Revision 3.X 1/11/2023 – renamed library. Added additional documentation.

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...

Doc completed Pct 99.91% Optimization Pct 57.04%

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

'===== BASE

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ANALOG DELAY	X Implemented	X Documented	X Not WPILIB	X Menu Item	- Execution Optimized	Test Routine		VI Name AnalogDelay_Execute.vi	Function Prototype	Notes Similar to interpolated tree map	Code Review	Test Program	Error Checking
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Revision 3.X 1/11/2023 – renamed library. Added additional documentation. Routine Function Prototype VI Name Notes LEAD LAG X X X X I LeadLag Execute.vi Routine VI Name Function Prototype Notes LINEAR FILTER X LinearFilter BackwardFiniteDifference.vi X I X X SI X X X X LinearFilter Calculate.vi X XX LinearFilter_CutoffFrequency.vi X X X X I X LinearFilter_Execute.vi Labview style helper AN INTERNAL ROUTINE XX No I LinearFilter Factorial.vi LinearFilter FiniteDifference.vi XX 1 X X LinearFilter HighPass.vi Χ X X X X X X X X LinearFilter HighPassBW1.vi LinearFilter_HighPassBW2.vi X X X X LinearFilter LowPassBW1.vi LinearFilter LowPassBW2.vi X X X X X X X X LinearFilter_MovingAverage.vi Χ LinearFilter New.vi LinearFilter Reset.vi LinearFilter_ResetToValue.vi XX X LinearFilter SinglePoleIIR.vi LinearFilter TimeConst.vi $X \mid X \mid X \mid X$ Function Prototype Notes MEDIAN FILTER X MedianFilter Calculate.vi X X X X X X MedianFilter_Execute.vi Labview style helper XX X SI MedianFilter New.vi X SI MedianFilter Reset.vi X X X X SI MedianFilter ResetToValue.vi Function Prototype VI Name Notes SLEW RATE FILTER X X SlewRateLimiter Calculate.vi X XX X SI SlewRateLimiter_Close.vi X X X X I X SlewRateLimiter Execute.vi Labview style helper X X X X SI SlewRateLimiter GetRate.vi XX SlewRateLimiter New.vi Χ XX Χ SlewRateLimiter NewInitialZero.vi X I X SI X X X X SlewRateLimiter Reset.vi Х SlewRateLimiter SetRate.vi

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Revision 3.X 1/11/2023 – renamed library. Added additional documentation. Function Prototype VI Name Notes TIME INTERPOLATABLE ROTATION2D X X X X I TimeInterpRotation2d AddSample.vi Update to use create matrix X X X No I X X X X SI X X X X I TimeInterpRotation2d CleanUp.vi Update to use create matrix TimeInterpRotation2d_Clear.vi TimeInterpRotation2d GetSample.vi TimeInterpRotation2d_GetTimeForValue.vi X X X X SI X X X X SI TimeInterpRotation2d_New.vi TimeInterpRotation2d SetMaxTime.vi Function Prototype Notes VI Name WAIT ADJUST X X X X WaitAdjust.vi Function Prototype Notes DigSeqLogic_Delay.vi
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WPILib LabVIEW Math Library - VI Implementation List Revision 3.X 1/11/2023 – renamed library. Added additional documentation. X SI HolDrvCtrl SetTolerance.vi Added 1/26/21 XX VI Name Function Prototype Notes PID AUTOTUNE X X X No PIDAutoTune ClosedLoopStep.vi X X X No PIDAutoTune Convert Academic To NonInteracting.vi x X X No PIDAutoTune_OpenLoopStep.vi X X X X PIDAutoTune_SetTuningArguments.vi $X \mid X \mid X \mid X$ PIDAutoTune Step Execute.vi Not WPILIB Function Prototype Notes VI Name PID CONTROLLER X X X X PIDController AdvCalculate FF Sp Pv Per.vi Advanced PID XX PIDController AdvCalculate FF Sp Pv.vi Advanced PID XX PIDController AdvExecute.vi Labview style helper. Advanced X PIDController AtSetpoint.vi Χ X SI X PIDController Calculate PV.vi X XX PIDController Calculate SP PV.vi X PIDController DisableContinousInput.vi XX X SI $X \mid X \mid$ X SI PIDController EnableContinousInput.vi Labview style helper
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		Χ		\longrightarrow	Χ	SI		SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)			
				X	14			SimpleMotorFF_Ka_AutoTune.vi				
		X	X		X	X		SimpleMotorFF_MaxAchieveAccel.vi	public double maxAchievableAcceleration(double maxVoltage, double velocity)			
		X	X		Χ	X		SimpleMotorFF_MaxAchieveVel.vi	public double maxAchievableVelocity(double maxVoltage, double acceleration)			
		X	X		Χ	X		SimpleMotorFF_MinAchieveAccel.vi	public double minAchievableAcceleration(double maxVoltage,			
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WPILib LabVIEW Math Library - VI Implementation List Revision 3.X 1/11/2023 – renamed library. Added additional documentation. Pose2d TransformBy.vi pose2d transformby(transform2d other) X SI pose2d new() can use cluster constant VI Name Function Prototype Notes POSE3D X SI Pose3d Div.vi X X SI $X \mid X$ Pose3d_Equals.VI XX Χ Pose3d_Exp.vi X X X SI X SI Pose3d getRotation.vi Pose3d_getTranslation.vi X X X X SI Pose3d getXYZ.vi XX X I Pose3d Interpolate.vi XX Pose3d_Log.vi XX X X X SI X SI Pose3d Minus.vi Pose3d_New.vi XX X SI Pose3d New Default.vi XX SI Pose3d New Pose2d.vi Pose3d New Trans3dRot3d.vi XX X SI X X X X X X SI Pose3d Plus.vi Χ X SI Pose3d RelativeTo.vi Pose3d RotationVectorToMatrix.vi No SI XX X SI Pose3d ToPose2d.vi XX SI Pose3d Times.vi Pose3d TransformBy.vi XX X SI Routine Execution Op VI Name Function Prototype Notes Quaternion_Equals.vi QUATERNION Χ SI Χ Χ X SI X SI X X Quaternion Get All.vi Quaternion Get LVQuat.vi XX X SI Quaternion Get Vect.vi XX X SI Quaternion Get W.vi Quaternion_Inverse.vi XX X SI X X SI Quaternion New.vi X X Quaternion_New_Default.vi SI XX X SI Quaternion New LVQuat.vi XX X SI Quaternion Normalize.vi X SI Quaternion Plus.vi $X \mid X$ X X X SI Quaternion_Times.vi XX X SI Quaternion ToRotationVector.vi VI Name Function Prototype Notes ROTATION2D X X X X X X SI X SI Rotation2d CreateAngle.vi rotation2d new(double value) Rotation2d_CreateAngleDegrees.vi rotation2d fromDegrees(double degrees) convert to radians then create XX X SI Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi XX X SI rotation2d new(double x, double y) XX Rotation2d Div.vi SI X SI X SI X Χ Rotation2d Equals.vi boolean equals(rotation2d other) Х

double getCos()

double getDegrees()

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X Χ Rotation2d GetAngleCosSin.vi

Rotation2d GetCos.VI

Rotation2d GetDegrees.VI

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New 1/26/21

degree

use cluster unpack

use cluster unpack, then convert to

WPILib LabVIEW Math Library - VI Implementation List Revision 3.X 1/11/2023 – renamed library. Added additional documentation. X SI Rotation2d GetRadians.VI double getRadians() use cluster unpack XX X SI Rotation2d GetRotations.vi X SI X X X X Rotation2d GetSin.VI double getSin() use cluster unpack X SI Rotation2d GetTan.VI double getTan() can calculate Χ X SI Rotation2d_Interpolate.vi X XX X SI Rotation2d Minus vi rotation2d minus(rotation2d other) XX X SI Rotation2d Plus.vi rotation2d plus(rotation2d other) Rotation2d_RotateBy.vi rotation2d rotateby(rotation2d other) $X \mid X$ X SI Χ Rotation2d Times.vi Χ X SI rotation2d times(double scalar) XX X SI Rotation2d UnaryMinus.vi rotation2d unaryminus() rotation2d new() can use cluster constant VI Name Function Prototype Notes ROTATION3D X X X SI Rotation3d Create AxisAngle.vi XX X SI Rotation3d Create Default.vi Rotation3d Create Quaternion.vi $X \mid X$ X SI X X X X X X Rotation3d Create InitialFinalVector.vi Χ 1 Χ SI Rotation3d Create RollPitchYaw.vi Rotation3d Create RotMatrix.vi X I XX SI Rotation3d Div.vi XX X SI Rotation3d Equals.vi X X X X SI Rotation3d_GetAxisAngle.vi X SI Rotation3d GetQuaternion.vi X XX X SI Rotation3d GetXYZ.vi XX X SI Rotation3d Interpolate.vi XX X SI Rotation3d Minus.vi X X X X X SI Rotation3d Plus.vi X SI Rotation3d RotateBy.vi X X X X X SI Rotation3d Times.vi X SI Rotation3d ToRotation2d.vi XX X SI Rotation3d UnaryMinus.vi Check Execution Function Prototype Notes TRANSFORM2D X | X | X SI Transform2d Create PosePose.vi transform2d new(pose2d, pose2d) X SI Transform2d Create TransRot.vi transform2d new(translation2d, rotation2d) $X \mid X$ X X SI Transform2d_Div.vi X SI Transform2d Equals.VI boolean equals(other transform2d) X X SI Transform2d GetRotation.VI rotation2d getRotation() use cluster unpack use cluster unpack XX X SI Transform2d GetTranslation.VI translation2d getTranslation() X X X X SI Transform2d GetXY.vi Transform2d_GetXYAngle.vi X X X X SI X SI Transform2d Inverse.vi $X \mid X \mid$ transform inverse() new X X Si Transform2d Plus.vi XX X SI Transform2d Times.vi transform2d times(double scalar) transform2d new() can use cluster constant

VI Name

Transform3d Create Default.vi

Transform3d Create Pose3dPose.3dvi Transform3d Create Trans3dRot3d.vi

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X

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Function Prototype

Notes

TRANSFORM3D

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Revision 3.X 1/11/2023 – renamed library. Added additional documentation. Notes Function Prototype VI Name TWIST3D X SI X Twist3d Create.vi X SI Twist3d Equals.VI X X X SI X Twist3d GetAll.VI '======== KINEMATICS '======= Function Prototype Notes CHASSIS SPEEDS X ChassisSpeeds_FromFieldRelativeChassisSpeeds.VI SI SI ChassisSpeeds_FromFieldRelativeSpeeds.VI chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle) ChassisSPeeds_GetXYOmega.vi X X X X SI X SI ChassisSpeeds_New.vi chassisspeeds new (double xvel, double yvel, double angvel) chassisspeeds new () can use cluster constant Function Prototype Notes DIFFERENTIAL DRIVE KINEMATICS X DiffKinematics New.vi diffDriveKine new(double trackWidth) Χ $X \mid I \mid X$ DiffKinematics toChassisSpeed.vi chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) X SI X DiffKinematics toWheelSpeed.vi diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds) Function Prototype VI Name Notes DIFFERENTIAL DRIVE ODOMETRY DiffOdometry_Execute.vi DONT NEED DiffOdometry_Update.vi pose2d update(rotation2d gyro, double leftdist, double right dist) Incorporates enhanced reset diffDrOdom new(rotation gyro, pose initial) diffDrOdom new(rotation gyro) void resetPosition(pose2d, rotation2d) incorporated into "update" pose2d getPoseMeters() Function Prototype Notes DIFFERENTIAL DRIVE WHEEL SPEEDS diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) X X Χ DiffWheel Normalize.vi void normalize(double maxVel)

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MECANUM DRIVE MOTOR VOLTAG	<u> </u>	_ <u>^</u>	≥		<u>```</u>	e	ගී VI Name	Function Prototype	Notes	<u>8</u>		<u>ш</u>
	othing a	done	_									1
MECANUM DRIVE ODOMETR	X	X X Documented		X X Menu Item	Execu	Test Routine	WecaOdometry_Execute.vi MecaOdometry_GetKinematics.vi MecaOdometry_GetPose.vi	Function Prototype	Notes	Code Review	Test Program	Hrror Checking
	X	X	•	X			MecaOdometry_New.vi					
		X		X			MecaOdometry_NewDefaultPose.vi					
		X		X			MecaOdometry_Reset.VI MecaOdometry_Update.vi					
							MecaOdometry_UpdateWithTime.vi		Removed			
MECANUM DRIVE WHEEL POSITIO				X Menu Item	S Execu	Test Routine	S VI Name MecaWheelPos_Get.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
		X		X			MecaWheelPos_New.vi MecaWheelPos_Sub.vi					<u> </u>
					ized [5		INCOMPTICE OS_COD.VI					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optim	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
MECANUM DRIVE WHEEL SPEED		X		X	SI	-	MecaWheel_New.Vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond)				
	X		X	X			MecaWheel_GetAll.vi MecaWheel_Normalize.vi	public void normalize(double				-
	1	`		⊥``				attainableMaxSpeedMetersPerSecond)				1

					Ď.								
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	:	rest Routine Sample Program				Code Review	Test Program	ror Checking
SWEDVE DRIVE KINEMATICS						H	* \ <u>\</u>	VI Name	Function Prototype	Notes	ŭ	74	<u> </u>
SWERVE DRIVE KINEMATICS		X	X	X				SwerveKinematics_New4.VI SwerveKinematics_NewX.VI		For 4 module drives uses array as input			
	X	X	$\frac{1}{x}$	X				SwerveKinematics_Newx.vi	public static void normalizeWheelSpeeds(SwerveModuleState[]	uses array as input			
		^	^	^				owerverunematics_rvernatizevvricerepectus.vr	moduleStates, double attainableMaxSpeedMetersPerSecond)				ı
		Χ	X					SwerveKinematics_ToChassisSpeeds4.VI		For 4 module drives			
	X	X	X					SwerveKinematics_ToChassisSpeedsX.VI		uses array as input			
	X	X		X				SwerveKinematics_ToSwerveModuleStates.VI	public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters)				
	X	X		X				SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI	public SwerveModuleState[]				ı
	V			v		+		Superval/increation TaTivintOd4 \/ \/	toSwerveModuleStates(ChassisSpeeds chassisSpeeds)				
	X	X		X		+		SwerveKinematics_ToTwist2d4.VI SwerveKinematics_ToTwist2dX.VI					
	^	^		^				Swerverinematics_ToTwist2dx.v1	public SwerveDriveKinematics(Translation2d wheelsMeters)	variable parameters (replace with array and "4" calls)			
									public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)	variable parameters (replace with array and "4" calls)			<u></u>
	mplemented	Documented	Not WPILIB	Menu Item	Execution Optimize	. :	rest Koutine Sample Program				Code Review	Program	Set 11-1-10
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OWEDVE DDIVE OD OMETDY	2	Ğ	ŢŽ	_ ≥	Û	- 1	ž vš		Function Prototype	Notes	ŭ	<u> </u>	<u> </u>
SWERVE DRIVE ODOMETRY						+		SwerveOdometry_Execute4.vi					
	Х	Χ		X	,			SwerveOdometry_ExecuteX.vi SwerveOdometry_GetPosition.VI	public Pose2d getPoseMeters()				
	\hat{X}	X		$\frac{\hat{x}}{x}$		_		SwerveOdometry_New.VI	public Posezu gerrosewieters() public SwerveDriveOdometry(SwerveDriveKinematics kinematics,				
									Rotation2d gyroAngle, Pose2d initialPose)				
	X	Χ		X				SwerveOdometry_NewZeroCenter.VI	Rotation2d gyroAngle, Pose2d initialPose) public SwerveDriveOdometry(SwerveDriveKinematics kinematics,	,			1
	X	Χ		X				SwerveOdometry_ResetPosition.VI	Rotation2d gyroAngle) public void resetPosition(Pose2d pose, Rotation2d gyroAngle)				
	X	X	X	X				SwerveOdometry Update4.VI	public void resett esitteri(t essezu pese, restationza gyrortigie)	For 4 module drives			
						\top		SwerveOdometry_UpdateWithTime4.VI		REMOVED			
								SwerveOdometry_UpdateWithTimeX.VI		REMOVED			
	Χ	Χ	X	X	•			SwerveOdometry_UpdateX.VI		uses array as input			
									public Pose2d updateWithTime(double currentTimeSeconds,	variable parameters (replace with			ı
						+			Rotation2d gyroAngle, SwerveModuleState moduleStates) public Pose2d update(Rotation2d gyroAngle,	array and "4" calls) variable parameters (replace with			
									SwerveModuleState moduleStates)	array and "4" calls)			
					nized		8						
	Implemented	Documented	9/IL/IB	tem	ion Optii	. :	rest Koutine Sample Progra				Review	rogram	harkina
	ylen	unc	, WP	Menu Iten	Execution	(rest Kol Sample				Je I	# D	7,
	lmp	ρο	Not	ζ	ŭ	ŀ	Sar	VI Name	Function Prototype	Notes	Code	7es	H.
E DRIVE MODULE POSITIONS		X		X	SI			SwerveModulePosition_CompareTo.vi					
		Χ		X				SwerveModulePosition_Get.vi					
	X	Χ	1	X	SI	_		SwerveModulePosition_New.vi					
	đ	7			ptimized		gram				*	E	
	Implementea	Documentea	Not WPILIB	Menu Item	Execution O	:	ı est Koutine Sample Progr	VI Name	Function Proteture	Notes	ode Reviev	est Prograi	rror Check
VERVE DRIVE MODULE STATE		X	<u> </u>	_ <u>≥</u>			<u> </u>	SwerveModuleState CompareTo.vi	Function Prototype public int compareTo(SwerveModuleState o)	Notes	<u> </u>		Щ
LINVE DRIVE WIODULE STATE	X	X	+	X		+		SwerveModuleState Get.vi	public int compare ro(owervervioudleotate o)				
	X	\hat{X}	1	$\frac{\hat{x}}{x}$				SwerveModuleState_New.vi	public SwerveModuleState(double speedMetersPerSecond,				
	'`		1	^	0,				Rotation2d angle)				ı

Revision 3.X 1/11/2023 – renamed library. Added additional documentation. SwerveModuleState Optimize.vi public SwerveModuleState optimize(SwerveModuleState desired, X X SI Χ Rotation2d angle) '======== SPLINE '======== Function Prototype VI Name Notes **CUBIC HERMITE SPLINE** protected SimpleMatrix getCoefficients() not needed, use cluster unpack private SimpleMatrix getControlVectorFromArrays(double[] CubicHermiteSpline getControlVectorFromArrays.vi initialVector, double[] finalVector)
private SimpleMatrix makeHermiteBasis() CubicHermiteSpline_makeHermiteBasis.vi Χ X public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] Χ X Χ CubicHermiteSpline New.vi yFinalControlVector) Che VI Name Function Prototype Notes POSE WITH CURVATURE X PoseWithCurve New.vi public PoseWithCurvature(Pose2d poseMeters, double SI curvatureRadPerMeter) public PoseWithCurvature() can use cluster constant public Pose2d poseMeters not needed, use cluster unpack public double curvatureRadPerMeter. not needed, use cluster unpack WPILIB Function Prototype Notes QUINTIC HERMITE SPLINE X QuinticHermiteSpline_getControlVectorFromArrays.vi private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) QuinticHermiteSpline makeHermiteBasis.vi private SimpleMatrix makeHermiteBasis() public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, X X Χ QuinticHermiteSpline New.vi double[] yFinalControlVector) protected SimpleMatrix getCoefficients() not needed, use cluster unpack Function Prototype Notes VI Name SPLINE (Abstract class) X Spline_getPoint.vi public PoseWithCurvature getPoint(double t) Spline(int degree) public static class ControlVector implemented as data structure public ControlVector(double[] x, double[] y) Routine Function Prototype VI Name Notes private static Spline.ControlVector getCubicControlVector(double SPLINE HELPER X SI SplineHelp GetCubicCtrlVector.vi scalar, Pose2d point)

XX

Χ

Trajectory TransformBy.vi

WPILib LabVIEW Math Library - VI Implementation List Revision 3.X 1/11/2023 – renamed library. Added additional documentation. SplineHelp GetCubicCtrlVectorsFromWayPts.vi public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints(Pose2d start, Translation2d[] interiorWaypoints, Pose2d end) $X \mid X \mid X \mid X$ SplineHelp GetCubicCtrlVectorsFromWeightedWayPts.vi SplineHelp GetCubicSpline Calc1.vi X X X No internal X X No SplineHelp GetCubicSpline Calc2.vi internal X X X No SplineHelp GetCubicSpline Calc3.vi internal Х X SplineHelp getCubicSplinesFromControlVectors.vi public static CubicHermiteSpline[] getCubicSplinesFromControlVectors(Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end) private static Spline.ControlVector getQuinticControlVector(double Χ X SI SplineHelp GetQuinticCtrlVector.vi Χ scalar, Pose2d point) public static List<Spline.ControlVector> REMOVED 2762 SplineHelp GetQuinticCtrlVectorsFromWayPts.vi getQuinticControlVectorsFromWaypoints(List<Pose2d> wavpoints) SplineHelp GetQuinticCtrlVectorsFromWeightedWayPts.vi REMOVED 2762 SplineHelp_getQuinticSplinesFromControlVectors.vi public static QuinticHermiteSpline[] X X getQuinticSplinesFromControlVectors(Spline.ControlVector[] controlVectors) SplineHelp GetQuinticSplinesFromWeightedWayPts.vi New 2762 X X X Χ X SplineHelp GetQuinticSplinesFromWayPts.vi New 2762 private static void thomasAlgorithm(double[] a, double[] b, double[] internal No SplineHelp_ThomasAlgorithm.vi c, double[] d, double[] solutionVector) g WPILIB Function Prototype Notes SPLINE PARAMETERIZER X SplineParam Spline T0 T1.vi public static List<PoseWithCurvature> parameterize(Spline spline double t0, double t1) SplineParam Spline.vi public static List<PoseWithCurvature> parameterize(Spline spline) Χ X X X X No SplineParam StackGet.vi internal X X X No SplineParam StackPop.vi internal X X X No SplineParam StackPush.vi internal '====== **TRAJECTORY** '======== Item VI Name Function Prototype Notes TRAJECTORY X Trajectory_Concatenate.vi Χ FUTURE boolean equals(other obj) Χ X Trajectory_equals.vi XX X SI Trajectory GetStates.vi public List<State> getStates() not needed, use unpack Trajectory_GetTotalTime.vi public double getTotalTimeSeconds() XX X SI not needed, use unpack X Χ No SI Trajectory_lerp_double.vi private static double lerp(double startValue, double endValue, internal double t) XX No SI Trajectory_lerp_Pose.vi private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t) XX Χ SI Trajectory New Empty.vi XX X Trajectory_New.vi public Trajectory(final List<State> states) SI public Trajectory relativeTo(Pose2d pose) XX Trajectory RelativeTo.vi Χ XX X Trajectory Sample.vi public State sample(double timeSeconds) Χ X Trajectory_SampleReverse.vi Sample in reverse order. Negate X Χ

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public Trajectory transformBy(Transform2d transform)

can use cluster unpack, array index

public Pose2d getInitialPose()

	Implemented	Documented	Not WPILIB		Menu Item	Execution Optimized	Test Routine	Sample Program		5 5 8 44	N	Code Review	est Program	rror Checking
RAJECTORY_STATE		<u>Q</u>			<u>≥</u> X	Ы SI			VI Name	Function Prototype boolean equals(other obj)	Notes	<u> </u>	, Je	<u> </u>
IRAJECTORT_STATE	X	X	X		X	SI			TrajectoryState_Equals.vi TrajectoryState GetAll.vi	boolean equals(other obj.)				
	X	X	<u> </u>			SI			TrajectoryState_GetPose.vi					
	Χ	Χ			X				TrajectoryState_Interpolate.vi	State interpolate(State endValue, double i)				
	X	X			X	SI			TrajectoryState_New.vi	public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter) public State()				
	mplemented	Documented	WPILIB		Item	Execution Optimized	Test Routine	le Program				Review	Test Program	Checking
	pler	cur.	¥.		Menu	noe.	st F	Sample I				Code	st F	'o'
F			Not			Ě			VI Name	Function Prototype	Notes	<u>8</u>	7e	En
RAJECTORY CONFIG	X	X			X				TrajectoryConfig_AddConstraint.vi	public TrajectoryConfig addConstraint(TrajectoryConstraint constraint)	Implemented differently, can't duplicate.			
	X	Χ		1	X				TrajectoryConfig_AddConstraints.vi	public TrajectoryConfig addConstraints(List extends</td <td>Implemented differently, can't</td> <td></td> <td></td> <td></td>	Implemented differently, can't			
	X	X			x	SI			TrajectoryConfig_Create.vi	TrajectoryConstraint> constraints) public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq)	duplicate.			
	X	Χ		+	X				TrajectoryConfig_GetCentripetalAccel.vi	double maxAccelerationivietersPerSecondSq)				
	Х	Χ	X		X				TrajectoryConfig_GetConstraints.vi	public List <trajectoryconstraint> getConstraints()</trajectoryconstraint>	Implemented differently, can't duplicate.			
-	X	X			X				TrajectoryConfig_GetEndVelocity.vi	public double getEndVelocity()	can use cluster unpack			
-	X	X			X X				TrajectoryConfig_GetKinematicsDiffDrive.vi TrajectoryConfig_GetKinematicsMecanumfDrive.vi					
	X	\overline{X}			X				TrajectoryConfig_GetKinematicsSwerveDrive.vi					
	Χ	Χ	X		X				TrajectoryConfig_GetMaxVelAccel.vi					
	Χ	Χ			Χ				TrajectoryConfig_GetStartVelocity.vi	public double getStartVelocity()	can use cluster unpack			
-	X	X			X				TrajectoryConfig_GetVoltageDiffDrive.vi	- this had a sis Davis and ()				
-	X	X	X		X X	SI			TrajectoryConfig_IsReversed.vi TrajectoryConfig_setCentripetalAccel.vi	public boolean isReversed()	can use cluster unpack			
	$\frac{\lambda}{X}$	X	+^		X	JI			TrajectoryConfig_SetCentripetalAccel.vi TrajectoryConfig_SetEndVelocity.vi	public TrajectoryConfig setEndVelocity(double				
	X	X			X	SI			TrajectoryConfig_setKinematicsDiffDrive.vi	endVelocityMetersPerSecond) public TrajectoryConfig setKinematics(DifferentialDriveKinematics	3			
	X	X	1		X	SI			TrajectoryConfig_setKinematicsMecanumfDrive.vi	kinematics) public TrajectoryConfig setKinematics(MecanumDriveKinematics				
			-							kinematics)				
	X	X			X	SI			TrajectoryConfig_setKinematicsSwerveDrive.vi	public TrajectoryConfig setKinematics(SwerveDriveKinematics kinematics)				
	X	Χ			X	SI			TrajectoryConfig_setReversed.vi	public TrajectoryConfig setReversed(boolean reversed)				
	X	Χ			X			_	TrajectoryConfig_SetStartVelocity.vi	public TrajectoryConfig setStartVelocity(double				
	X	X	X	-	x	SI			TrajectoryConfig setVoltageDiffDrive.vi	startVelocityMetersPerSecond)				
			<u> </u>		+	<u> </u>			gozia. / ooinig_ooi v oilagoziiizii vo. vi	public double getMaxVelocity()	Created function to return both			
										public double getMaxAcceleration()	Created function to return both			
										NOTE ADD OTHER "SET" ROUTINES FOR OTHER CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC.				
						mized		e.						-
	Implemented	Documented	WPILIB	:	u Item	ecution Optii	Routine	Sample Program				: Review	Program	. Checking
	nple	700,	Not V		Menu	x ec	Test	am,	VI Nama	Function Protetune	Notes	Code	<i>Test</i>	rror
JECTORY GENERATE		X	_		<u> </u>	Ĕ	<u> </u>		VI Name TrajectoryGenerate_Make_Cubic_CtrlVect.vi	Function Prototype public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector</translation2d>	Notes uses cubic splines	0	Ĕ	Ē

	X	X		X	,		TrajectoryGenerate_Make_Cubic.vi	public static Trajectory generateTrajectory(Pose2d start,	uses cubic splines			
			ı		,			List <translation2d> interiorWaypoints, Pose2d end,</translation2d>				
	Y	X		Y	\rightarrow		TrajectoryGenerate Make Generic.vi	TrajectoryConfig config) Helper to bring these all together	Use this one!!!			
	X			X	\rightarrow		TrajectoryGenerate_Make_Generic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory/ ControlVectorI ist	uses quintic splines			
								public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config)				
	Χ		Χ				TrajectoryGenerate_Make_Quintic_Weighted.vi		New 2762			
	X	X	ı	X			TrajectoryGenerate_Make_Quintic.vi	<pre>public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config)</pose2d></pre>	uses quintic splines			
	X	X		X			TrajectoryGenerate_splinePointsFromSplines.vi	public static List <posewithcurvature></posewithcurvature>				
		لـــــا					7 7 21	splinePointsFromSplines(Spline[] splines)				
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	Пщ	Do	Not	Me	Exe	7es	ଓ VI Name	Function Prototype	Notes	Ö	7es	Err
TRAJECTORY GENERATE (Control Vector)								public ControlVectorList(int initialCapacity)	may not need, just data			
								public ControlVectorList()	may not need, just data			
								public ControlVectorList(Collection extends<br Spline.ControlVector> collection)	may not need, just data			
	ented	Documented	Not WPILIB	em	on Optimized	Test Routine	ple Program			eview	ogram	hecking
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	nple	200	10t l	len	xec	est	ର୍ଷ୍ଟି VI Name	Function Prototyno	Notos	Sode	Test	rrot
TRAJECTORY PARAMETERIZE	<u> </u>				Щ		7 VI Name TrajectoryParam_calcStuffFwd.vi	Function Prototype	Notes	O	<u> </u>	<u> </u>
TRAJECTOR FARAIMETERIZE	X			No	\rightarrow		TrajectoryParam_calcStuffRev.vi					
	X	X		No	-+		TrajectoryParam enforceAccel.vi	private static void enforceAccelerationLimits(boolean reverse,	This routines needs to be changed			
	X	X	X	No			TrajectoryParam_enforceVelocity.vi	List <trajectoryconstraint> constraints, ConstrainedState state)</trajectoryconstraint>	when new constraints are added. This routines needs to be changed			
	X	X		X			TrajectoryParam_timeParam.vi	public static Trajectory timeParameterizeTrajectory(List <posewithcurvature> points. List<trajectoryconstraint> constraints, double startVelocityMetersPerSecond, double endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double</trajectoryconstraint></posewithcurvature>	when new constraints are added.			
	,					- 1		maxAccelerationMetersPerSecondSq, boolean reversed)				
	lemented	umented	WPILIB	nu Item	cution Optimized	t Routine	nple Program			le Review	t Program	אר Checking
	mplemented	Documented	Vot WPILIB	Menu Item	Optimiz	Test Routine	Sample Program	Function Prototype	Notes	Sode Review	Test Program	Error Checking
CTORY PARAMETERIZE CONSTRAINED STATE		X	Not	X Menu	Optimiz	st	ConstrainedState_New.vi	Function Prototype ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)	Notes	Code Review	Test Program	Error Checking
CTORY PARAMETERIZE CONSTRAINED STATE	X	X	Not	X Wenu	Optimiz	Test Routine	ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double	Notes	Code Review	Test Program	Error Checking
CTORY PARAMETERIZE CONSTRAINED STATE	X	X X X	X	X Wenu	Optimiz	Test Routine	ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi ConstrainedState_SetMinAccel.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double	Notes	Code Review	Test Program	Error Checking
CTORY PARAMETERIZE CONSTRAINED STATE	X X X	X X X	X X X	X X X	Optimiz	Test Routine	ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi ConstrainedState_SetMinAccel.vi ConstrainedState_SetVelAccel.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double	Notes	Code Review	Test Program	Error Checking
CTORY PARAMETERIZE CONSTRAINED STATE	X X X	X X X	X X X	X X X	Optimiz	Test Routine	ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi ConstrainedState_SetMinAccel.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)	Notes	Code Review	Test Program	Error Checking
CTORY PARAMETERIZE CONSTRAINED STATE	X X X	X X X	X X X	X X X	Optimiz	Test Routine	ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi ConstrainedState_SetMinAccel.vi ConstrainedState_SetVelAccel.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double	Notes	Code Review	Test Program	Error Checking
CTORY PARAMETERIZE CONSTRAINED STATE	X X X	X X X	X X X	X X X	Optimiz	Test Routine	ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi ConstrainedState_SetMinAccel.vi ConstrainedState_SetVelAccel.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)	Notes	Code Review	Test Program	Error Checking
CTORY PARAMETERIZE CONSTRAINED STATE	X X X	X X X	X X X	X X X	Optimiz	Test	ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi ConstrainedState_SetMinAccel.vi ConstrainedState_SetVelAccel.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)	Notes	w Code Review	m Test Program	ing Error Checking
CTORY PARAMETERIZE CONSTRAINED STATE	X X X	X X X	X X X X	X X X X X	Optimiz	Test	ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi ConstrainedState_SetMinAccel.vi ConstrainedState_SetVelAccel.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)	Notes	view Code Review	gram Test Program	scking Error Checking
CTORY PARAMETERIZE CONSTRAINED STATE	x X X X X	X X X X X	X X X X	ttea X X X X X X X X X X X X X X X X X X X	n Optimized Execution Optimiz	Test	ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi ConstrainedState_SetMinAccel.vi ConstrainedState_SetVelAccel.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)	Notes	Review Code Review	Program Test Program	Checking Error Checking
CTORY PARAMETERIZE CONSTRAINED STATE	X X X	X X X	WPILIB X X X X X	ttea X X X X X X X X X X X X X X X X X X X	n Optimized Execution Optimiz	st Routine Test	ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi ConstrainedState_SetMinAccel.vi ConstrainedState_SetVelAccel.vi ConstrainedState_SetVelocity.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq) ConstrainedState()	Notes	nde Review Code Review	st Program Test Program	or Checking
CTORY PARAMETERIZE CONSTRAINED STATE	/ 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	Optimiz	st Routine Test	ConstrainedState_New.vi ConstrainedState_SetMaxAccel.vi ConstrainedState_SetMinAccel.vi ConstrainedState_SetVelAccel.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)	Notes	Code Review	Test Program Test Program	Error Checking

Revision 3.X 1/11/2023 – renamed library. Added additional de										
	X	X		X X			TrajectoryUtil_MakeWeightedWayPoint.vi			
	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)		
TRAPEZOID PROFILE	X X X X X X X X X	X X X X	X	X X No X X X X X X X X X X X X X X X X X	Test F		VI Name TrapProfConstraint_New.vi TrapProfile_Calculate.vi TrapProfile_Direct.vi TrapProfile_Execute.vi TrapProfile_Execute_AtGoal.vi TrapProfile_IsFinished.vi TrapProfile_New_DefInitial.vi TrapProfile_New.vi TrapProfile_ShouldFlipAcceleration.vi TrapProfile_TimeLeftUntil.vi TrapProfile_TotalTime.vi TrapProfile_TotalTime.vi TrapProfile_TotalTime.vi TrapProfState_Equals.vi		Private, remove from menu Private, remove from menu	
	X	X		X			TrapProfState New.vi			
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TRAJECTORY CONSTRAINT										•
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CENTRIPETAL ACCELERATION CONSTRAINT	X Implemented	X Documented	Not W	X Menu Item Execution Optimize			VI Name CentripetalAccelConstraint_getMaxVelocity.vi	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	X		X S	<i>I</i>		CentripetalAccelConstraint_New.vi	public CentripetalAccelerationConstraint(double	Can use cluster pack for now)
								maxCentripetalAccelerationMetersPerSecondSq)		
	nplemented	ocumented	Not WPILIB	enu Item xecution Ontimized	st Routii	ample Program				;
DIEE DRIVE WINEMATIC CONCERNIO	- 1	Q		Ž Ú	i		VI Name		Notes	
DIFF DRIVE KINEMATIC CONSTRAINT		X		X			DiffDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)		
	X	X		X			DiffDriveKinematicsConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)		
	Х	X		X S	1		DiffDriveKinematicsConstraint_New.vi	public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond)		
	Implemented	Documented	Not WPILIB	Menu Item Execution Ontimized		Sample Program	VI Name	Function Prototype	Notes	

1073 - renamed iinrarv Added additionali									
023 – renamed library. Added additional DIFF DRIVE VOLTAGE CONSTRAIN	ГХ	X		X			DiffDriveVoltageConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double	
	X	X		X			DiffDriveVoltageConstraint_getMinMaxAccel.vi	velocityMetersPerSecond) public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI		DiffDriveVoltageConstraint_New.vi	public DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)	
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	nted	nted	BIT	Ē	n Optin	ıııne Prograi			
	nplemente	Documente	Not WPILI	Menu Item	Execution	rest Routine Sample Prog	VI Name	Function Prototype	Notes
ELLIPTICAL REGION CONSTRAINT		X		X	Ш		EllipRegionConstraint_getMaxVelocity.vi	Function Flototype	Notes
	X	X		X			EllipRegionConstraint_getMinMaxAccel.vi EllipRegionConstraint_IsPoseInRegion.vi		
	X			Χ			EllipRegionConstraint_New.vi		
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	'mplemente	Documente	WPILIB	Item	ition (Routine tple Prog			
	npler	ocar	Not W	Menu	Execution	Samp	VI Name	Function Prototype	Notes
JERK CONSTRAIN			X		Ш		JerkConstraint_getMaxVelocity.vi	Routine exists, it is just a shell	FUTURE
	/		X		SI		JerkConstraint_getMinMaxAccel.vi JerkConstraint_New.vi	Routine exists, it is just a shell Routine exists, it is just a shell	FUTURE FUTURE
	plemented	Documented	t WPILIB	Menu Item	Execution Opt	st Koutine mple Progra			
MAX VELOCITY CONSTRAINT	_ <u></u> <u></u>		Not		SI	Sam	VI Name MaxVelocityConstraint_getMaxVelocity.vi	Function Prototype	Notes
MAX VELOCITI CONSTRAINT	X	X		X	SI		MaxVelocityConstraint_getMinMaxAccel.vi		
	X	X		Χ	SI		MaxVelocityConstraint_New.vi		
				'					
	pə,	pə	В		Optimized	ne ogram			
	nplemented	ocumented	lot WPILIB	Menu Item	xecution Optimized	est Routine	VI Nama	Function Prototyne	Notes
IM DRIVE KINEMATICS CONSTRAIN	ξ Τ <i>X</i>		Not	X Menu	Execution Optimized	Sample Program	VI Name MecaDriveKinematicsConstraint_getMaxVelocity.vi	Function Prototype	Notes
UM DRIVE KINEMATICS CONSTRAIN	Τ <u>Χ</u> Χ	X	Not	X Wenu		Sample Program	MecaDriveKinematicsConstraint_getMaxVelocity.vi MecaDriveKinematicsConstraint_getMinMaxAccel.vi	Function Prototype	Notes
NUM DRIVE KINEMATICS CONSTRAIN	Τ <u>Χ</u> Χ	Y X X	WPILIB	u Item	otimized IS	ıram .	MecaDriveKinematicsConstraint getMaxVelocity.vi	Function Prototype	Notes
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UM DRIVE KINEMATICS CONSTRAIN' ECTANGULAR REGION CONSTRAINT	Implemented X X X III	X X Documented	Not WPILIB Not	X X Menu Item	otimized IS	ıram .	MecaDriveKinematicsConstraint_getMaxVelocity.vi MecaDriveKinematicsConstraint_getMinMaxAccel.vi MecaDriveKinematicsConstraint_New.vi VI Name RectRegionConstraint_getRectRegion.vi RectRegionConstraint_getMinMaxAccel.vi		
	T X X X Implemented X	X X X X X	Not WPILIB Not	X Wenu Item	otimized IS	ıram .	MecaDriveKinematicsConstraint_getMaxVelocity.vi MecaDriveKinematicsConstraint_getMinMaxAccel.vi MecaDriveKinematicsConstraint_New.vi VI Name RectRegionConstraint_getRectRegion.vi		

WPILib LabVIEW Math Library - VI Implementation List Revision 3.X 1/11/2023 – renamed library. Added additional documentation. Notes Function Prototype public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)
public MinMax SWERVE DRIVE KINEMATICS CONSTRAINT X SwerveDriveKinematicsConstraint getMaxVelocity.vi SwerveDriveKinematicsConstraint_getMinMaxAccel.vi getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) Newpublic SwerveDriveKinematicsConstraint(final SwerveDriveKinematics kinematics, double X Χ SI SwerveDriveKinematicsConstraint_New.vi Can use cluster pack for now maxSpeedMetersPerSecond) Function Prototype Notes TRAJECTORY CONSTRAINT TrajConstraint_GetMaxVelocity.vi $X \mid X \mid X \mid X$ TrajConstraint_GetMinMaxAccel.vi X X X X X X X TrajConstraint GetType.vi Function Prototype Notes TRAJECTORY CONSTRAINT (Min Max) X Constraint_MinMax_New SI Constraint_MinMax_New.vi XX X SI Constraint MinMax NewMinMax.VI Constraint MinMax New '======== 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	Nample Program	Function Prototype	Notes
UTIL	Χ	Χ	Χ	Χ	SI		Util_ApproxEqual.vi		
	Χ	Χ	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_GetLibUsage.vi		
	X	Χ	X	X			Util_GetTime.vi		Once tested completely, this should be optimized!
	Χ	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	X			Util_Trajectory_ReadFile.vi		
	Χ	Χ	Χ	X			Util_Trajectory_to_XY.vi		
	Χ	Χ	Χ	No			Util_Trajectory_WriteFile_Config.vi		internal
	Χ	Χ	Χ	No			Util_Trajectory_WriteFile_OneState.vi		internal
	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_Trajectory_WriteFile.vi		

Revision 3.X 1/11/2023 – renamed library. Added additional documentation

docum	entatio	n.				
X	X	X	X		Util_TrajectoryState_Meters_To_Inches.vi	
X	Χ	X	X		Util_TrajState_to_DiffDrive_WheelPos.vi	
X	X	Χ	Χ		Util_DispWaypoint_Eng_To_SI.vi	
X	Χ	X	X		Util_DispWaypoint_To_CubicInput.vi	
X	X	Χ	Χ		Util_DispWaypoint_To_QuinticInput.vi	
X	Χ	X	X		Util_DispWeightedWaypiont_Eng_To_WeightedWaypoint	
X	Χ	Χ	No		Util_DispWeightedWayPoint_To_WeightedWayPoint.vi	Sorry about the confusing name

'====== CONVERSIONS

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

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Op	Test Routine	Sample Program Name	Function Prototype	Notes
CONV	Χ	Χ	Χ	Χ	SI		Conv_AngleDegrees_Heading.vi		
	Χ	Χ	Χ	Χ	SI		Conv_AngleRadians_Heading.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Centimeters_Meters.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Deg_Radians.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Deg_Rotations.vi		
	Χ	X	Χ	Χ	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	Χ	SI		Conv_Kilograms_Pounds.vi		
	Χ	X	Χ	Χ	SI		Conv_Meters_Feet.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Meters_Inches.vi		
	Χ	X	Χ	Χ	SI		Conv_Pose2d_SI_Eng.vi		
	Χ	X	Χ	Χ	SI		Conv_Pounds_Kilograms.vi		
	Χ	X	Χ	Χ	SI		Conv_Radians_Deg.vi		
	Χ	X	Χ	Χ	SI		Conv_Radians_Rotations.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Rotations_Deg.vi		
	Χ	X	Χ	Χ	SI		Conv_Rotations_Radians.vi		
	Χ	X	Χ	Χ	SI		Conv_Yards_Meters.vi		

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

'===== PATHFINDER UTIL

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

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

DIFFERENTIAL DRIVE POSE ESTIMATOR X X X X X V D DIffDrivePoseEst_AddVisionMeasurement.vi

OVIEW Main Library – Vi implementation L										
1/11/2023 – renamed library. Added additional			14		D:WD: D					
	X	X	X		DiffDrivePoseEst_FillStateVector.vi					
		X	X		DiffDrivePoseEst_GetEstimatedPosition.vi					
		X	X		DiffDrivePoseEst_Kalman_F_Callback.vi					
		X	X		DiffDrivePoseEst_Kalman_H_Callback.vi					
		X	X		DiffDrivePoseEst_New.vi					
	X	X	X		DiffDrivePoseEst_ResetPosition.vi					
	X	X	X		DiffDrivePoseEst SetVisionMeasurementStdDevs.vi					
	X	X	X		DiffDrivePoseEst Update.vi					
		X	X		DiffDrivePoseEst_UpdateWithTime.vi					
		X	X		DiffDrivePoseEst VisionCorrect Callback.vi					
		X	X		DiffDrivePoseEst VisionCorrect Kalman H Callback.vi					
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	Ĕ	å §	Νe	EX E	δ VI Name	Function Prototype	Notes	Š	ě	ii.
EXTENDED KALMAN FILTEI	RX	\overline{X}	\overline{X}		ExtendedKalmanFilter Correct OnlyUY.vi	71				
		X	X		ExtendedKalmanFilter Correct.vi		Just a shell, not functional!			
		X	X		ExtendedKalmanFilter GetP Single.vi		Just a shell, flot full clional:			
		X	X		ExtendedKalmanFilter_GetP.vi					
		X	X		ExtendedKalmanFilter_GetXHat_Single.vi					
		X	X		ExtendedKalmanFilter_GetXHat.vi					
		Χ	X		ExtendedKalmanFilter_New.vi					
	X	X	X		ExtendedKalmanFilter_Predict.vi					
	X	X	X		ExtendedKalmanFilter Reset.vi					
		X	X		ExtendedKalmanFilter SetP.vi					
		X	X		ExtendedKalmanFilter_SetXHat_Single.vi					
		X	X		ExtendedKalmanFilter_SetXHat.vi					
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	X	X	No	lo <u> </u>		MecaDrivePoseEst_Kalman_F_Callback.vi					
	X		No.			MecaDrivePoseEst_Kalman_H_Callback.vi MecaDrivePoseEst_New.vi					+
	\hat{X}		X			MecaprivePoseEst_New.vi MecaprivePoseEst_ResetPosition.vi					+
	X		X			MecaDrivePoseEst_SetVisionMeasurementStdDevs.vi					I
	X		X			MecaDrivePoseEst_Update.vi MecaDrivePoseEst_UpdateWithTime.vi					+
	X	X	No	lo		MecaDrivePoseEst_VisionCorrect_Callback.vi					\exists
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_	X	X	X			SwerveDrivePoseEst_Kalman_H_Callback.vi SwerveDrivePoseEst New.vi					
	X		X			SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_ResetPosition.vi					+
	X	X	Χ	(SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi					\Box
	X		X			SwerveDrivePoseEst_Update.vi SwerveDrivePoseEst_UpdateWithTime.vi					_
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	X X X X X X X X	X X X X X X X X X	X			UnscentedKalmanFilter_Correct_OnlyUYR.vi UnscentedKalmanFilter_Correct.vi UnscentedKalmanFilter_GetP_Single.vi UnscentedKalmanFilter_GetP.vi UnscentedKalmanFilter_GetXHat_Single.vi UnscentedKalmanFilter_GetXHat.vi UnscentedKalmanFilter_New_Default.vi UnscentedKalmanFilter_New_FuncGroup.vi					
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WPILib LabVIEW Math Library – VI Implementation List
Revision 3.X 1/11/2023 – renamed library. Added additional documentation.
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STATE SPACE CONTROL

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DIFFERENTIAL DRIVE ACCELERATION LIMITER	X Implemented	× Documented	Not WPILIB	X Menu Item	Execution Optimized	X Test Routine	W VI Name DiffDrvAccelLimit Calculate.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
DITTERCENTIAL DRIVE ACCELLATION LIMITER	X	X		X		X	DiffDrvAccelLimit_New.vi					
IMPLICIT MODEL FOLLOWER	x Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	X Test Routine	W VI Name ImplModelFollow_Calculate.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
IIII EISTI MODEL I SEESWEIK	X	Χ		X		X	ImplModelFollow_GetU.vi ImplModelFollow_GetU_Single.vi					
	X	X		X		X	ImplModelFollow_New.vi ImplModelFollow_New_Plant.vi					
	X	X		X		X	ImplModelFollow_Reset.vi					
LINEAR PLANT INVERSION FEEDFORWARD	X X X	X	Not WPILIB	X X Wenu Item	Execution Optimized	Test Routine	VI Name LinearPIntInvFF_Calculate_NextR.vi LinearPIntInvFF_Calculate.vi LinearPIntInvFF_GetR_Single.vi LinearPIntInvFF_GetR_vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	Χ		X			LinearPIntInvFF_GetUff_Single.vi LinearPIntInvFF_GetUff.vi					
	X X	X X		X X X			LinearPIntInvFF_New_Plant.vi LinearPIntInvFF_New.vi LinearPIntInvFF_Reset_Initial.vi					
	X	X		X			LinearPIntInvFF_Reset_Zero.vi					
	Implemented	. Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR QUADRATIC REGULATOR	X X X	X		X			LinearQuadraticRegulator_Calculate_NextR.vi LinearQuadraticRegulator_Calculate.vi					
	Χ	X		Χ			LinearQuadraticRegulator_GetK_Single.vi		NOT ORIGINAL			

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Revision 3.X	1/11/2023 – renamed library.	Added additional docume

al docume	entatio	n.					
X	X		Χ	X	LinearQuadraticRegulator_GetK.vi		
X	X		Χ		LinearQuadraticRegulator_GetR_Single.vi		
X	X		Χ		LinearQuadraticRegulator_GetR.vi		
X	X		Χ		LinearQuadraticRegulator_GetU_Single.vi		
X	X		Χ		LinearQuadraticRegulator_GetU.vi		
X	X		Χ	X	LinearQuadraticRegulator_LatencyCompensate.vi	Routine exists, but it only has	
						interger raise matrix to power.	
X	X		Χ		LinearQuadraticRegulator_New_ELMS.vi		
X	X		Χ		LinearQuadraticRegulator_New_N.vi		
					LinearQuadraticRegulator_New_Raw.vi		
X	X		Χ	X	LinearQuadraticRegulator_New_SystemELMS.vi		
X	X		Χ		LinearQuadraticRegulator_New.vi		
X	X		Χ		LinearQuadraticRegulator_Reset.vi		
					· · ·		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM	Χ	Χ		Χ	1			LinearSystem_CalculateX.vi					
	Χ	Χ		Χ	I			LinearSystem_CalculateY.vi					
	Χ	Χ		X	SI			LinearSystem_GetA.vi					
	Χ	Χ		X	SI			LinearSystem_GetAElement.vi					
	Χ	Χ		X	SI			LinearSystem_GetB.vi					
	Χ	Χ		X	SI			LinearSystem_GetBElement.vi					
	Χ	Χ		X	SI			LinearSystem_GetC.vi					
	Χ	Χ		X	SI			LinearSystem_GetCElement.vi					
	Χ	Χ		X	SI			LinearSystem_GetD.vi					
	Χ	Χ		X	SI			LinearSystem_GetDElement.vi					
	Χ	Χ		X	SI			LinearSystem_New.vi					

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

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LTV DIFFERENTIAL DRIVE CONTROLLER	X Implemented	_	Not WPILIB	X Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name LTVDiffDriveCtrl_Calculate.vi LTVDiffDriveCtrl New.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X				LTVDiffDriveCtrl Calculate TrajState.vi					
	Χ	X		Х				LTVDiffDriveCtrl_Calculate_SetTolerance.vi					
	Χ	X		Х				LTVDiffDriveCtrl Calculate AtReference.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LTV UNICYCLE CONTROLLER	Χ	X		X		Χ		LTVUnicycleCtrl_AtReference.vi					
	Χ			Χ		Χ		LTVUnicycleCtrl_Calculate_TrajState.vi					
	X	X		Χ		Χ		LTVUnicycleCtrl_Calculate.vi					
	X	X		X		Χ		LTVUnicycleCtrl_New.vi					
	Χ	X		X		Χ		LTVUnicycleCtrl_SetEnabled.vi					
	X	X		X		Χ		LTVUnicycleCtrl_SetTolerance.vi					
	l	1	1	1	1	I	1					1	1

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

CALLBACK HELPER	X X X X X X X X X X	X X Documented	X X X X X X	X X Menu Item	Execution Optimized	Test Routine	VI Name CallbackHelp_MatrixMinus.vi CallbackHelp_MatrixMult_CoerceSizeB.vi CallbackHelp_MatrixMult.vi CallbackHelp_MatrixPlus.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
DISCRETIZATION	X X Implemented	X X Documented	Not WPILIB	X X Menu Item	Execution Optimized	X X X Test Routine	Discretization_DiscretizeA.vi Discretization_DiscretizeAB.vi Discretization_DiscretizeABTaylor.vi Discretization_DiscretizeAQ.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
STATE SPACE UTIL	X Implemented	X Documented	X Not WPILIB	Nenu Item	Execution Optimized	Test Routine	S VI Name StateSpaceUtil_Check_Stabalizable.vi	Function Prototype	Notes Internal routine	Code Review	Test Program	Error Checking

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Revision 3.X 1/11/2023 – renamed library. Added additional documentation.	

nal docume	entatio	n.						
X	X		Χ		StateSpaceUtil_ClampInputMaxMagnitude.vi	Routine exists, it is just a shell		
X	X		Χ		StateSpaceUtil_IsDetectable.vi			
X	X		Χ		StateSpaceUtil_IsStabalizable.vi			
X	X		X	X	StateSpaceUtil_MakeCostMatrix.vi			
X	X		Χ	Χ	StateSpaceUtil_MakeCovarianceMatrix.vi			
X	X		X		StateSpaceUtil_MakeWhiteNoiseVector.vi			
X	X		Χ		StateSpaceUtil_NomalizeInputVector.vi			
X	X		X		StateSpaceUtil_PoseTo3dVector.vi			
X	X		Χ		StateSpaceUtil_PoseTo4dVector.vi			
X	X		Χ		StateSpaceUtil_PoseToVector.vi			

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

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

	Implemented	Documented	Not WPILIB	Menu item	Execution Optimiz	Test Routine	Name Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DC MOTOR SIM	Χ	Χ		X			DCMotorSim_getAngularPositionRad.vi					
	Χ	Χ		X			DCMotorSim_getAngularPositionRotations.vi					
	Χ	Χ		X			DCMotorSim_getAngularVelocityRadPerSec.vi					
	Χ	Χ		X			DCMotorSim_getAngularVelocityRPM.vi					
	Χ	Χ		X			DCMotorSim_GetCurrentDrawAmps.vi					
	Χ	Χ		X			DCMotorSim_New_MOI.vi					
	Χ	Χ		X			DCMotorSim_New_Plant.vi					
	X	X		X			DCMotorSim_SetInputVoltage.vi					
	X	X		X			DCMotorSim_Update.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimi:	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE TRAIN SIM	X	X		Χ			DiffDriveTrainSim_ClampInput.vi					
	X	X		Χ			DiffDriveTrainSim_CreateKitbotSim_EstMass.vi					
	X	X		Χ			DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi					
	X	X		Χ			DiffDriveTrainSim_CreateKitbotSim.vi					
	Χ	Χ		Χ			DiffDriveTrainSim_GetCurrentDrawAmps.vi					
	Χ	Χ		Χ			DiffDriveTrainSim_GetCurrentGearing.vi					
	Χ	Χ		Χ			DiffDriveTrainSim_GetDynamics.vi					
	X	X		Χ			DiffDriveTrainSim_GetHeading.vi					
		Χ		Χ			DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi					
		Χ		Χ			DiffDriveTrainSim_GetLeftPositionMeters.vi					
	X	X		Χ			DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi					
	_	X		Χ			DiffDriveTrainSim_GetOutput_Single.vi					
		X		Χ			DiffDriveTrainSim_GetPose.vi					
		Χ		Χ			DiffDriveTrainSim_GetRightCurrentDrawAmps.vi					
	Χ	Χ		Χ			DiffDriveTrainSim_GetRightPositionMeters.vi					
		Χ		Χ			DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi					
	X	X		Χ			DiffDriveTrainSim_GetState_Single.vi					

DiffDriveTrainSim_GetState.vi

1/11/2023 – renamed library. Added additional						D:#D::: T::- C: 1/:+D-4\M/1C::					
	X	X		X		DiffDriveTrainSim_KitBotWheelSize.vi					
		X		X		DiffDriveTrainSim_New_Mass_MOI.vi					
		X		X		DiffDriveTrainSim_New.vi					
	X			Χ		DiffDriveTrainSim_SetCurrentGearing.vi					
	X			X		DiffDriveTrainSim_SetInputs.vi					
	X	X		X		DiffDriveTrainSim_SetPose.vi					
	X	X		X		DiffDriveTrainSim SetState.vi					
	X			X		DiffDriveTrainSim_ToughBoxMiniGearRatio.vi					
		X		X		DiffDriveTrainSim_ToughBoxMiniMotor.vi					
	X			X		DiffDriveTrainSim_Todgriboxiviiiiviotor.vv					
		+^		+^		DIIIDIIVE ITAIIIOIIII_Opuale.vi					
ELEVATOR SIM	X X X	X X X		X Wenu Item	Execution Optimized	VI Name ElevatorSim_GetCurrentDraw.vi ElevatorSim_GetPositionMeters.vi ElevatorSim_GetVelocityMetersPerSecond.vi ElevatorSim_HasHitLowerLimit.vi ElevatorSim_HasHitUpperLimit.vi ElevatorSim_New_LinSys_NoNoise.vi ElevatorSim_New_LinSys.vi ElevatorSim_New_NoNoise.vi ElevatorSim_New_NoNoise.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X	X			ElevatorSim_RKF45_Func.vi					
	X	X		X		ElevatorSim_SetInputVoltage.vi					
	X	X		X		ElevatorSim SetState.vi					
			X			ElevatorSim_Update.vi		Needed because this doesn't			
		^	^	^		Liovatoroim_opuato.vi		extend.			
	Y	X		X		ElevatorSim UpdateX.vi		CALCITU.			
	X	X		X		ElevatorSim_WouldHitLowerLimit.vi ElevatorSim_WouldHitUpperLimit.vi					
			'		_						
	p ə,	nted		E	on Optimized	Program			eview	gram	ecking
	p ə,	nented		ltem	ition Optimized	ile Program			Review	rogram	Checking
	p ə,	cumented		ltem	ecution Optimized	mple Program			de Review	st Program	or Checking
	p ə,	Documented		ltem	Execution Optimized	€	Function Prototype	Notes	Code Review	Test Program	Error Checking
EI VWHEEI SIN	Implemented	x Documented	Not WPILIB	Menu Item	Exec	ଞ୍ଚ VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
FLYWHEEL SIM	X Implemented	X	Not WPILIB	X Menu Item	Exec	VI Name FlyWheelSim_GetAngularVelocityRadPerSec.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
FLYWHEEL SIN	X X Implemented	X	Not WPILIB	X X Menu Item	Exec	VI Name FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetAngularVelocityRPM.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
FLYWHEEL SIM	X X Implemented	X	Not WPILIB	X Menu Item	Exec	VI Name FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetAngularVelocityRPM.vi FlyWheelSim_GetCurrentDrawAmps	Function Prototype		Code Review	Test Program	Error Checking
FLYWHEEL SIN	X X Implemented	X	Not WPILIB	X X Menu Item	Exec	VI Name FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetAngularVelocityRPM.vi FlyWheelSim_GetCurrentDrawAmps FlyWheelSim_New_LinSys		Future	Code Review	Test Program	Error Checking
FLYWHEEL SIN	X X Implemented	X	Not WPILIB	X X Menu Item	Exec	VI Name FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetAngularVelocityRPM.vi FlyWheelSim_GetCurrentDrawAmps FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise			Code Review	Test Program	Error Checking
FLYWHEEL SIN	X X Implemented	X	Not WPILIB	X X Menu Item	Exec	VI Name FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetAngularVelocityRPM.vi FlyWheelSim_GetCurrentDrawAmps FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise		Future	Code Review	Test Program	Error Checking
FLYWHEEL SIM	X X Implemented	X X X	Not WPILIB	X X Menu Item	Exec	VI Name FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetAngularVelocityRPM.vi FlyWheelSim_GetCurrentDrawAmps FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise FlyWheelSim_New_LinSys_NoNoise		Future Future	Code Review	Test Program	Error Checking
FLYWHEEL SIN	X mplemented	XXXX	Not WPILIB	X Wenu Item	Exec	VI Name FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetAngularVelocityRPM.vi FlyWheelSim_GetCurrentDrawAmps FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise FlyWheelSim_New_LinSys_NoNoise FlyWheelSim_New_MOI.vi		Future Future	Code Review	Test Program	Error Checking
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								Riccati_DARE_Choose.vi		Intended to allow DARE method			
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WPILib LabVIEW Math Library - VI Implementation List Revision 3.X 1/11/2023 – renamed library. Added additional documentation. Riccati DARE Iterate.vi X X X X X X X X X Χ Riccati DARE StructDoubling.vi Riccati DARE N.vi XX Χ Riccati DARE.vi Χ $X \mid X \mid$ Χ XX X Riccati Input Check.vi '======== VISION '======== Function Prototype Notes COMPUTER VISION UTILITIES X X Χ CompVisionUtil CalculateDistanceToTarget.vi CompVisionUtil_EstimateCameraToTarget.vi X X X X Χ Χ CompVisionUtil EstimateFieldToCamera.vi Χ Χ CompVisionUtil_EstimateFieldToRobot.vi Χ XX Χ CompVisionUtil EstimateFieldToRobot Alt.vi COMMUNICATIONS '======== VI Name Function Prototype Notes NETWORK UDP X NetworkUDP Close.vi SI Χ XX NetworkUDP Receive.vi X XX 1 NetworkUDP Send.vi '======= TYPE DEFINITIONS '======== VI Name Function Prototype Notes TypeDef Z Z X X N/A ARM FF.CTL BANG_BANG.CTL Z Z X X N/A BICon-Matrix_FUNC_TYPE.CTL NOT USED. Should this be X X N/A deleted or abandoned??? CALLBACK FUNC TYPE.CTL Z Z X X N/A Z Z X X N/A CHASSIS SPEEDS.CTL Z Z X X N/A CONTRAINED STATE.CTL Z Z X X N/A Z Z X X N/A Z Z X X N/A COORDINATE AXIS.CTL COORDINATE_SYSTEM.CTL DCMOTOR_TYPES_ENUM.CTL Z Z X X N/A DCMOTOR.CTL

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Z	Ζ	Χ	Χ	N/A	TIMER.CTL							
Z	Ζ	Χ	Χ	N/A	TRAJ_CONFIG.CTL							
Ζ	Ζ	Χ	Χ	N/A	TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL							
Z	Ζ	Χ	Χ	N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_KINEMATICS.CTL							
Z	Ζ	Χ	Χ	N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_VOLTAGE.CTL							
Z	Ζ	Χ	Χ	N/A	TRAJ_CONSTRAINT_ELLIP_REGION.CTL							
1		Χ		N/A	TRAJ_CONSTRAINT_JERK.CTL	Routine exists, it is just a shell						
Z	Ζ	Χ	Χ	N/A	TRAJ_CONSTRAINT_MAX_VELOCITY.CTL							
Z	Ζ	Χ	Χ	N/A	TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL							
Z	Ζ	Χ	Χ	N/A	TRAJ_CONSTRAINT_MINMAX.CTL							
Z	Ζ	Χ	Χ	N/A	TRAJ_CONSTRAINT_RECT_REGION.CTL							
Z	Ζ	Χ	Χ	N/A	TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL							
Z	Ζ	Χ	Χ	N/A	TRAJ_STATE.CTL							
Z	Ζ	Χ	Χ	N/A	TRAJECTORY_SPLINE_TYPE_ENUM.CTL							
Z	Ζ	Χ	Χ	N/A	TRAJECTORY.CTL							
Z	Ζ	Χ	Χ	N/A	TRANSFORM2D.CTL							
Z	Ζ	Χ	Χ	N/A	TRANSFORM3D.CTL							
Z	Ζ	Χ	Χ	N/A	TRANSLATION2D.CTL							
Z	Ζ	Χ	Χ	N/A	TRANSLATION3D.CTL							
Z	Ζ	Χ	Χ	N/A	TRAPEZOID_PROFILE_CONSTRAINT.CTL							
Z	Ζ	Χ	Χ	N/A	TRAPEZOID_PROFILE_STATE.CTL							
Z	Ζ	Χ	Χ	N/A	TRAPEZOID_PROFILE.CTL							
Z	Ζ	Χ	Χ	N/A	TWIST2D.CTL							
Z	Ζ	Χ	Χ	N/A	TWIST3D.CTL							
Z	Ζ	Χ	Χ	N/A	UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL							
Z	Ζ	Χ	Χ	N/A	UNSCENTED KALMAN FILTER.ctl							
Z	Ζ	Χ	Χ	N/A	UNSCENTED KALMAN NEW FUNC GROUP.CTL							
Z	Ζ	Χ	Χ	N/A	UTIL_PATHFINDER_CONFIG.CTL							
N/A		N/A		N/A	WAYPOINTS.CTL	Delete – obsolete						
Z	Ζ	Χ	Χ	NA	WEIGHTED_WAYPOINT.CTL	New V1.5						
N/A		N/A		N/A	X_Y_HEADINGS.CTL	Delete – obsolete						
Z	Ζ	Χ	Χ	N/A	X_Y_PAIR.CTL							

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