Revision 2.X 3\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
CTL Totals
VI Total
CTL Total
VI Shell Total
VI Shell Total
CTRL Shell Total
3

Doc completed Pct 51.25%
Optimization Pct 31.81%

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 X X X X X 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	IS Execution Optimized	Test Routine		VI Name LinearFilter_Calculate.vi LinearFilter_CutoffFrequency.vi LinearFilter_Execute.vi LinearFilter_HighPass.vi LinearFilter_HighPassBW1.vi LinearFilter_HighPassBW2.vi LinearFilter_LowPassBW1.vi LinearFilter_LowPassBW2.vi LinearFilter_LowPassBW2.vi LinearFilter_NowIngAverage.vi LinearFilter_Reset.vi LinearFilter_ResetToValue.vi LinearFilter_ResetToValue.vi	Function Prototype	Notes Labview style helper
	Χ	X		X	Χ			LinearFilter_SinglePoleIIR.vi		
	Χ	Χ	Χ	X	Χ			LinearFilter_TimeConst.vi		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Protetyne	Notes
						F			Function Prototype	Notes
MEDIAN FILTER		X		X	X			MedianFilter_Calculate.vi		
	Χ	Χ	X					MedianFilter_Execute.vi		Labview style helper
	Χ	X		X	SI		_	MedianFilter_New.vi		
	Χ	Χ		X	SI			MedianFilter_Reset.vi		
	Χ	Χ	Χ	X	SI			MedianFilter_ResetToValue.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Sample Program	VI Name	Function Prototype	Notes
SLEW RATE FILTER	X	Χ		X				SlewRateLimiter_Calculate.vi		
	X	X	X	X				SlewRateLimiter_Close.vi		
	X	Χ	X	X				SlewRateLimiter_Execute.vi		Labview style helper
	X	Χ	X	X	SI			SlewRateLimiter_GetRate.vi		
	X	Χ		X				SlewRateLimiter_New.vi		
	X	Χ		X				SlewRateLimiter_NewInitialZero.vi		
	X	X		Χ				SlewRateLimiter_Reset.vi		
	Χ	Χ		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	X	X				Timer_Close.vi		releases semaphore
	Χ	X		X				Timer_Get.vi		·
	Χ	X	X	X				Timer_GetAndReset.vi		
	Χ	X	X	No				Timer_GetInternal.vi		Internal (private) only
	Χ	X		X				Timer_HasPeriodPassed.vi		
	Χ	X	X	X				Timer_HasPeriodPassedOnce.vi		
	Χ	X		X				Timer_New.vi		
	Χ	X		X				Timer_Reset.vi		
	Χ	X	X	No				Timer_ResetInternal		Internal (private) only
	Χ	X		X				Timer_Start.vi		
	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 Optimize	Test Routine	Sogram Name ArmFF Calculate.vi	Function Prototype	Notes
AKWIFF									
	Χ	Χ		Χ			ArmFF_CalculateVelocityOnly.vi		
			Χ				ArmFF_Execute.vi		LabVIEW style single call
			Χ				ArmFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	Χ	X		Χ			ArmFF_MaxAchieveAccel.vi		
	Χ	Χ		Χ			ArmFF_MaxAchieveVelocity.vi		
	Χ	Χ		Χ			ArmFF_MinAchieveAccel.vi		
	Χ	X		Χ			ArmFF_MinAchieveVelocity.vi		
	Χ	Χ		Χ			ArmFF_New.vi		
	Χ	X		Χ			ArmFF_New_ZeroGravity.vi		

- VI Implementation on the list of the lis			ng one	e VI	.) Ad	ueu auc	ilional columns for test and sample.		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program		Function Prototype	Notes
CONTROLLER UTII			<	X	Ш	<u> </u>	ControllerUtil_GetModulusError.vi	Tunction Prototype	This was short lived in WPILIB, b
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	VI Name	Function Prototype	Notes
ELEV FI		X		<u> </u>	-		ElevFF_Calculate.vi	T undidit i fototype	Notes
	X	X		X			ElevFF CalculateVelocityOnly.vi		
			Χ				ElevFF_Execute.vi		LabVIEW style single call
			Χ				ElevFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	X	X		Χ			ElevFF_MaxAchieveAccel.vi		
	X	X		Χ			ElevFF_MaxAchieveVelocity.vi		
	X	X		X			ElevFF_MinAchieveAccel.vi		
	X	X		X			ElevFF_MinAchieveVelocity.vi ElevFF New.vi		
	X	X		X					
	lemented		: WPILIB		scution Optimized	st Routine	ElevFF_New_ZeroAccel.vi		
HOL_DRV_CTRI	X X X	Documented	X X Not WPILIB	X X Menu Item	Execution Optimized	Test Routine Samule Program	VI Name HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_Execute.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_New.vi HolDrvCtrl_SetEnabled.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
HOL_DRV_CTRI	X X X		X	X X Menu Item	Execution Optimized	Test Routine	VI Name HolDrvCtrl_AtReference.vi HolDrvCtrl_Calculate.vi HolDrvCtrl_Calculate_Trajectory.vi HolDrvCtrl_Execute.vi HolDrvCtrl_Execute.vi HolDrvCtrl_Execute_Trajectory.vi HolDrvCtrl_New.vi	Function Prototype	Added 1/26/21 Added 1/26/21 Added 1/26/21 Future Future Added 1/26/21
	Implemented X X X X	Documented	Not WPILIB	Menu Item X X X Menu Item	Execution Optimized	Test Routine Samule Program	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 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_CTRI	X X X X X X X X X X X X X X X X X X X	X Documented	X X X	X X X X X X X X X X X X X X X X X X X		trine Test Ro	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		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
	X X X X X X X X X X X X X X X X X X X	X X Documented	Not WPILIB	X X X X X X X X X X X X X X X X X X X		trine Test Ro	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 VI Name PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.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 Documented	X X X X X X	X X X X X X X X X X X X X X X X X X X		trine Test Ro	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 VI Name PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.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 Notes Advanced PID Advanced PID Labview style helper. Advanced
	X X X X X X X X X X X X X X X X X X X	X X X Documented	X X X X X X	X X X X X X X X X X X X X X X X X X X		trine Test Ro	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 VI Name PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.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 Notes Advanced PID Advanced PID Labview style helper. Advanced
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X	X X X X X X X X X X X X X X X X X X X		trine Test Ro	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 VI Name PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_Sp_PV.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
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X	X X X X X X X X X X X X X X X X X X X		trine Test Ro	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 VI Name PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_Sp_PV.vi PIDController_Calculate_Sp_PV.vi PIDController_Calculate_DisableContinousInput.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
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X	X X X X X X X X X X X X X X X X X X X		trine Test Ro	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 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 PIDController_EnableContinousInput.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 Labview style helper. Advanced PID
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X X X X X	X X X X X X X X X X X X X X X X X X X		trine Test Ro	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 VI Name PIDController_AdvCalculate_FF_Sp_Pv.vi PIDController_AdvExecute.vi PIDController_AdvExecute.vi PIDController_AtSetpoint.vi PIDController_Calculate_PV.vi PIDController_Calculate_Sp_PV.vi PIDController_Calculate_Sp_PV.vi PIDController_Calculate_DisableContinousInput.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 PID Advanced PID Labview style helper. Advanced

t is stiii	missir	ig one	e vi) AC	ded additional columns for test and sample.	
X	X		X		PIDController_GetPID.vi	
X	X		X		PIDController_GetPositionError.vi	
X	X		X		PIDController_GetSetpoint.vi	
X	X		X		PIDController_GetVelocityError.vi	
X			X		PIDController_IsContinuousEnabled.vi	
X	X		X		PIDController_New.vi	
X	X		X		PIDController_NewPeriod.vi	
X		Χ	X	SI	PIDController_Pack_AdvLimits.vi	
X		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	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.vi	Advanced PID, Obsolete – DELETE
X	X	X	No		PIDController_SetFFGain.vi	Advanced PID, Obsolete – DELETE
X	X		X		PIDController_Setl.vi	
					PIDController_SetInputRange.vi	OBSOLETE – Removed
X	X		X		PIDController_SetIntegratorRange.vi	
X	X	X	X		PIDController_SetOutputLimits.vi	Advanced PID
X	X		X		PIDController_SetP.vi	
X	X	X	X		PIDController_SetPeriod.vi	
X	X		X		PIDController_SetPID.vi	
X	X	X	Χ		PIDController_SetPIDF.vi	Advanced PID
X	X		X		PIDController_SetSetpoint.vi	
X	X		X		PIDController_SetTolerance.vi	
X	Χ		Χ		PIDController_SetTolerancePandV.vi	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name Function Prototype	Notes
PROFILED PID CONTROLLER	X	X		X				ProfiledPIDController_AtGoal.vi	
	X	Χ		X				ProfiledPIDController_AtSetpoint.vi	
	X	X		Χ				ProfiledPIDController_Calculate_Meas.vi	
	X	X		Χ				ProfiledPIDController_Calculate_Meas_Goal.vi	
	X	Χ		Χ				ProfiledPIDController_Calculate_Meas_StateGoal.vi	
	X	Χ		Χ				ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi	
	X	Χ		Χ				ProfiledPIDController_DisableContInput.vi	
	X	Χ		Χ				ProfiledPIDController_EnableContInput.vi	
	X	Χ		X				ProfiledPIDController_GetGoal.vi	
	X	Χ		X				ProfiledPIDController_GetPeriod.vi	
	X	Χ	X	X				ProfiledPIDController_GetPID.vi	WPILIB has separate getters.
	X	Χ		X				ProfiledPIDController_GetPositionError.vi	
	Χ	X		X				ProfiledPIDController_GetSetpoint.vi	
	X	X		X				ProfiledPIDController_GetVelocityError.vi	
	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_SetConstraints.vi	
	X	X		X				ProfiledPIDController_SetGoal.vi	
	X	X		X				ProfiledPIDController_SetGoal_PosOnly.vi	
	X	X		X				ProfiledPIDController_SetIntegratorRange.vi ProfiledPIDController SetPID.vi	
	X	X		X				ProfiledPIDController SetTolerance PosOnly.vi	
	X	X		X				ProfiledPIDController SetTolerance PosOnly.vi	
		_ X		<u> </u>				FloilledFlDColliollet_SetTolerafice_Posvet.vi	

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	VI Name	Function Prototype	Notes
SIMPLE MOTOR FEEDFORWARD		Χ		X	SI		SimpleMotorFF_New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)	
							· _		
								public SimpleMotorFeedforward(double ks, double kv)	
	X	X		X	SI		SimpleMotorFF_Calculate.vi	public double calculate(double velocity, double acceleration)	
	X	Χ		X	SI		SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)	
			Χ				SimpleMotorFF Execute.vi		LabVIEW style single call
			Χ				SimpleMotorFF ExecuteVelocityOnly.vi		LabVIEW style single call
	X	X		Х	X		SimpleMotorFF_MaxAchieveVel.vi	public double maxAchievableVelocity(double maxVoltage, double acceleration)	
	X	X		X	X		SimpleMotorFF_MinAchieveVel.vi	public double minAchievableVelocity(double maxVoltage, double acceleration)	
	X	X		X	X		SimpleMotorFF_MaxAchieveAccel.vi	public double maxAchievableAcceleration(double maxVoltage, double velocity)	
	X	X		X	X		SimpleMotorFF_MinAchieveAccel.vi	public double minAchievableAcceleration(double maxVoltage, double velocity)	

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

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

Revision 2.X 3\11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample.

XX X SI Pose Equals.VI boolean equals(other obj ecution Optimized ple Progi est Routine Jenu Item VI Name Function Prototype Notes ROTATION rotation2d new() can use cluster constant XX X SI Rotation CreateAngle.vi rotation2d new(double value) XX X SI Rotation CreateXY.vi rotation2d new(double x, double y) X SI XX Rotation CreateAngleDegrees.vi rotation2d fromDegrees(double degrees) convert to radians then create XX X SI Rotation Plus.vi rotation2d plus(rotation2d other) XX X SI Rotation Minus.vi rotation2d minus(rotation2d other) XX X SI Rotation UnaryMinus.vi rotation2d unaryminus() XX X SI Rotation Times.vi rotation2d times(double scalar) XX X SI Rotation RotateBy.vi rotation2d rotateby(rotation2d other) X X SI Rotation GetAngleCosSin.vi New 1/26/21 X SI XX Rotation GetRadians.VI double getRadians() use cluster unpack XX X SI use cluster unpack, then convert to double getDegrees() degree XX Rotation GetCos.VI use cluster unpack X SI double getCos() XX X SI Rotation GetSin.VI use cluster unpack double getSin() XX X SI Rotation GetTan.VI double getTan() can calculate XX X SI Rotation Equals.vi boolean equals(rotation2d other) Execution Optimized iple Program Not WPILIB Menu Item Function Prototype Notes TRANSFORM X X X SI Transform Create PosePose.vi transform2d new(pose2d, pose2d) XX X SI Transform Create TransRot.vi transform2d new(translation2d, rotation2d) transform2d new() can use cluster constant X X Transform Times.vi X SI transform2d times(double scalar) X SI $X \mid X$ Transform GetTranslation.VI translation2d getTranslation() use cluster unpack X SI $X \mid X$ Transform GetRotation.VI rotation2d getRotation() use cluster unpack X X SI Transform GetXY.vi X X SI Transform GetXYAngle.vi X SI XX Transform Inverse.vi transform inverse() new XX X SI boolean equals(other transform2d) Transform Equals.VI cecution Optimized iple Progi WPILIB lenu Item VI Name Function Prototype Notes TRANSLATION can use cluster constant translation2d new() X X X SI Translation Create.vi translation2d new(double x, double y) Χ X SI Translation Create DistAng.vi X SI XX Translation GetDistance.vi double getDistance(translation2d other) XX X SI Translation GetX.VI double getX() can use cluster unpack X SI XX Translation GetY.VI double getY() can use cluster unpack X X X X SI Translation GetXY.VI can use cluster unpack XX X SI Translation GetNorm.VI double getNorm() translation2d rotateBy(rotation2d other) XX X SI Translation RotateBy.vi XX X SI Translation Plus.vi translation2d plus(translation2d other) XX X SI Translation Minus.vi translation2d minus(translation2d other)

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 3\11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample. translation2d unaryminus() $X \mid X$ X SI Translation UnaryMinus.vi X SI $X \mid X$ Translation Times.vi translation2d times(double scalar) translation2d div(double scalar) can multiply by 1/scalar Translation Equals.vi X SI boolean equals(translation other) ple Progra Menu Item VI Name **Function Prototype** Notes Twist Create.vi TWIST X X Χ SI twist new(x, y, theta) X SI Twist Equals.VI XX boolean equals(obj other) X X X X SI Twist GetAll.VI '======== KINEMATICS '======== ple Progr **Function Prototype** Notes **CHASSIS SPEEDS** chassisspeeds new () can use cluster constant X X X SI ChassisSpeeds New.vi chassisspeeds new (double xvel, double yvel, double angvel) $X \mid X$ Χ SI ChassisSpeeds FromFieldRelativeSpeeds.VI chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) **Function Prototype** Notes DIFFERENTIAL DRIVE KINEMATICS X X DiffKinematics New.vi diffDriveKine new(double trackWidth) X DiffKinematics toChassisSpeed.vi chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) $X \mid X$ XX X SI DiffKinematics toWheelSpeed.vi diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds) nple Progr VI Name **Function Prototype** Notes **DIFFERENTIAL DRIVE ODOMETRY** diffDrOdom new(rotation gyro, pose initial) diffDrOdom new(rotation gyro) void resetPosition(pose2d, rotation2d) incorporated into "update" pose2d getPoseMeters() X X XX DiffOdometry_Update.vi pose2d update(rotation2d gyro, double leftdist, double right dist) Incorporates enhanced reset Execution Optimized

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

Function Prototype

Notes

Page 7 / 28

Sample Progr est Routine

Documented Not WPILIB

Menu Item

3\11/12/2021 – State Space Items – (This list is		11115511	Ig one	₹ VI) Add	ed add	illional columns for test and sample.	1:#D.4ML101- ()	
DIFFERENTIAL DRIVE WHEEL SPEEDS						_		diffDrWheelSpeeds new()	
	V	V		V	V		DiffM/haal Nawsalizavi	diffDrWheelSpeeds new(double leftVel, double rightVel)	
	_ X_	Χ		Χ	X		DiffWheel_Normalize.vi	void normalize(double maxVel)	
					Execution Optimized	rest Koutine Sample Program			
	ted	,eq	9	_	õ.	e g			
	Implementea	Documentec	Not WPILIB	Menu Item	ion	rest Koutine Sample Proc			
	len	Ж	Š	וחנ	i ct	Ý 2			
	du,	9	Vot	Mei	Щ I	ses Sar	VI Name	Function Prototype	Notes
MECANUM DRIVE KINEMATICS				X	1		MecaKinematics_New.vi	7.	
	X	X		Χ			MecaKinematics_SetInverseKinematics.vi		
	X	X		Χ			MecaKinematics_ToChassisSpeeds.vi		
	X			X	X		MecaKinematics_ToWheelSpeeds.vi		
	X	X		Χ	X		MecaKinematics_ToWheelSpeedsZeroCenter.vi		
					g				
					nize	5	:		
	~	_			Optimized	, ž			
	ıtec	ıtec	.IB	£	0 ;	rest Koutine Sample Program			
	Implementec	Documente	Not WPILIB	Menu Item	Execution	400			
	nel a	cur	ž	nu	noe.	Str			
			_ 8	Me	Ĭ Ŭ	S G	VI Name	Function Prototype	Notes
MECANUM DRIVE MOTOR VOLTAGE									
noth	ning c	done							
	Þé	g			ptimized	ກ ເ			
	Implementec	Documentec	Not WPILIB	Menu Item	Execution Op	i est Koutine Sample Program	VI Name	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X	X	Not WPILIB	Χ	Execution C	Samule Pro	MecaOdometry_New.vi	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X	X	Not WPILIB	X	Execution C	Sample Pro	MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X X	X X X	Not WPILIB	X X X	Execution C	Sample Pm	MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X X X	X X X		X X X	Execution O	l est Kouting	MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X X X	X X X		X X X X	Execution C	l est Kouting	MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X X	X X X		X X X	Execution C	Sample Pro	MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X X X	X X X		X X X X X		l est Koutin	MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X X X	X X X		X X X X X			MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X X X X X	X X X X X		X X X X X	otimized		MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X X X X X	X X X X X		X X X X X	Optimized		MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X X X X X	X X X X X		X X X X X	Optimized		MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X X X X X	X X X X X		X X X X X	Optimized		MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi		Notes
	X	X X X X X		X X X X X X X	Execution Optimized	Sample Program Sample Program	MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi	Function Prototype	Notes
MECANUM DRIVE ODOMETRY	X	X X X X X		X X X X X X X	Optimized		MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double	Notes
	X X X X X X X X X X X X X X X X X X X	X X X X X		X X X X X X X X X X X X X X X X X X X	2) Execution Optimized		MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi VI Name MecaWheel_New.Vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double	Notes
	X	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		MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes
	X X X X X X X X X X X X X X X X X X X	X X X X X		X X X X X X X X X X X X X X X X X X X	2) Execution Optimized		MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi VI Name MecaWheel_New.Vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double	Notes
	X X X X X X X X X X X X X X X X X X X	X X X X X		X X X X X X X X X X X X X X X X X X X	S Execution Optimized		MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi VI Name MecaWheel_New.Vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes
	X X X X X X X X X X X X X X X X X X X	X X X X X		X X X X X X X X X X X X X X X X X X X	S Execution Optimized	Sample Program	MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi VI Name MecaWheel_New.Vi MecaWheel_Normalize.vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes
	X X 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	S Execution Optimized	Sample Program	MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi VI Name MecaWheel_New.Vi MecaWheel_Normalize.vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes
	X X 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	S Execution Optimized	Sample Program	MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi VI Name MecaWheel_New.Vi MecaWheel_Normalize.vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes
	X X X 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	S Execution Optimized	Sample Program	MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi VI Name MecaWheel_New.Vi MecaWheel_Normalize.vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes
	X X X X X X X X X X X X X X X X X X X	X X X X X		X X X X X X X X X X X X X X X X X X X	otimized X & Execution Optimized		MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi MecaOdometry_GetPose.vi MecaOdometry_Reset.VI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi VI Name MecaWheel_New.Vi MecaWheel_Normalize.vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes

Rotation2d gyroAngle, SwerveModuleState moduleStates) array and "4" calls) X X X X X SwerveOdometry_UpdateWithTimeX.VI X X X X X SwerveOdometry_UpdateWithTime4.VI SwerveOdometry_UpdateWithTime4.VI For 4 module drives	RC LabVIEW Trajectory Library – VI Implementation			ina or	NO 1/I	\	lod or	ddition	al columns for test and comple		
### Part of the Process ### A			111155	arig or	ie vi) Add	ieu au	duitioi	ial columns for test and sample.	public SwerveDriveKinematics(Translation2d wheelsMeters)	variable parameters (replace with
SMERVE DRIVE DOUMETRY X X X X SeveroCharmers, Technologic States Y SeveroCharmers, Technologic States Y SeveroCharmers, Technologic States Y SeveroCharmers, Technologic States X X X X X X X X X X SeveroCharmers, Technologic States X										ļ,	
SWERVE DRIVE ODOMETRY X X X X X S Sear-Accordancy (Appendix of the Sear-Accordancy of the Sear-Accordance of the Sear-Accordancy of the Sear-Accordance of the Sear-Accordance of the Sear-Accordancy of the Sear-Accordance of the S		X	X	X	X						uses array as input
SWERVE DRIVE COOMERY X X X X X X X X X X X X X X X X X X X				X	X						For 4 module drives
O'CoverveInduction(Chinesis Capendo Charles Speech									-	toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters)	
SWERVE DRIVE DODULE STATE X		X	X		X			S	werveKinematics_ToSwerveModuleStatesZeroCenter.VI	toSwerveModuleStates(ChassisSpeeds chassisSpeeds)	
SWERVE DRIVE MODULE STATE X X X X X X X X X X X X X X X X X X X											
SWERVE DRIVE MODULE STATE X X X X X X X X X X X X X X X X X X X		Х	X	X	Х			S	verveKinematics ToChassisSpeedsX.VI	Wilderstates	
SWERVE DRIVE ODOMETRY X		X	X	X	X						
SWERVE DRIVE DOOMERY X X X X X SevereOctometry, New VI public SevereOptiveColometry (SwerveOptiveColometry (Swerve		X		X	X			S	werveKinematics_NormalizeWheelSpeeds.vi	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)	
SwerveOdomety NewZeroCenter VI public SwervePodomety Commits (SwerveObomety Commits SwerveObomety Commits SwerveObomety Commits (SwerveObomety Commits SwerveObomety Commits (SwerveObomety Commits (SwerveObomety Commits Com	SWEDVE DRIVE ODOMETRY	_	_ 7			Execution Optimized	st Ro	Sample <			Notes
SwerveOdometry_ResetPosition VI public Pose2d pose, Rotation2d groAngle) public Pose2d pose, Rotation2d groAngle) public Pose2d petPoseModers y public Pose2d petPoseModers y public Pose2d public Pos	SWERVE DRIVE ODOME IR									Rotation2d gyroAngle, Pose2d initialPose) public SwerveDriveOdometry(SwerveDriveKinematics kinematics,	
public Pose2d update(With Time(counte currentTimeSeconds, Rotation2d growAngle, SwerveModuleStates). X										public void resetPosition(Pose2d pose, Rotation2d gyroAngle)	
SWERVE DRIVE MODULE STATE X			X	X	X					public Pose2d updateWithTime(double currentTimeSeconds,	
SwerveModuleStatemoduleStates) X		X	X	X	X			S	verveOdometry_UpdateWithTime4.VI		For 4 module drives
SWERVE DRIVE MODULE STATE Page										public Pose2d update(Rotation2d gyroAngle, SwerveModuleState moduleStates)	variable parameters (replace with array and "4" calls)
SWERVE DRIVE MODULE STATE Page P		X	X	X	X			S	werveOdometry_UpdateX.VI	·	
SWERVE DRIVE MODULE STATE X X X X S		X	X	X	X			S	werveOdometry_Update4.VI		For 4 module drives
PLINE Part		E X	X		X	SI SI	Test Routine	Sample (c)	werveModuleState_New.vi werveModuleState_CompareTo.vi	public SwerveModuleState(double speedMetersPerSecond, Rotation2d angle) public int compareTo(SwerveModuleState o) public SwerveModuleState optimize(SwerveModuleState desired,	
CUBIC HERMITE SPLINE X X X X X CubicHermiteSpline_New.vi public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yFinalControlVector, double[] yFinalControlVector) protected SimpleMatrix getCoefficients() not needed, use cluster unpack	PLINE										
protected SimpleMatrix getCoefficients() not needed, use cluster unpack	CUBIC HERMITE SPLINI	_=				Execution Optimized	Test Routine	Sample <		public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[]	Notes
							_	+		protected SimpleMatrix getCoefficients()	not needed, use cluster unpack
		V	V		\ \ \	 			IhicHermiteSpline makeHermiteBasis vi		not necucu, use olusier unpack

Revision 2.X 3\11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample. CubicHermiteSpline getControlVectorFromArrays.vi private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) Execution Optimized Test Routine Vot WPILIB Menu Item VI Name Function Prototype Notes POSE WITH CURVATURE X public PoseWithCurvature(Pose2d poseMeters, double PoseWithCurve New.vi curvatureRadPerMeter) public PoseWithCurvature() can use cluster constant public Pose2d poseMeters not needed, use cluster unpack public double curvatureRadPerMeter. not needed, use cluster unpack Execution Optimized nple Progi Not WPILIB Menu Item VI Name **Function Prototype** Notes QUINTIC HERMITE SPLINE X X QuinticHermiteSpline New.vi public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) protected SimpleMatrix getCoefficients() not needed, use cluster unpack X Χ QuinticHermiteSpline makeHermiteBasis.vi private SimpleMatrix makeHermiteBasis() private SimpleMatrix getControlVectorFromArrays(double[] Χ Χ QuinticHermiteSpline getControlVectorFromArrays.vi initialVector, double[] finalVector) cution Optimized Program Function Prototype VI Name Notes **SPLINE (Abstract class)** Spline(int degree) Spline getPoint.vi public PoseWithCurvature getPoint(double t) $X \mid X \mid$ | X | public static class ControlVector public ControlVector(double[] x, double[] y) implemented as data structure Sample Program Execution Optin **Test Routine** Not WPILIB **Menu Item** VI Name Function Prototype Notes public static Spline.ControlVector[] SPLINE HELPER X SplineHelp GetCubicCtrlVectorsFromWayPts.vi X getCubicControlVectorsFromWaypoints(Pose2d start, Translation2d[] interiorWaypoints, Pose2d end) Χ $X \mid X$ SplineHelp GetCubicCtrlVectorsFromWeightedWayPts.vi SplineHelp GetQuinticCtrlVectorsFromWayPts.vi public static List<Spline.ControlVector> $X \mid X$ X getQuinticControlVectorsFromWaypoints(List<Pose2d> waypoints) SplineHelp GetQuinticCtrlVectorsFromWeightedWayPts.vi XX XX SplineHelp getCubicSplinesFromControlVectors.vi Χ public static CubicHermiteSpline[] getCubicSplinesFromControlVectors(Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end) X X X No SplineHelp GetCubicSpline Calc1.vi internal X X X No SplineHelp GetCubicSpline Calc2.vi internal X X X No SplineHelp GetCubicSpline Calc3.vi internal

FRC LabVIEW Trajectory Library - VI Implementation	า Lis	t							
Revision 2.X 3\11/12/2021 - State Space Items - (This list is			ng one) Adde				
	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[] c, double[] d, double[] solutionVector)	internal
	Χ	X		X	SI		SplineHelp_GetCubicCtrlVector.vi	private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point)	
	Χ	X		X	SI		SplineHelp_GetQuinticCtrlVector.vi	private static Spline.ControlVector getQuinticControlVector(double scalar, Pose2d point)	
SPLINE PARAMETERIZER	X X X	Χ	Not WPILIB	X X No	Execution Optimized Test Routine		VI Name SplineParam_Spline.vi SplineParam_Spline_T0_T1.vi SplineParam_StackGet.vi SplineParam_StackPop.vi SplineParam_StackPush.vi	Function Prototype public static List <posewithcurvature> parameterize(Spline spline) public static List<posewithcurvature> parameterize(Spline spline, double t0, double t1)</posewithcurvature></posewithcurvature>	
'======= TRAJECTORY '=========									
TRAJECTORY	× Implemented	X Documented	Not WPILIB		© Execution Optimize		VI Name Trajectory_New.vi	Function Prototype public Trajectory(final List <state> states)</state>	Notes
MACESTON	$\frac{\lambda}{X}$				SI		Trajectory New Empty.vi	public Trajectory(ilital Elst-Otator states)	
								public Pose2d getInitialPose()	can use cluster unpack, array index
		<u> </u>							not needed, use unpack
		1						public List <state> getStates()</state>	not needed, use unpack
	X	X	X	X			Trajectory_Sample.vi Trajectory_SampleReverse.vi	public State sample(double timeSeconds)	Sample in reverse order. Negate sample.
	Χ			Χ			Trajectory_TransformBy.vi	public Trajectory transformBy(Transform2d transform)	
	X	Χ	LΤ	Χ			Trajectory_RelativeTo.vi	public Trajectory relativeTo(Pose2d pose)	
	X		\vdash	X	- C/		Trainatemy laws devible ::	boolean equals(other obj)	FUTURE
	Χ			No			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
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized Test Routine	Sample Program	VI Name		Notes
TRAJECTORY_STATE	X	X		X	SI		TrajectoryState_New.vi	public State() public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter)	
	X	Χ	\prod	X			TrajectoryState_Interpolate.vi	State interpolate(State endValue, double i)	FUTURE
	Χ			X				boolean equals(other obj)	FUTURE

					Ø			
					Execution Optimizea			
	pə	pə	В		Opt	ue u	VI Name Function Prototy	
	Implementea	Documented	Not WPILIB	Menu Item	ion	Test Routine		
	olen	cnu	t W	nu	ecu	st R		
			8	_¥		je 1	VI Name Function Prototy	
TRAJECTORY CONFIG	Х	Χ		X	SI		TrajectoryConfig_Create.vi public Trajectory double maxAcce	Config(double maxVelocityMetersPerSecond, erationMetersPerSecondSq)
							public Trajectory constraint)	Config addConstraint(TrajectoryConstraint Implemented differently, can't duplicate.
								Config addConstraints(List extends</td
							TrajectoryConstr	aint> constraints) duplicate.
	X	X		X			kinematics)	Config setKinematics(DifferentialDriveKinematics
	X	X		X	SI		kinematics)	Config setKinematics(MecanumDriveKinematics
	X	X		X	SI		kinematics)	Config setKinematics(SwerveDriveKinematics
							public double ge	
							public Trajectory startVelocityMete	Config setStartVelocity(double
							public double ge	
							public Trajectory	Config setEndVelocity(double
							endVelocityMete	
							public double ge	
								MaxAcceleration() can use cluster unpack toryConstraint> getConstraints() Implemented differently, can't
							ĺ	duplicate.
	\ <u> </u>			\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	0,		public boolean is	
	X		~	X	SI		TrajectoryConfig_setReversed.vi public Trajectory TrajectoryConfig_setCentripetalAccel.vi	Config setReversed(boolean reversed)
		\hat{X}					TrajectoryConfig_setCentripetalAccel.vi	
·	,	- •	,				NOTE ADD OTH	ER "SET" ROUTINES FOR OTHER ERE, SINCE NEW CONTRAINTS ARE NOT GENERIC.
TDA IECTODY CENEDATE	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	VI Name NOTE ADD OTH CONTRAINTS H SPECIFIC AND Function Prototy	ERE, SINCE NEW CONTRAINTS ARE NOT GENERIC. De Notes
TRAJECTORY GENERATE	X Implemented	X Documented	WPILIB	X Menu Item	sution Optimized	Test Routine	VI Name Function Prototy TrajectoryGenerate_Make_Cubic_CtrlVect.vi public static Traje initial, List <transend. td="" trajectoryc<=""><td>De Notes Cotory generateTrajectory(Spline.ControlVector ation2d> interiorWaypoints, Spline.ControlVector buffig config)</td></transend.>	De Notes Cotory generateTrajectory(Spline.ControlVector ation2d> interiorWaypoints, Spline.ControlVector buffig config)
TRAJECTORY GENERATE	Implemented	Documented	WPILIB	Menu Item	sution Optimized	Test Routine	VI Name Function Prototy TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic_Vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Cubic.vi public static TrajectoryC TrajectoryGenerate_Make_Cubic.vi public static TrajectoryC ItajectoryGenerate_Make_Cubic.vi	re Notes ctory generateTrajectory(Spline.ControlVector ation2d> interiorWaypoints, Spline.ControlVector onfig config) ctory generateTrajectory(Pose2d start, d> interiorWaypoints, Pose2d end, uses cubic splines
TRAJECTORY GENERATE	X Implemented	X Documented	WPILIB	X Menu Item	sution Optimized	Test Routine	VI Name Function Prototy TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Cubic.vi Dublic static TrajectoryGenerate_Make_Cubic.vi	e Notes ctory generateTrajectory(Spline.ControlVector ation2d> interiorWaypoints, Spline.ControlVector book of interiorWaypoints, Pose2d start, d> interiorWaypoints, Pose2d end, config) ctory generateTrajectory(ControlVectorList uses quintic splines
TRAJECTORY GENERATE	X Implemented	X Documented	WPILIB	X Wenu Item	sution Optimized	Test Routine	VI Name Function Prototy TrajectoryGenerate_Make_Cubic_CtrlVect.vi public static Traje initial, List <trans controlvectors,="" end,="" list<translation2="" public="" static="" t="" t<="" td="" traje="" trajectoryc="" trajectorygenerate_make_cubic.vi="" trajectorygenerate_make_quintic.vi="" trajectorygenerate_make_quintic_ctrlvect.vi=""><td>re Notes ctory generateTrajectory(Spline.ControlVector ation2d> interiorWaypoints, Spline.ControlVector or onfig config) ctory generateTrajectory(Pose2d start, do interiorWaypoints, Pose2d end, config) ctory generateTrajectory(ControlVectorList rajectoryConfig config) ctory generateTrajectory(ControlVectorList rajectoryConfig config) ctory generateTrajectory(ControlVectorList rajectoryConfig config) ctory generateTrajectory(List<pose2d> uses quintic splines</pose2d></td></trans>	re Notes ctory generateTrajectory(Spline.ControlVector ation2d> interiorWaypoints, Spline.ControlVector or onfig config) ctory generateTrajectory(Pose2d start, do interiorWaypoints, Pose2d end, config) ctory generateTrajectory(ControlVectorList rajectoryConfig config) ctory generateTrajectory(ControlVectorList rajectoryConfig config) ctory generateTrajectory(ControlVectorList rajectoryConfig config) ctory generateTrajectory(List <pose2d> uses quintic splines</pose2d>
TRAJECTORY GENERATE	X //mplemented	X Documented	WPILIB	X Wenu Item	sution Optimized	Test Routine	VI Name Function Prototy TrajectoryGenerate_Make_Cubic_CtrlVect.vi public static Traje initial, List <trans controlvectors,="" end,="" list<<="" list<translation2="" public="" static="" t="" td="" traje="" trajectoryc="" trajectoryconfig="" trajectorygenerate_make_cubic.vi="" trajectorygenerate_make_quintic.vi="" trajectorygenerate_make_quintic_ctrlvect.vi="" trajectorygenerate_splinepointsfromsplines.vi="" waypoints,=""><td>re Notes rectory generateTrajectory(Spline.ControlVector ation2d> interiorWaypoints, Spline.ControlVector config config) rectory generateTrajectory(Pose2d start, do interiorWaypoints, Pose2d end, config) rectory generateTrajectory(ControlVectorList rajectoryConfig config) rectory generateTrajectory(ControlVectorList rajectoryConfig config) rectory generateTrajectory(List<pose2d> uses quintic splines</pose2d></td></trans>	re Notes rectory generateTrajectory(Spline.ControlVector ation2d> interiorWaypoints, Spline.ControlVector config config) rectory generateTrajectory(Pose2d start, do interiorWaypoints, Pose2d end, config) rectory generateTrajectory(ControlVectorList rajectoryConfig config) rectory generateTrajectory(ControlVectorList rajectoryConfig config) rectory generateTrajectory(List <pose2d> uses quintic splines</pose2d>
TRAJECTORY GENERATE	X Implemented	X Nocumented	WPILIB	X Wenu Item	sution Optimized	Test Routine	VI Name Function Prototy TrajectoryGenerate_Make_Cubic_CtrlVect.vi public static Traje initial, List <trans controlvectors,="" end,="" list<<="" list<translation2="" public="" static="" t="" td="" traje="" trajectoryc="" trajectoryconfig="" trajectorygenerate_make_cubic.vi="" trajectorygenerate_make_quintic.vi="" trajectorygenerate_make_quintic_ctrlvect.vi="" trajectorygenerate_splinepointsfromsplines.vi="" waypoints,=""><td>re Notes ctory generateTrajectory(Spline.ControlVector ation2d> interiorWaypoints, Spline.ControlVector of prince o</td></trans>	re Notes ctory generateTrajectory(Spline.ControlVector ation2d> interiorWaypoints, Spline.ControlVector of prince o

							tional columns for test and sample.	public ControlVectorList() public ControlVectorList(Collection extends</th <th>may not need, just data may not need, just data</th>	may not need, just data may not need, just data
•					imized	2		Spline.ControlVector> collection)	
	Implemented	Documented	Not WPILIB	Menu Item	Execution Opti	rest Koutine 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</trajectoryconstraint></posewithcurvature>	
	X	X		No			TrajectoryParam_enforceAccel.vi	maxAccelerationMetersPerSecondSq, boolean reversed) private static void enforceAccelerationLimits(boolean reverse,	This routines needs to be chang
-	X	X	X	No			TrajectoryParam_calcStuffFwd.vi	List <trajectoryconstraint> constraints, ConstrainedState state)</trajectoryconstraint>	when new constraints are adde
	X	Χ	X	No			TrajectoryParam_calcStuffRev.vi		
	X	X	X	No			TrajectoryParam_enforceVelocity.vi		This routines needs to be chan when new constraints are adde
JECTORY PARAMETERIZE CONSTRAINED STATE	X	X	X	X	Execution	l est Koutine Sample Program	VI Name ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi	Function Prototype ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq) ConstrainedState()	Notes
-	X	X		X			ConstrainedState_SetMinAccel.vi		
-	X								
L	X	X		X			ConstrainedState_SetVelAccel.vi ConstrainedState_SetVelocity.vi		
TRAJECTORY UTIL	Implemented	X			Execution Optimized	Sample Program	ConstrainedState_SetVelocity.vi VI Name TrajectoryUtil_fromPathWeaverJSON.vi	Function Prototype public static Trajectory fromPathweaverJson(Path path)	Notes
TRAJECTORY UTIL	Implemented	Nocumented X	X	Menu Item X	Execution Optimized	l est Koutine Sample Program	ConstrainedState_SetVelocity.vi VI Name	public static Trajectory fromPathweaverJson(Path path) public static void toPathweaverJson(Trajectory trajectory, Path	Notes
TRAJECTORY UTIL	X Implemented	Nocumented X	X	X Menu Item	Execution Optimized	Sample Program	ConstrainedState_SetVelocity.vi VI Name TrajectoryUtil_fromPathWeaverJSON.vi	public static Trajectory fromPathweaverJson(Path path) public static void toPathweaverJson(Trajectory trajectory, Path path) public static Trajectory deserializeTrajectory(String json)	Notes
TRAJECTORY UTIL	X Implemented	Nocumented X	X	X Menu Item	Execution Optimized	l est Koutine Sample Program	ConstrainedState_SetVelocity.vi VI Name TrajectoryUtil_fromPathWeaverJSON.vi	public static Trajectory fromPathweaverJson(Path path) public static void toPathweaverJson(Trajectory trajectory, Path path)	Notes
TRAJECTORY UTIL	X X Implemented	X Documented	X Not WPILIB	X Wenu Item	Optimized	we.	VI Name TrajectoryUtil_fromPathWeaverJSON.vi TrajectoryUtil_toPathWeaverJSON.vi	public static Trajectory fromPathweaverJson(Path path) public static void toPathweaverJson(Trajectory trajectory, Path path) public static Trajectory deserializeTrajectory(String json) public static String serializeTrajectory(Trajectory trajectory)	
TRAJECTORY UTIL	Implemented X X Implemented	X Documented X	X	X Menu Item	otimized	Sample Program Sample Program	VI Name TrajectoryUtil_fromPathWeaverJSON.vi TrajectoryUtil_toPathWeaverJSON.vi	public static Trajectory fromPathweaverJson(Path path) public static void toPathweaverJson(Trajectory trajectory, Path path) public static Trajectory deserializeTrajectory(String json)	Notes

	Revision 2.X 3\11/	12/2021 – State Space Items –	(This list is still missing one VI) Added additional columns for test and sample.
--	--------------------	-------------------------------	------------------------------------	---

				 dataonal columno for toct and cample.	
X	X	(No	TrapProfile_Direct.vi	Private, remove from menu
X	λ	()	$X \mid X$	TrapProfile_Execute.vi	
X	λ	(X	TrapProfile_IsFinished.vi	
X	λ	(X	TrapProfile_New.vi	
X	λ	(X	TrapProfile_New_DefInitial.vi	
X	λ	(No	TrapProfile_ShouldFlipAcceleration.vi	Private, remove from menu
X	λ	(X	TrapProfile_TimeLeftUntil.vi	
X	λ	(X	TrapProfile_TotalTime.vi	
X	λ	(X	TrapProfState_Equals.vi	
X	λ	(X	TrapProfState_New.vi	

'===== TRAJEC '=====

	X	X		X			TrapProfile_TotalTime.vi		
		Χ		X			TrapProfState_Equals.vi		
	X	X		X			TrapProfState_New.vi		
======									
JECTORY CONSTRAINT									
=======					~				
					zeα				
					ji.		E E		
	þ	Ø	~		Optimiz	ø	200		
	nte	nte	7	E .		iţi	5		
	'mplemente	Documente	Not WPILIB	Menu Item	Execution	Test Routine	Sample Program Name		
	ble	no	, <u>, , , , , , , , , , , , , , , , , , </u>	эuг	ec	st	ž į		
	$\overline{}$		_≥		- ŭ		•		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	
	_ ^	^		^			Certifipetal/Acceleonstraint_getiviiinivia/Accel.vi	getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters,	
								double curvatureRadPerMeter, double velocityMetersPerSecond)	
								<u> </u>	
	X	X		X	SI		CentripetalAccelConstraint_New.vi	public CentripetalAccelerationConstraint(double	Can use cluster pack for now
								maxCentripetalAccelerationMetersPerSecondSq)	
					Ø				
					ize		_		
					tim		ia ⊊		
	ьq	þe	m		do	9	Program		
	ent	inte	7	Item	UC	uti	<u>r</u>		
	ŭ	Ĭ.	Ş	717	čį	B	e/a		
	Implementea	Documented	Not WPILIB	Menu	Execution Optimize	Test Routine	ง อ o o o o o o o o o o o o o o o o o o		
			>		Ü	<u> </u>			Notes
DIFF DRIVE KINEMATIC CONSTRAINT	X	X		X			DiffDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double	
								velocityMetersPerSecond)	
	X	Х		X			DiffDriveKinematicsConstraint_getMinMaxAccel.vi	public MinMax	
								getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters,	
								double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	Χ		V	01		DiffDriveKinematicsConstraint_New.vi	public DifferentialDriveKinematicsConstraint(final	
	^	^		X	SI		DilibriveKiriematicsConstraint_New.vi	DifferentialDriveKinematics kinematics, double	
								maxSpeedMetersPerSecond)	
								inia/lepsamsters - coccina/	
					imized				
					niz		un au		
	~	_			ptir		yra.		
	ıţec	tec	18	u	Opt	ine	Progra		
	Jen	en	7//	ten	io	ont	Φ.		
	len	ű,	Ž	μ	cnt	Œ.	λαι		
	Implemented	Documented	Not WPILIB	Menu Item	Execution	Test Routine	Name NI Name	Function Prototype	Notes
DIFF DRIVE VOLTAGE CONSTRAINT		X	_	<i>X</i>	E		DiffDriveVoltageConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d	
J J. L. FOLIAGE GONOTICANT	^`			^				poseMeters, double curvatureRadPerMeter, double	
								velocityMetersPerSecond)	
	X	X		X			DiffDriveVoltageConstraint_getMinMaxAccel.vi	public MinMax	Code updated to match 2/2020
								getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters,	library update.
								double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI		DiffDriveVoltageConstraint_New.vi	public	Can use cluster pack for now
								DifferentialDriveVoltageConstraint(SimpleMotorFeedforward	
								feedforward, DifferentialDriveKinematics kinematics, double	
								maxVoltage)	

.A 3(11/12/2021 – State Space items – (11iis iist is	Sun i	1111551	ing or	ie vi.) ^	uueu	dulional columns for test and sample.		
JERK CONSTRAINT	Naplemented	Documented	X X Not WPILIB	Menu Item	Execution Optimized	Test Routine	VI Name JerkConstraint_getMaxVelocity.vi JerkConstraint_getMinMaxAccel.vi		Notes FUTURE FUTURE
					CI				
	/		X		SI		JerkConstraint_New.vi	Routine exists, it is just a shell	FUTURE
MECANUM DRIVE KINEMATICS CONSTRAINT	Χ	X X Documented	Not WPILIB	X	SI	Test Routine	VI Name MecaDriveKinematicsConstraint_New.vi MecaDriveKinematicsConstraint_getMaxVelocity.vi	Function Prototype	Notes
	Χ	X		X			MecaDriveKinematicsConstraint getMinMaxAccel.vi		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	71	Notes
SWERVE DRIVE KINEMATICS CONSTRAINT	X	X		X			SwerveDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X			SwerveDriveKinematicsConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI		SwerveDriveKinematicsConstraint_New.vi	Newpublic SwerveDriveKinematicsConstraint(final SwerveDriveKinematics kinematics, double maxSpeedMetersPerSecond)	Can use cluster pack for now
TRAJECTORY CONSTRAINT									
Interface class - no		done	e (not	neer	ded)				

TRAJECTORY CONSTRAINT (Min Max) X X X SI Constraint_MinMax_New.vi XX X SI Constraint_MinMax_NewMinMax.VI

Function Prototype Notes Constraint_MinMax_New Constraint_MinMax_New

'======== UTILITY

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

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

'======== CONVERSIONS '=========

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

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

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

'========

PATHFINDER UTIL

'========

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

> ATHEINDERULIG
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> X
> < Function Prototype Notes PathfinderUtil_Continuous_Heading_Difference.vi
> PathfinderUtil_OptimizeTrajectoryStates.vi
> PathfinderUtil_ToTrajectory.vi
> PathfinderUtil_ToTrajectoryStates.vi

'=========

STATE SPACE MODEL

'========

	Implemented	Documented	Not WPILIB		Test Routine	Nample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DC MOTOR	X		λ	(DCMotor_GetAndymark9015.vi					
	X		λ	_		DCMotor_GetAndymarkRs775_125.vi					
	X		λ			DCMotor_GetBag.vi					
	Χ		λ	(DCMotor_GetBanebotsRs550.vi					
	Χ		λ	(DCMotor_GetBanebotsRs775.vi					
	X		λ	(DCMotor_GetCIM.vi					
	X		λ	_		DCMotor_GetCurrent.vi					
	Χ		λ	(DCMotor_GetFalcon500.vi					
	Χ		λ	(DCMotor_GetMiniCIM.vi					
	Χ		X	_		DCMotor_GetNEO.vi					
	Χ		X	_		DCMotor_GetNEO550.vi					
	Χ		X	_		DCMotor_GetVex775Pro.vi					
	Χ		X	(DCMotor_New.vi					
										1	

FRC LabVIEW Trajectory Library – VI Implementation Revision 2.X 3\11/12/2021 – State Space Items – (This list is			V	1 \	A ddod	additio	nal columns for test and comple	_				
Revision 2.A 3(1)/12/2021 – State Space Items – (This list is	Implemented	Documented g	Not WPILIB	Execution Optimized	Test Routine	ımple Program	I Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM ID	X		X	(Li	inearSystemId_CreateDriveTrainSystem.vi		Update to use create matrix			
	X		X	(Li	inearSystemId_CreateElevatorSystem.vi		Update to use create matrix			
	X		X	(Li	inearSystemId_CreateFlywheelSystem.vi		Update to use create matrix			
	X		λ	(Li	inearSystemId_CreateSingleJointedArmSystem.vi		Update to use create matrix			
	X		λ	(Li	inearSystemId_IdentifyDriveTrainSystem.vi		Update to use create matrix			
	X		λ	(Li	inearSystemId_IdentifyPositionSystem.vi		Update to use create matrix			
	Χ		λ	(Li	inearSystemId IdentifyVelocitySystem.vi		Update to use create matrix			

'========

STATE SPACE

'=======

CE ESTIMATION ===												
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	rest Koutine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATOR				X			DiffDrivePoseEst_AddVisionMeasurement.vi		Just a shell, not functional!			
	/						DiffDrivePoseEst_BiConsum_VisionCorrect.vi					
	Χ			Χ			DiffDrivePoseEst_BiFunc_F.vi					
	Χ			Χ			DiffDrivePoseEst_BiFunc_H.vi					
	X			Χ			DiffDrivePoseEst_FillStateVector.vi					
	X			Χ			DiffDrivePoseEst_GetEstimatedPosition.vi					
	X			X			DiffDrivePoseEst_New.vi					
	X			Χ			DiffDrivePoseEst_ResetPosition.vi					
	Χ			X			DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi					
	X			X			DiffDrivePoseEst_Update.vi					
	X			X			DiffDrivePoseEst_UpdateWithTime.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	rest Routine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
EXTENDED KALMAN FILTER				Χ			ExtendedKalmanFilter_Correct.vi		Just a shell, not functional!			
	X			X			ExtendedKalmanFilter_Correct_OnlyUY.vi					
	Χ			X			ExtendedKalmanFilter_GetP.vi					
	X			X			ExtendedKalmanFilter_GetP_Single.vi					
	X			X			ExtendedKalmanFilter_GetXHat.vi					
	X			X			ExtendedKalmanFilter_GetXHat_Single.vi					
	X			X			ExtendedKalmanFilter_New.vi					
	X			X			ExtendedKalmanFilter_Predict.vi					
	X			X			ExtendedKalmanFilter_Reset.vi					
	X			X			ExtendedKalmanFilter_SetP.vi					
	X			Χ			ExtendedKalmanFilter_SetXHat.vi					
	V			V								
	X			X			ExtendedKalmanFilter_SetXHat_Single.vi					

Revision 2.X 3\11/12/2021 - State Space Items - (This list is still missing one VI....) Added additional columns for test and sample. iple Program Function Prototype Notes KALMAN FILTER X X KalmanFilter Correct.vi X KalmanFilter New.vi Χ X KalmanFilter_Predict.vi Χ Χ Χ KalmanFilter Reset.vi Χ X KalmanFilter GetK Χ X KalmanFilter GetK Single.vi X X KalmanFilter SetXHat X Χ KalmanFilter SetXHat Initial Χ Χ KalmanFilter GetXHat Χ Χ KalmanFilter_GetXHaT_Single **Function Prototype** Notes KALMAN FILTER LATENCY COMPENSATOR KalmanFilterLatencyComp_AddObserverState.vi Work in progress. KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi Work in progress. KalmanFilterLatencyComp FindClosestMeasurement.vi Work in progress. KalmanFilterLatencyComp New.vi Work in progress. **Function Prototype** Notes UNSCENTED KALMAN FILTER X UnscentedKalmanFilter Correct.vi Work in progress. X X X UnscentedKalmanFilter Correct FuncGroup.vi X Χ UnscentedKalmanFilter Correct OnlyUY.vi X UnscentedKalmanFilter Correct OnlyUYR.vi Χ Χ UnscentedKalmanFilter GetP.vi Χ Χ UnscentedKalmanFilter GetP Single.vi Χ X UnscentedKalmanFilter GetXHat.vi Χ Χ UnscentedKalmanFilter GetXHat Single.vi Χ Χ UnscentedKalmanFilter New.vi Χ Χ UnscentedKalmanFilter New Default.vi Χ Χ UnscentedKalmanFilter New FuncGroup.vi Χ Χ UnscentedKalmanFilter Predict.vi Χ Χ UnscentedKalmanFilter Reset.vi Χ Χ UnscentedKalmanFilter_SetP.vi Χ Χ UnscentedKalmanFilter_SetXHat.vi Χ Χ UnscentedKalmanFilter_SetXHat_Single.vi Χ Χ UnscentedKalmanFilter Transform.vi

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM	X			X			LinearSystem_CalculateX.vi					
	Χ			Χ			LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi					

t is still	missir	ng one VI	.) Ac	dded a	addition	onal columns for test and sample.	
X		X				LinearSystem_GetA.vi	
X		X				LinearSystem_GetAElement.vi	
X		X				LinearSystem_GetB.vi	
X		X				LinearSystem_GetBElement.vi	
X		X				LinearSystem_GetC.vi	
X		X				LinearSystem_GetCElement.vi	
X		X				LinearSystem_GetD.vi	
X		X				LinearSystem_GetDElement.vi	
X		X			Li	LinearSystem_New.vi	

	Implemented	Documented Inc. 1971	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM LOOP	Χ		X				LinearSystemLoop_ClampInput.vi					
	X		X				LinearSystemLoop_Correct.vi					
							LinearSystemLoop_GetClampFunction.vi					
	Χ		X				LinearSystemLoop_GetController.vi					
	Χ		X				LinearSystemLoop_GetError_Single.vi					
	Χ		X				LinearSystemLoop_GetError.vi					
	Χ		X				LinearSystemLoop_GetFeedForward.vi					
	Χ		X				LinearSystemLoop_GetNextR_Single.vi					
	Χ		X				LinearSystemLoop_GetNextR.vi					
	Χ		X				LinearSystemLoop_GetObserver.vi					
	Χ		X				LinearSystemLoop_GetU_Row.vi					
	Χ		X				LinearSystemLoop_GetU.vi					
	Χ		X				LinearSystemLoop_GetXHat_Single.vi					
	Χ		X				LinearSystemLoop_GetXHat.vi					
							LinearSystemLoop_New_BBB					
							LinearSystemLoop_New_LinearSystem_ClampFunc					
	Χ		X				LinearSystemLoop_New_LinearSystem_ClampVal.vi					
	Χ		X				LinearSystemLoop_New.vi					
	Χ		X				LinearSystemLoop_Predict.vi					
	Χ		X				LinearSystemLoop_Reset.vi					
							LinearSystemLoop_SetClampFunction.vi					
							LinearSystemLoop_SetNextR_Some.vi					
	Χ		X				LinearSystemLoop_SetNextR.vi					
							LinearSystemLoop_SetXHat_Single.vi					
							LinearSystemLoop_SetXHat.vi					
Į												

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

> X Not WPILIB
> X Menu Item Function Prototype Notes BiFuncHelp_MatrixMinus.vi
> BiFuncHelp_MatrixMult.vi
> BiFuncHelp_MatrixMult_CoerceSizeB.vi
> BiFuncHelp_MatrixPlus.vi Bi-FUNCTION HELP X X X X XX XX XX

Revision 2.X 3\11/12/2021 – State Space Items – (This lie	st is still m	issing o	ne VI) Ad	ded add	itional columns for test and sample.	_				
DISCRETIZATI		Documented Not WPILIB	X X Wenu Item		Test Routine Sample Program	VI Name Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQTaylor.vi Discretization_DiscretizeR.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
STATE SPACE U	X X Implemented	Documented Not WPILIB	X X X X X X X X X X X X X X X X X X X		Test Routine Sample Program	VI Name StateSpaceUtil_MakeCostMatrix.vi StateSpaceUtil_MakeCovarianceMatrix.vi StateSpaceUtil_MakeWhiteNoiseVector.vi StateSpaceUtil_IsStabalizable.vi StateSpaceUtil_PoseToVector.vi StateSpaceUtil_ClampInputMaxMagnitude.vi StateSpaceUtil_NomalizeInputVector.vi	Function Prototype	Notes Routine exists, it is just a shell	Code Review	Test Program	Error Checking
'======= SIMULATION '=========	X	_	XXX	nized	4	StateSpaceUtil_PoseTo4dVector.vi StateSpaceUtil_PoseTo3dVector.vi					
BATTERY S	ІтрІетк	Documented Not WPILIB	X Menu Item		Test Routine Sample Progra	VI Name BatterySim_CalculateDefaultBatteryLoadedVoltage.vi BatterySim_CalculateLoadedVoltage.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE TRAIN S	X X X X X X X X X X X X X X X X X X X	Documented Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	DiffDriveTrainSim_ClampInput.vi DiffDriveTrainSim_CreateKitbotSim.vi DiffDriveTrainSim_CreateKitbotSim_EstMass.vi DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi DiffDriveTrainSim_GetCurrentDrawAmps.vi DiffDriveTrainSim_GetCurrentGearing.vi DiffDriveTrainSim_GetDynamics.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X X X					DiffDriveTrainSim_GetHeading.vi DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi DiffDriveTrainSim_GetLeftPositionMeters.vi					

Revision 2.X 3	3\11/12/20	21 – State 9	Space Items -	- (This list is still missing one VI) Added additional columns for test and sample.

s still mi	ssing o	one VI) Added additional columns for test and sample.		
X		DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.	.vi	
X		DiffDriveTrainSim_GetOutput_Single.vi		
X		DiffDriveTrainSim_GetPose.vi		
X		DiffDriveTrainSim_GetRightCurrentDrawAmps.vi		
X		DiffDriveTrainSim_GetRightPositionMeters.vi		
X		DiffDriveTrainSim_GetRightVelocityMetersPerSecond	nd.vi	
X		DiffDriveTrainSim_GetState.vi		
X		DiffDriveTrainSim_GetState_Single.vi		
X		DiffDriveTrainSim_KitBotWheelSize.vi		
X		DiffDriveTrainSim_New.vi		
X		DiffDriveTrainSim_New_Mass_MOI.vi		
X		DiffDriveTrainSim_SetCurrentGearing.vi		
X		DiffDriveTrainSim_SetInputs.vi		
X		DiffDriveTrainSim_SetPose.vi		
X		DiffDriveTrainSim_SetState.vi		
X		DiffDriveTrainSim_ToughBoxMiniGearRatio.vi		
X		DiffDriveTrainSim_ToughBoxMiniMotor.vi		
X		DiffDriveTrainSim_Update.vi		
		Pe:		
		zir m		
		·= m		9

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine Sample Program		Function Prototype	Notes	Code Review	Test Program	Error Checking
ELEVATOR SIM	X			X			ElevatorSim_New.vi					
	X			X			ElevatorSim_GetCurrentDraw.vi					
	X			X			ElevatorSim_GetPositionMeters.vi					
	X			X			ElevatorSim_GetVelocityMetersPerSecond.vi					
	Χ			X			ElevatorSim_SetInputVoltage.vi					
	Χ			X			ElevatorSim_UpdateX.vi					
	Χ			X			ElevatorSim_WouldHitLowerLimit.vi					
	Χ			X			ElevatorSim_WouldHitUpperLimit.vi					
	X		X	X			ElevatorSim_Update.vi		Needed because this doesn't extend.			
	X			X			ElevatorSim_HasHitLowerLimit.vi					
	Χ			X			ElevatorSim_HasHitUpperLimit.vi					
	Χ		Χ				ElevatorSim_RKF45_Func.vi					
							ElevatorSim_New_NoNoise.vi					
							ElevatorSim_New_LinSys.vi					
							ElevatorSim_New_LinSys_NoNoise.vi					

	inipienieu	Documented Not WPILIB	Menu Item	Execution Optimiz	 VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
FLYWHEEL SIM	(X		FlyWheelSim_GetAngularVelocityRadPerSec.vi					
	(X		FlyWheelSim_New_MOI.vi					
	(X		FlyWheelSim_SetInput.vi					
	(X		FlyWheelSim_Update.vi					
	(X		FlyWheelSim_GetCurrentDrawAmps					
)	(X		FlyWheelSim_GetAngularVelocityRPM.vi					
					FlyWheelSim_New_LinSys_NoNoise		Future			
					FlyWheelSim_New_LinSys		Future			
					FlyWheelSim_New_LinSys_MOI_NoNoise		Future			

Revision 2.X 3\11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample. mple Program Function Prototype Notes LINEAR SYSTEM SIM X LinearSystemSim GetOutput.vi Χ LinearSystemSim GetOutput Single.vi Χ X Χ LinearSystemSim New Χ X LinearSystemSim SetInput Single.vi Χ Χ LinearSystemSim Update.vi Χ LinearSystemSim UpdateX.vi No X LinearSystemSim UpdateY.vi X No LinearSystemSim New NoNoise.vi Χ LinearSystemSim SetInput.vi Χ Χ LinearSystemSim_SetInput_Array.vi Doesn't use clamp? Χ Χ LinearSystemSim_Setstate.vi LinearSystemSim_GetCurrentDrawAmps.vi DONT IMPLEMENT.. LinearSystemSim ClampInput.vi Execution Optimized **Function Prototype** Notes SINGLE JOINT ARM SIM X X SngJntArmSim_EsitmateMOI.vi Χ Χ SngJntArmSim_GetAngleRads.vi Χ Χ SngJntArmSim_GetCurrentDraw.vi SngJntArmSim_GetVelocityRadsPerSec.vi Χ Χ Χ SngJntArmSim HasHitLowerLimit.vi Χ Χ Χ SngJntArmSim HasHitUpperLimit.vi Χ Χ SngJntArmSim_New.vi Χ SngJntArmSim_Rkf45_Func.vi Χ Χ SngJntArmSim_SetInputVoltage.vi Χ SngJntArmSim_Update.vi Χ Χ Χ SngJntArmSim_UpdateX.vi SngJntArmSim_WouldHitLowerLimit.vi Χ Χ Χ Χ SngJntArmSim WouldHitUpperLimit.vi '======== MATRIX UTILITIES '======== VI Name Function Prototype Notes MAT BUILDER X MatBuilder Fill.vi Χ

MatBuilder Create.vi

Χ

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 3\11/12/2021 – State Space Items – (This list is still missing one VI....) Added additional columns for test and sample. nple Program VI Name Function Prototype Notes MATRIX X Matrix_AssignBlock.vi X Χ Matrix Block.vi X Matrix Create.vi Χ X Matrix Diag.vi Χ Χ Matrix ElementSum.vi Χ X Matrix Exp.vi Χ X Matrix ExtractColumnVector.vi Χ X Matrix ExtractFrom.vi Χ Χ Matrix_ExtractRowVector.vi Χ Χ Matrix_Fill.vi Χ Χ Matrix_Ident.vi Χ Χ Matrix_IsEqual.vi Χ Χ Matrix_LltDecompose.vi Χ Χ Matrix_Pow.vi Χ X Matrix_SetColumn.vi Χ X Matrix SetRow.vi **Function Prototype** Notes MATRIX HELPER X XX MatrixHelper Zero.vi X X MatrixHelper CooerceSize.vi XX MatrixHelper_MultCooerceBSize.vi $X \mid X$ Menu Item VI Name Function Prototype Notes VecBuilder 1x1Fill.vi VECTOR BUILDER X Χ VecBuilder_2x1Fill.vi Χ Χ Χ Χ VecBuilder_3x1Fill.vi Χ VecBuilder_4x1Fill.vi Χ Χ VecBuilder_5x1Fill.vi Χ VecBuilder_6x1Fill.vi Χ VecBuilder_7x1Fill.vi Χ VecBuilder_8x1Fill.vi

========	
ИАТH	
========	

 $X \mid X$

FRC_LabVIEW_Trajectory_Library_Routines.xlsx Page 25 / 28

VecBuilder_9x1Fill.vi VecBuilder_10x1Fill.vi VecBuilder_ArrayBy1Fill.vi

C LabVIEW Trajectory Library – VI Implementati	on List									
sion 2.X 3\11/12/2021 – State Space Items – (This lis	t is still miss	sing one	ie VI)	Adde	ed additional columns for test and sample.					
				izec	_					
				ţį	.a.w					Ø
	p _e	ສ ຕ		S &	9 160			ě	am	ecking
	ente	<u> </u>	шe	n ;	P F			œ Ž	gr	sec
	Implemente	Vocumented Not WPILIB	Menu Item	Execution O, Test Routine	Sample Ni Name			Code Re	Test Program	Š
	e ple	2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	enr	GC GC	The state of the s			g _e	st	Error
		<u> </u>	_ Š'	<u>ũ μ</u>		Function Prototype	Notes		76	<u> </u>
ANGLE STATISTIC			X		AngleStats_AngleAdd.vi					
	X	X	X		AngleStats_AngleAdd_BiFunc.vi					
	X		X		AngleStats_AngleMean.vi					
	X	X	X	$\overline{}$	AngleStats_AngleMean_BiFunc.vi					-
	X	-	X	-	AngleStats_AngleResidual.vi					
	^	^	+^+		AngleStats_AngleResidual_BiFund	C.VI				
				g						
				ize	5					
				tin	ran			_	~	βι
	ted in d	<u>0</u>	_ ′	9 6	, og			ev.	'an	Checking
	en		ten	ion				Şe.	<i>1</i> 60.	he
	em	\$ \$	ח ה	cut	ald l			L	ď	
	Implementea Documented	Documente Not WPILIB	Menu Item	Execution Op Test Routine	Name Ni Name	Function Prototype	Notes	Code Revie	Test Program	Error
MATH UTILI			X X	<u> </u>	MathUtil_AngleModulus.vi	i unction Frototype	Notes			
MATTIONE	'' X		X		MathUtil_Clamp.vi					
	X		X		MathUtil_Clamp_Int.vi					
	X		X		MathUtil_InputModulus.vi					
						·	·			
			•	pə.						
				niz	8					
	ד ס		;	ptii	gra			\$	8	ing
	ıte.	<u>ģ</u> 9	, ع	1 Op	Ž			Ķ.	ıra.	€¢
	Implementec	ocumente Not WPILIE	lte.	Execution Op Test Routine	Sample Programme			Code Revie	Test Program	Checking
	ialc Tu:	<u> </u>	nu	726	d du			qe	st F	٥٠
	E OC	3 8	Menu Item	FX F	ິນ ເຊັ່ນ VI Name	Function Prototype	Notes	Š	Ţĕ,	Error
MERWE SCALED SIGMA POINT	rs X				MerweScSigPts_ComputeWeights	s.vi				
	Χ				MerweScSigPts_GetNumSigmas.v	vi				
	X				MerweScSigPts_GetWc.vi					
	X				MerweScSigPts_GetWc_Single.vi					
	X	!			MerweScSigPts_GetWm.vi					
	X				MerweScSigPts_GetWm_Single.vi	i e				
	Χ	'			MerweScSigPts_New.vi					
	Х	!			MerweScSigPts_New_Default.vi					
	X	4!			MerweScSigPts_SigmaPoints.vi					
				Ø						
				ize	-					
				tim	äΨ					9
	₽6 Pr	<u> </u>	·	opt of	a go			8	ш	Checking
	Implemented	Jocumente Vot WPILIE	Hé.	Execution Op Test Routine	Nample Programme			∋Vić	gra	je.
	ine ne	ĭ Ā	Menu Item	Execution (e e e e e e e e e e e e e e e e e e e			Revi	Prc	
	a)dı Dür	7 ×	านอ	(ec				Code	st	Error
				<u>ũ</u> r		Function Prototype	Notes	ŏ	7e	<u> </u>
NUMERICAL INTEGRATION			No		NumIntegrate_Func_Ax_Bu_K.vi					
	X		No		NumIntegrate_Func_Bs.vi					
	X		No		NumIntegrate_Func_Ch.vi					-
	X		No		NumIntegrate_Func_Ct.vi		NOT DONE			1
	/		+		NumIntegrate_Rk4_Dbl.vi		NOT DONE			
	X		X		NumIntegrate_Rk4_K_Dbl.vi NumIntegrate_Rk4_Mat_X.vi		NOT DONE			-
	X		X		Numintegrate_Rk4_Mat_X.vi Numintegrate_Rk4_Mat_X_U.vi					
	^	'	11		INUITINGUIALE_RK4_Mat_X_U.VI					
	V	1	V	\	Numintegrate Dittle vi					
	X		X No		NumIntegrate_Rkf45.vi NumIntegrate_Rkf45Impl.vi					

FRC LabVIEW Trajectory Library – VI Implementation	n List										
Revision 2.X 3\11/12/2021 - State Space Items - (This list is		nissing	j one VI) Add	ded a						
	X		X			NumIntegrate_Trap_Dbl.vi					
	X		X			NumIntegrate_Trap_Mat.vi					
	Implemented	Documented	Not WPILIB Menu Item	Execution Optimized	Test Routine	NI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
NUMERICAL JACOBIAN			X			NumJacobianX.vi		There are others that may need			
								implemented.			
	Implemented	Documented	Not WPILIB Menu Item	Execution Optimized	Test Routine	NI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
RICCATI	/		X			Riccati Check Detectable.vi		Routine exists, it is just a shell			
	Х		X			Riccati Check Stabilizable.vi		Not really done !!!			
	X		X			Riccati_DARE.vi					
	X		X			Riccati DARE Iterate.vi					
	X		X			Riccati_Input_Check.vi					
			-								

Page 27 / 28

'========									
TYPE DEFINITIONS									
'========									
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	VI Name	Function Prototype	Notes
ТуреDe					N/A	<u></u>	ARM FF.CTL	- I different follotype	Notes
.,,,,,,,	1		X		N/A		BICon-Matrix_FUNC_TYPE.CTL		
	Z		Х		N/A		BiFun Matrix FUNC TYPE.CTL		
	Z	Χ	X	X	N/A		CHASSIS_SPEEDS.CTL		
	Z	X	X	Χ	N/A		CONTRAINED_STATE.CTL		
	Z		X	X	N/A		DCMOTOR.CTL		
	Z	Χ	X	Χ	N/A		DIFF_DRIVE_KINEMATICS.CTL		
	Z		Х		N/A		DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl		
	Z		Х		N/A		DiFF_DRIVE_POSE_EST.ctl		
	Z		Х		N/A		DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl		
	Z		X		N/A		DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl		
	Z		Χ		N/A		DIFF_DRIVE_TRAIN_SIM.ctl		
	Z		X	X	N/A		ELEVATOR_SIM.CTL		
	Z		X		N/A		ELEV_FF.CTL		
	Ζ				N/A		EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL		
	Ζ		Χ		N/A		ExTENDED_KALMAN_FILTER.CTL		
	Z		Χ		N/A		FLYWHEEL_SIM.ctl		
	Z				N/A		HOLONOMIC_DRV_CTRL.CTL		New 1/26/21
	Z		X	X	N/A		KALMAN_FILTER.ctl		

is stil	l miss				ded additional columns for test and sample.										
1			X		KALMAN_FILTER_LATENCY_COMP.CTL										
Z	Χ	X	Х	N/A	LINEAR FILTER.CTL										
Z	_	X		N/A	LINEAR PLANT INV FF.ctl										
Z		X		N/A	LINEAR QUADRATIC REGULATOR.ctl										
Z		X		N/A	LINEAR SYSTEM LOOP.ctl										
		X		N/A	LINEAR_SYSTEM_SIM.ctl										
Z															
Z		X		N/A	LINEAR_SYSTEM.ctl										
Z				N/A	MECA_DRIVE_KINEMATICS.CTL										
Z				N/A	MECA_DRIVE_ODOMETRY.CTL										
Z	X	X		N/A	MECA_WHEEL_SPEEDS.CTL										
Z		X	Χ	N/A	MEDIAN FILTER.CTL										
Z		X		N/A	MERWE SCALED SIGMA PTS.ctl										
Z	_	X		N/A	OBSERVER SNAPSHOT.CTL										
Z		X		N/A	OBSERVER SNAP LIST ITEM.CTL										
Z		X	Х	N/A	PARAM STACK ITEM.CTL										
Z		X		N/A	PARAM STACK.CTL										
Z		X		N/A	PID_ADV_LIMITS.CTL										
Z		X		N/A	PID_ADV_TUNING.CTL										
Z		X		N/A	PID_CONTROLLER.CTL										
Z		Χ		N/A	PID_ERROR_TOLERANCE.CTL										
Z		Χ		N/A	PID_INPUT_LIMITS.CTL										
Z		X	Χ	N/A	PID TUNING.CTL										
Z		X		N/A	POSE2D.CTL										
Z		X		N/A	POSEwCURVATURE.CTL										
Z	_	X		N/A	PROFILED PID CONTROLLER.CTL										
Z		X		N/A	RAMSETE.CTL										
Z				N/A	ROTATION2D.CTL										
Z	_	X		N/A	SINGLE JOINT ARM SIM.CTL										
Z	_	X		N/A	SIMPLE_MOTOR_FF.CTL										
Z		X		N/A	SLEW_RATE_LIMITER.CTL										
Z		X		N/A	SPLINE_CTRL_VECTOR.CTL										
Z		X		N/A	SPLINE.CTL										
Z		X		N/A	SWERVE_DRIVE_KINEMATICS.CTL										
Z		X		N/A	SWERVE_DRIVE_MODULE_STATE.CTL										
Z	X			N/A	SWERVE_DRIVE_ODOMETRY.CTL										
Z		X	X	N/A	TIMER.CTL										
Z	X	X	X	N/A	TRAJ_CONFIG.CTL										
Z	X	X	Χ	N/A	TRAJ CONSTRAINT CENTRIPETAL ACCEL.CTL										
Z				N/A	TRAJ CONSTRAINT DIFF DRIVE KINEMATICS.CTL										
Z		X		N/A	TRAJ CONSTRAINT DIFF DRIVE VOLTAGE.CTL										
1		X	,,	N/A	TRAJ CONSTRAINT JERK.CTL		Routine exists, it is just a shell								
Z	X		Х	N/A	TRAJ CONSTRAINT MECA DRIVE KINEMATICS.CTL		reduire exists, it is just a crion								
Z			X		TRAJ CONSTRAINT MINMAX.CTL										
Z		$\frac{1}{X}$		N/A	TRAJ_CONSTRAINT_MINMAX.CTL TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL										
Z	_	X	X		TRAJ_STATE.CTL										
Z		X		N/A	TRAJECTORY.CTL										
Z		X		N/A	TRANSFORM2D.CTL										
Z	_	X		N/A	TRANSLATION2D.CTL										
Z		X		N/A	TRAPEZOID_PROFILE_CONSTRAINT.CTL										
Ζ		Χ		N/A	TRAPEZOID_PROFILE_STATE.CTL										
Z		Χ	X	N/A	TRAPEZOID_PROFILE.CTL										
Z	X	Χ		N/A	TWIST2D.CTL										
Z	_	Χ		N/A	UNSCENTED KALMAN FILTER.ctl										
Z		X		N/A	UNSCENTED KALMAN NEW FUNC GROUP.CTL										
Z		X		N/A	UNSCENTED KALMAN CORRECT FUNC GROUP.CTL										
Z		_	Х	N/A	UTIL PATHFINDER CONFIG.CTL										
Z	_	X		NA	UTIL WAYPOINT.ctl										
Z				NA	UTIL WEIGHTED WAYPOINT.ctl		New V1.5								
	_	X		N/A	WAYPOINTS.CTL										
N/A	_	N/A					Delete – obsolete								
Z N/A	_	X		NA	WEIGHTED_WAYPOINT.CTL		New V1.5								
11/1/4	4	N/A		N/A	X_Y_HEADINGS.CTL		Delete – obsolete								