	Implemented	Documented	Not WPILIB	tem	ion Optimi.	Test Routine	Program			
	plen	unoc	t W	Menu Item	Execution	st R	ımple			
_		ŭ					လိ	VI Name	Function Prototype	Notes
TypeDef	Ζ		Χ	X	N/A			ARM_FF.CTL		
	١		Χ	Χ	N/A			BICon-Matrix_FUNC_TYPE.CTL		
L	Ζ		Χ		N/A			CALLBACK_FUNC_TYPE.CTL		
_	Ζ	Χ			N/A			CHASSIS_SPEEDS.CTL		
L	Ζ	Χ	Χ		N/A			CONTRAINED_STATE.CTL		
L	Ζ		Χ		N/A			DCMOTOR.CTL		
L	Ζ	Χ	Χ	Χ	N/A			DIFF_DRIVE_KINEMATICS.CTL		
L	Ζ		Χ		N/A			DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl		
L	Ζ		Χ		N/A			DiFF_DRIVE_POSE_EST.ctl		
L	Ζ		Χ		N/A			DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl		
	Ζ		Χ		N/A			DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl		
L	Ζ		Χ		N/A			DIFF_DRIVE_TRAIN_SIM.ctl		
L	Ζ		Χ		N/A			ELEVATOR_SIM.CTL		
L	Ζ		Χ		N/A			ELEV_FF.CTL		
	Ζ		X		N/A			EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL		
	Ζ		X		N/A			ExTENDED_KALMAN_FILTER.CTL		
	Ζ		Χ		N/A			FLYWHEEL_SIM.ctl		
	Ζ		X	Χ	N/A			HOLONOMIC_DRV_CTRL.CTL		New 1/26/21
	Ζ		X		N/A			KALMAN_FILTER.ctl		
	1		X		N/A			KALMAN_FILTER_LATENCY_COMP.CTL		
	Ζ	X	X		N/A			LINEAR_FILTER.CTL		
	Ζ		Χ		N/A			LINEAR_PLANT_INV_FF.ctl		
	Ζ		Χ	Χ	N/A			LINEAR_QUADRATIC_REGULATOR.ctl		
	Ζ		X	X	N/A			LINEAR_SYSTEM_LOOP.ctl		
	Ζ		X	X	N/A			LINEAR_SYSTEM_SIM.ctl		
	Ζ		X	X	N/A			LINEAR_SYSTEM.ctl		
	Ζ	Χ	X		N/A			MECA_DRIVE_KINEMATICS.CTL		
	Ζ	X	X	Χ	N/A			MECA DRIVE ODOMETRY.CTL		
	Ζ	Χ	X	Χ	N/A			MECA WHEEL SPEEDS.CTL		
	Ζ		Χ		N/A			MEDIAN FILTER.CTL		
	Ζ		Χ		N/A			MERWE SCALED SIGMA PTS.ctl		
	Ζ		Χ		N/A			OBSERVER SNAPSHOT.CTL		
	Ζ		Χ		N/A			OBSERVER SNAP LIST ITEM.CTL		
	Ζ	Χ	Χ	Χ	N/A			PARAM STACK ITEM.CTL		
	Ζ	Χ	Χ	Χ	N/A			PARAM STACK.CTL		
	Ζ		Χ		N/A			PID ADV LIMITS.CTL		
	Ζ		Х		N/A			PID ADV TUNING.CTL		
	Ζ				N/A			PID_CONTROLLER.CTL		

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still mi	ssing	one \	VI)) Adde	d additional columns for test and sample.	
Z		Χ	X	N/A	PID_ERROR_TOLERANCE.CTL	
Z		Χ	X	N/A	PID_INPUT_LIMITS.CTL	
Z		Χ	X	N/A	PID TUNING.CTL	
Ζ	Χ	Χ	X	N/A	POSE2D.CTL	
Z	X	Χ	Х	N/A	POSEwCURVATURE.CTL	
Z		Χ	X	N/A	PROFILED PID CONTROLLER.CTL	
Z	Χ	Χ	X	N/A	RAMSETE.CTL	
Z	X	Х	X	N/A	ROTATION2D.CTL	
Z		Χ	X	N/A	SINGLE JOINT ARM SIM.CTL	
Z	Χ	Χ	X	N/A	SIMPLE MOTOR FF.CTL	
Z		Χ	Х	N/A	SLEW RATE LIMITER.CTL	
Z	Χ	Χ	Х	N/A	SPLINE CTRL VECTOR.CTL	
Z	X	Χ	Х	N/A	SPLINE.CTL	
Z	X	Χ	Х	N/A	SWERVE_DRIVE_KINEMATICS.CTL	
Z	X	X	X	N/A	SWERVE DRIVE MODULE STATE.CTL	
Z	X	X	X	N/A	SWERVE DRIVE ODOMETRY.CTL	
Z		X	X	N/A	TIMER.CTL	
Z	Х	X	X	N/A	TRAJ CONFIG.CTL	
Z	X	X	X	N/A	TRAJ CONSTRAINT CENTRIPETAL ACCEL.CTL	
Z	X	X	X	N/A	TRAJ CONSTRAINT DIFF DRIVE KINEMATICS.CTL	
Z	X	X	X	N/A	TRAJ_CONSTRAINT_DIFF_DRIVE_VOLTAGE.CTL	
_		X	- / (N/A	TRAJ CONSTRAINT JERK.CTL	Routine exists, it is just a shell
Z	Х		Х	N/A	TRAJ CONSTRAINT MECA DRIVE KINEMATICS.CTL	roduire exists, it is just a sileli
Z	X	Χ	X	N/A N/A	TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL	routine exists, it is just a sitell
Z	Χ	X	Χ	N/A	TRAJ_CONSTRAINT_MINMAX.CTL	roduire exists, it is just a sitell
Z	X X	X X X	X	N/A N/A	TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	roduire exists, it is just a sitell
Z Z Z	X X X	X X X	X X X	N/A N/A N/A	TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL	roduire exists, it is just a sitell
Z Z Z Z Z	X X X X	X X X X	X X X X	N/A N/A N/A N/A	TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJECTORY.CTL	roduire exists, it is just a silen
Z	X X X X	X X X X X	X X X X	N/A N/A N/A N/A N/A	TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL TRAJ_STATE.CTL TRAJECTORY.CTL TRANSFORM2D.CTL	roduire exists, it is just a sitell
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