Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

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
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Doc completed Pct 97.39% Optimization Pct 58.99%

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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Category Category		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 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse Function Prototype Notes LEAD LAG X X X X I LeadLag Execute.vi VI Name Function Prototype Notes LINEAR FILTER X X XI LinearFilter BackwardFiniteDifference.vi XX X SI LinearFilter Calculate.vi LinearFilter_CutoffFrequency.vi X X X X X X X X X I X LinearFilter Execute.vi Labview style helper LinearFilter Factorial.vi AN INTERNAL ROUTINE No I XX XI LinearFilter FiniteDifference.vi
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Revision 3.08

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WPILib LabVIEW Math Library – VI Implementation List
Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

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		X X		X	SI		PIDController_Calculate_SP_PV.vi PIDController_DisableContinousInput.vi					
		$\frac{x}{x}$		X	SI		PIDController EnableContinuousInput.vi					
			X	Χ			X PIDController_Execute.vi		Labview style helper			
	N.			.,.			PIDController_GetContinuousError.vi		OBSOLETE – Removed			
	X	X		X	SI SI	-	PIDController_GetPeriod.vi PIDController GetPID.vi					
		$\frac{\lambda}{X}$		X	SI		PIDController GetPositionError.vi					
		$\frac{x}{x}$		X	SI		PIDController GetSetpoint.vi					
	X	X		Χ	SI		PIDController_GetTolerance.vi					
		Χ		Χ	SI	\perp	PIDController_GetVelocityError.vi					
		X		X	SI	<u> </u>	PIDController_IsContinuousInputEnabled.vi					
		X		X		-	PIDController_New.vi PIDController NewPeriod.vi					
			X	\hat{X}	SI	 	PIDController Pack AdvLimits.vi					
	X	X	X	Χ	SI		PIDController_Pack_AdvTuning.vi					
	X	Χ	Χ	Χ	SI		PIDController_Pack_ErrorTolerance.vi					
			X	X	SI	<u> </u>	PIDController_Pack_InputLimits.vi					
		X X	X	X	SI SI	-	PIDController_Pack_Tuning.vi PIDController_Reset.vi					
		X		X	SI	_	PIDController_Reset.vi PIDController_SetD.vi					
	X	\tilde{X}	X	X	SI		PIDController_SetDerivativeFilter.vi		Advanced PID			
		X					PIDController_SetFeedForward_OBSOLETE_DELETE.vi		Advanced PID, Obsolete – DELETE			
	X	X	X	No			PIDController_SetFFGain_OBSOLETE_DELETE.vi		Advanced PID, Obsolete – DELETE			
	Χ	Χ		Χ	SI		PIDController_Setl.vi		522.2			
							PIDController_SetInputRange.vi		OBSOLETE – Removed			
	X	X	X	X	SI	-	PIDController_SetIntegratorRange.vi PIDController_SetOutputLimits.vi		Advanced PID			
		$\frac{x}{X}$	^	X	SI SI		PIDController_SetOutputLimits.vi PIDController_SetP.vi		Advanced PID			
	X		Х	X	SI		PIDController SetPeriod.vi					
	X	X		Χ	SI		PIDController_SetPID.vi					
	X	X	Χ	Χ	SI		PIDController_SetPIDF.vi		Advanced PID			
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PID CONTROLLER	X	X	Not WPILIB	Χ	SI	Test Routine	VI Name ProfiledPIDController_AtGoal.vi	Function Prototype	Notes	Code Reviev	Test Progr	Error Ch
PID CONTROLLER	X	X X	Not WPILIB	X X		Test Routine	VI Name ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi	Function Prototype	Notes	Code Reviev	Test Progr	Error Ch
PID CONTROLLER	X X X	X X X	Not WPILIB	X X X	SI	Test Routine	VI Name ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi	Function Prototype	Notes	Code Reviev	Test Progr	Error Ch
PID CONTROLLER	X X X	X X X X	Not WPILIB	X X X X	SI	Test Routine	VI Name ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi	Function Prototype	Notes	Code Reviev	Test Progr	Error Ch
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PID CONTROLLER	X X X X X X X X X X X X X X X X X X X	X X X X X X X		X X X X X X X	SI SI SI SI	Test Routine	VI Name ProfiledPIDController_AtGoal.vi ProfiledPIDController_AtSetpoint.vi ProfiledPIDController_Calculate_Meas_Goal.vi ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi ProfiledPIDController_Calculate_Meas_StateGoal.vi ProfiledPIDController_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi	Function Prototype		Code Reviev	Test Progr	Error Ct

WPILib LabVIEW Math Library - VI Implementation List Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse XX ProfiledPIDController GetPositionError.vi X SI ProfiledPIDController_GetSetpoint.vi XX X SI ProfiledPIDController_GetTolerance.vi XX X SI XX X SI ProfiledPIDController GetVelocityError.vi ProfiledPIDController New.vi XX XI ProfiledPIDController_NewPeriod.vi $X \mid X$ X SI ProfiledPIDController Reset PosOnly.vi ProfiledPIDController Reset PosVel.vi XX X SI XX ProfiledPIDController Reset.vi X SI SI ProfiledPIDController SetConstraints.vi XX X SI ProfiledPIDController SetGoal PosOnly.vi XX X SI ProfiledPIDController SetGoal.vi ProfiledPIDController_SetIntegratorRange.vi $X \mid X$ X SI XX X SI ProfiledPIDController SetPID.vi ProfiledPIDController_SetTolerance_PosOnly.vi XX X SI XX X SI ProfiledPIDController SetTolerance PosVel.vi VI Name Function Prototype Notes RAMSETE X X X SI Ramsete AtReference.vi AtReference $X \mid X \mid$ Ramsete Calculate Trajectory.vi calculate trajectory Ramsete_Calculate.vi $X \mid X$ Χ calculate Ramsete Execute ENG.vi Use this one!! X X X X I X X X X I Ramsete Execute Ext Odom.vi XXXXXI Ramsete Execute Ext Odom ENG.vi X X X X SI Ramsete Execute PackTuning ENG.vi Ramsete Execute PackTuning.vi $X \mid X \mid X \mid X \mid SI$ Ramsete Execute.vi X X X X I X SI Ramsete_New_B_Z.vi new(b, zeta) X SI XX Ramsete New.vi XX X SI Ramsete SetEnabled.vi SetEnabled X SI Ramsete_SetTolerance.vi SetTolerance $X \mid X \mid$ Ramsete SINC.vi XX XX internal sinc VI Name Function Prototype Notes SIMPLE MOTOR FEEDFORWARD X X SimpleMotorFF Calculate CalcAccel.vi XX X SimpleMotorFF Calculate NextV Dt.vi XX X SI SimpleMotorFF Calculate.vi public double calculate(double velocity, double acceleration) SimpleMotorFF_CalculateVelocityOnly.vi $X \mid X$ X SI public double calculate(double velocity) SimpleMotorFF Ka AutoTune.vi X X X X SimpleMotorFF MaxAchieveAccel.vi public double maxAchievableAcceleration(double maxVoltage, double velocity) X X Χ SimpleMotorFF MaxAchieveVel.vi public double maxAchievableVelocity(double maxVoltage, double acceleration) SimpleMotorFF MinAchieveAccel.vi X Χ public double minAchievableAcceleration(double maxVoltage, double velocity)

'======= GEOMETRY '----

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SimpleMotorFF MinAchieveVel.vi

SimpleMotorFF_Pack_Ka_Tune_Params.vi

SimpleMotorFF New.vi

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acceleration)

public double minAchievableVelocity(double maxVoltage, double

public SimpleMotorFeedforward(double ks, double kv, double ka)

public SimpleMotorFeedforward(double ks, double kv)

3.08 11/07/2023 - Added edge detect, bool cmd, dru	ım seguenc	er. doub	le soler	noid puls	e		-				
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COORDINATE AXIS			X	SI		CoordAxis_D.vi					
	XX	+	X	SI		CoordAxis_E.vi					<u> </u>
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	XX			SI	-	CoordAxis_New.vi					
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	XX		X	SI		CoordSystem_Convert_Translation3d.vi					
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POSE2D		_		SI		Pose2d Div.VI	Function Flototype	Notes			<u> </u>
1 00225	X X	+-+	X	SI		Pose2d Equals.VI	boolean equals(other obj)				
	X X	+	X	X		Pose2d_Exp.vi	pose2d exp(twist2d twist)				
	XX		X	SI		Pose2d_getRotation.vi	rotation2d getRotation()	can also use cluster unpack			
	XX		X	SI		Pose2d_getTranslation.vi	translation2d getTranslation()	can also use cluster unpack			
	XX	X	X	SI		Pose2d getXY.vi	, v				
				SI		Pose2d_getXYAngle.vi Pose2d_Interpolate.vi					
	XX		X	1		Pose2d_Interpolate.vi					
	XX	\bot	Χ	X		Pose2d_Log.vi	twist2d log(pose2d end)				<u> </u>
	XX	\perp	X	SI		Pose2d_Minus.vi	transform2d minus(pose2d other)				<u> </u>
	X X		Χ	SI		Pose2d_New_TRRO.vi	pose2d new(translation2d, rotation2d)				
	1 1/ 1 11		X	SI		Pose2d_New.vi	pose2d new(double x, double y, rotation2d)				
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POSE3D	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	19 19<	Sample Program	Pose2d_RelativeTo.vi Pose2d_Times.vi Pose2d_TransformBy.vi VI Name Pose3d_Div.vi Pose3d_Equals.VI	pose2d relativeto(pose2d other) pose2d transformby(transform2d other) pose2d new()		Code Review	Test Program	Error Checking
POSE3D	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	X Signature	Sample Program	Pose2d_RelativeTo.vi Pose2d_Times.vi Pose2d_TransformBy.vi VI Name Pose3d_Div.vi Pose3d_Equals.VI Pose3d_Exp.vi	pose2d relativeto(pose2d other) pose2d transformby(transform2d other) pose2d new()		Code Review	Test Program	Error Checking
POSE3D	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	X X Co Co Co Co Co Co Co	Sample Program	Pose2d_RelativeTo.vi Pose2d_Times.vi Pose2d_TransformBy.vi VI Name Pose3d_Div.vi Pose3d_Equals.VI Pose3d_Exp.vi Pose3d_getRotation.vi	pose2d relativeto(pose2d other) pose2d transformby(transform2d other) pose2d new()		Code Review	Test Program	Error Checking
POSE3D	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	12 12 13 14 15 15 15 15 15 15 15	Sample Program	Pose2d_RelativeTo.vi Pose2d_Times.vi Pose2d_TransformBy.vi VI Name Pose3d_Div.vi Pose3d_Equals.VI Pose3d_Exp.vi Pose3d_getRotation.vi Pose3d_getTranslation.vi	pose2d relativeto(pose2d other) pose2d transformby(transform2d other) pose2d new()		Code Review	Test Program	Error Checking
POSE3D	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	12 12 13 14 15 15 15 15 15 15 15	Sample Program	Pose2d_RelativeTo.vi Pose2d_Times.vi Pose2d_TransformBy.vi VI Name Pose3d_Div.vi Pose3d_Equals.VI Pose3d_Exp.vi Pose3d_getRotation.vi	pose2d relativeto(pose2d other) pose2d transformby(transform2d other) pose2d new()		Code Review	Test Program	Error Checking

WPILib LabVIEW Math Library – VI Implementation List Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum

ementation Lis													
ct, bool cmd, dru	m seqı	uence	er, dou	ble so	enoid p	ulse							
	X	Χ		X	SI			Pose3d_Minus.vi					
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	X	X		X	SI			Pose3d New Pose2d.vi					
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	X	X		X	SI			Pose3d_New_Trans3dRot3d.vi					
	Χ	X		X	SI			Pose3d_Plus.vi					
	X	X		X	SI			Pose3d_RelativeTo.vi					
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QUATERNION	X X X / Implemented	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	ଏ ଓ ଓ ଓ Execution Optimized	Test Routine		VI Name Quaternion_Equals.vi Quaternion_Get_All.vi Quaternion_Get_LVQuat.vi Quaternion_Get_Vect.vi Quaternion_Get_W.vi Quaternion_Inverse.vi Quaternion_New.vi Quaternion_New_Default.vi Quaternion_New_Default.vi Quaternion_New_LVQuat.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	1 V 1	X		X	SI			Quaternion_New_LVQuat.vi					
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ROTATION2D	X X X X	X X Documented	Not WPILIB	X X X X	ত্ৰ Execution Optimized ত্ৰ ত্ৰ	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d_CreateAngle.vi	rotation2d new(double value)		Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X	X X Documented	Not WPILIB	X X X	ଓ ଓ Execution Optimized	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d_CreateAngle.vi Rotation2d_CreateAngleDegrees.vi		Notes convert to radians then create	Code Review	Test Program	Error Checking
ROTATION2D	X X X X	X X Documented	Not WPILIB	X X X X	ଓ ଓ ଓ Execution Optimized	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d_CreateAngle.vi	rotation2d new(double value)		Code Review	Test Program	Error Checking
ROTATION2D	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	ଓ ଓ ଓ Execution Optimized	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees)		Code Review	Test Program	Error Checking
ROTATION2D	X 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	ଦ୍ର ତା Execution Optimized	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXy.vi	rotation2d new(double value)		Code Review	Test Program	Error Checking
ROTATION2D	X X X X 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	ଓ ଓ ଅଧିକରେ Optimized	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXy.vi Rotation2d CreateXY.vi Rotation2d Div.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y)		Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X 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	X X X X X X X X X X X X X X X X X X X	ତା ଓ ଓ ଓ ଅଧିକ ଓ ଅଧିକ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ ଓ	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Equals.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees)	convert to radians then create	Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X 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	X X X X X X X X X X X X X X X X X X X	ର ର ଜଣ ଅଧିକ । ର	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other)	convert to radians then create New 1/26/21	Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X 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	X X X X X X X X X X X X X X X X X X X	তি ত	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXy.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos()	convert to radians then create New 1/26/21 use cluster unpack	Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X 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	X X X X X X X X X X X X X X X X X X X	ର ର ଜଣ ଅଧିକ । ର	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other)	New 1/26/21 use cluster unpack use cluster unpack, then convert to	Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X X X X X X	X X X Poocnmented X X X X X X X X X X X X	Not	X X X X X X X X X X X X X X X X X	10 10 10 10 10 10 10 10	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetDegrees.VI Rotation2d GetDegrees.VI Rotation2d GetPadians.VI	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos()	convert to radians then create New 1/26/21 use cluster unpack use cluster unpack, then convert to	Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X X X X X X	X X X Poocnmented X X X X X X X X X X X X	Not	X X X X X X X X X X X X X X X X X	10 10 10 10 10 10 10 10	Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetDegrees.VI Rotation2d GetDegrees.VI Rotation2d GetPadians.VI	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees()	New 1/26/21 use cluster unpack use cluster unpack, then convert to	Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X X X X X X	X X X Poocumented X X X X X X X X X X X X	Not	X X X X X X X X X X X X X X X X X X X		Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetDegrees.VI Rotation2d GetRadians.VI Rotation2d GetRadians.VI Rotation2d GetRadians.VI Rotation2d GetRotations.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees() double getRadians()	New 1/26/21 use cluster unpack, then convert to degree use cluster unpack	Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X 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	X		Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetCos.VI Rotation2d GetRadians.VI Rotation2d GetRadians.VI Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetSin.VI	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees() double getRadians() double getSin()	convert to radians then create New 1/26/21 use cluster unpack use cluster unpack, then convert to degree use cluster unpack use cluster unpack	Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X 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	X		Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXy.vi Rotation2d Div.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetDegrees.VI Rotation2d GetRadians.VI Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetSin.VI Rotation2d GetSin.VI Rotation2d GetSin.VI Rotation2d GetTan.VI	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees() double getRadians()	New 1/26/21 use cluster unpack, then convert to degree use cluster unpack	Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X X X X X X	X	Not	X		Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXy.vi Rotation2d Div.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetDegrees.VI Rotation2d GetRadians.VI Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetSin.VI Rotation2d GetSin.VI Rotation2d GetSin.VI Rotation2d GetTan.VI Rotation2d Interpolate.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees() double getRadians() double getSin() double getTan()	convert to radians then create New 1/26/21 use cluster unpack use cluster unpack, then convert to degree use cluster unpack use cluster unpack	Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X X X X X X	X	Not	X		Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetCos.VI Rotation2d GetRadians.VI Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetTan.VI Rotation2d Interpolate.vi Rotation2d Minus.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees() double getRadians() double getSin() double getTan() rotation2d minus(rotation2d other)	convert to radians then create New 1/26/21 use cluster unpack use cluster unpack, then convert to degree use cluster unpack use cluster unpack	Code Review	Test Program	Error Checking
ROTATION2D	X X X X X X X X X X X X X X X X X X X	X	Not	X		Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetCos.VI Rotation2d GetRadians.VI Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetTan.VI Rotation2d Interpolate.vi Rotation2d Minus.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees() double getRadians() double getSin() double getTan() rotation2d minus(rotation2d other)	convert to radians then create New 1/26/21 use cluster unpack use cluster unpack, then convert to degree use cluster unpack use cluster unpack	Code Review	Test Program	Error Checking
ROTATION2D	X	X	Not	X		Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateAngleRotations.vi Rotation2d Div.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetCos.VI Rotation2d GetRadians.VI Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetSin.VI Rotation2d GetTan.VI Rotation2d Interpolate.vi Rotation2d Minus.vi Rotation2d Plus.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees() double getRadians() double getSin() double getTan() rotation2d minus(rotation2d other) rotation2d plus(rotation2d other)	convert to radians then create New 1/26/21 use cluster unpack use cluster unpack, then convert to degree use cluster unpack use cluster unpack	Code Review	Test Program	Error Checking
ROTATION2D	X	X	Not	X		Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetCos.VI Rotation2d GetRadians.VI Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetSin.VI Rotation2d GetSin.VI Rotation2d GetTan.VI Rotation2d Interpolate.vi Rotation2d Plus.vi Rotation2d Plus.vi Rotation2d RotateBy.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees() double getRadians() double getSin() double getTan() rotation2d minus(rotation2d other) rotation2d plus(rotation2d other) rotation2d rotateby(rotation2d other)	convert to radians then create New 1/26/21 use cluster unpack use cluster unpack, then convert to degree use cluster unpack use cluster unpack	Code Review	Test Program	Error Checking
ROTATION2D	X	X	Not	X		Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetCos.VI Rotation2d GetRadians.VI Rotation2d GetRadians.VI Rotation2d GetRotations.vi Rotation2d GetSin.VI Rotation2d GetSin.VI Rotation2d GetSin.VI Rotation2d GetTan.VI Rotation2d Interpolate.vi Rotation2d Ninus.vi Rotation2d RotateBy.vi Rotation2d RotateBy.vi Rotation2d Times.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees() double getRadians() double getSin() double getTan() rotation2d minus(rotation2d other) rotation2d plus(rotation2d other) rotation2d rotateby(rotation2d other) rotation2d rotateby(rotation2d other) rotation2d times(double scalar)	convert to radians then create New 1/26/21 use cluster unpack use cluster unpack, then convert to degree use cluster unpack use cluster unpack	Code Review	Test Program	Error Checking
ROTATION2D	X	X	Not	X		Test Routine	Sample Program	Quaternion Plus.vi Quaternion Times.vi Quaternion ToRotationVector.vi VI Name Rotation2d CreateAngle.vi Rotation2d CreateAngleDegrees.vi Rotation2d CreateAngleRotations.vi Rotation2d CreateXY.vi Rotation2d Div.vi Rotation2d Equals.vi Rotation2d Equals.vi Rotation2d GetAngleCosSin.vi Rotation2d GetCos.VI Rotation2d GetCos.VI Rotation2d GetRadians.VI Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetRotations.vi Rotation2d GetSin.VI Rotation2d GetSin.VI Rotation2d GetTan.VI Rotation2d Interpolate.vi Rotation2d Plus.vi Rotation2d Plus.vi Rotation2d RotateBy.vi	rotation2d new(double value) rotation2d fromDegrees(double degrees) rotation2d new(double x, double y) boolean equals(rotation2d other) double getCos() double getDegrees() double getRadians() double getSin() double getTan() rotation2d minus(rotation2d other) rotation2d plus(rotation2d other) rotation2d rotateby(rotation2d other)	convert to radians then create New 1/26/21 use cluster unpack use cluster unpack, then convert to degree use cluster unpack use cluster unpack	Code Review	Test Program	Error Checking

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Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse Function Prototype Notes ROTATION3D XX X SI Rotation3d Create AxisAngle.vi $X \mid X$ X SI Rotation3d Create Default.vi Rotation3d Create Quaternion.vi $X \mid X$ X SI Rotation3d_Create_InitialFinalVector.vi X X ΧI X SI X I Rotation3d Create RollPitchYaw.vi Rotation3d Create RotMatrix.vi XX X SI Rotation3d Div.vi Rotation3d_Equals.vi XX X SI | X | X | X | SI | X | X | SI | Rotation3d GetAxisAngle.vi Rotation3d GetQuaternion.vi XX X SI Rotation3d GetXYZ.vi $X \mid X$ X SI Rotation3d Interpolate.vi X SI Rotation3d Minus.vi XX X X X X X SI Rotation3d Plus.vi X SI Rotation3d RotateBy.vi XX X SI Rotation3d Times.vi Rotation3d ToRotation2d.vi XX X SI Rotation3d UnaryMinus.vi XX X SI VI Name Function Prototype Notes TRANSFORM2D X SI Transform2d Create PosePose.vi transform2d new(pose2d, pose2d) transform2d new(translation2d, rotation2d) X SI Transform2d Create TransRot.vi XX Transform2d Div.vi $X \mid X$ X SI Transform2d_Equals.VI XX boolean equals(other transform2d) X SI XX X SI Transform2d GetRotation.VI rotation2d getRotation() use cluster unpack XX X SI Transform2d GetTranslation.VI translation2d getTranslation() use cluster unpack X X X X SI Transform2d GetXY.vi Transform2d_GetXYAngle.vi X X X X SI X SI Transform2d Inverse.vi XX transform inverse() new Transform2d_Plus.vi X Si XX X SI Transform2d_Times.vi transform2d times(double scalar) transform2d new() can use cluster constant Function Prototype Notes TRANSFORM3D X X Transform3d Create Default.vi X SI XX X SI Transform3d Create Pose3dPose.3dvi X SI X SI Transform3d Create Trans3dRot3d.vi Transform3d_Div.vi XX X SI Transform3d Equals.VI Transform3d_GetRotation3d.VI XX X SI Transform3d GetTranslation3d.VI XX X SI X X X X SI X X X X SI Transform3d GetXYZ.vi Transform3d Inverse.vi X Si X SI XX Transform3d Plus.vi Transform3d_Times.vi XX

	Implemented Documented	Menu Item	Execution Optimize	Test Routine Sample Program awa IA	Forestine Protestine	Notes	Code Review	Test Program	
TRANSLATION2D		: ≥	SI	で の VI Name Translation2d_Create_DistAng.vi	Function Prototype	Notes	0	<u> </u>	
MANOLATIONED	XX	X	SI	Translation2d Create.vi	translation2d new(double x, double y)				
	XX	X	SI	Translation2d_Div.vi					
	X X X X	X	SI	Translation2d_Equals.vi Translation2d_GetAngle.vi	boolean equals(translation other)				
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\frac{\hat{x}}{x}$	SI	Translation2d GetDistance.vi	double getDistance(translation2d other)				
	XX	X	SI	Translation2d_GetNorm.VI	double getNorm()	can use cluster unpack			
	X X X X	X	SI	Translation2d_GetX.VI Translation2d GetXY.VI	double getX()	can use cluster unpack			
	XXX	X	SI	Translation2d_GetXY.VI Translation2d_GetY.VI	double getY()	can use cluster unpack			
	XX	X	SI	Translation2d_Interpolate.vi					
	XX	X	SI	Translation2d_Minus.vi	translation2d minus(translation2d other)				
	X X X X	X	SI SI	Translation2d_Plus.vi Translation2d RotateBy.vi	translation2d plus(translation2d other) translation2d rotateBy(rotation2d other)				
	XX	X	SI	Translation2d_Times.vi	translation2d totaleBy(totalion2d other) translation2d times(double scalar)				
	XX	X	SI	Translation2d_UnaryMinus.vi	translation2d unaryminus()				
					translation2d new() translation2d div(double scalar)	can use cluster constant can multiply by 1/scalar			
					translationzu div(double scalar)	can multiply by 1/scalar			
TRANSLATION3D		X	SI	Translation3d_Create.vi	Function Prototype	Notes	Code Review	Test Program	
	X X X X	X	SI	Translation3d_Create_Default.vi Translation3d_Create_DistAng.vi					
	XX	X	SI	Translation3d_Div.vi					
	X X X X	X	SI	Translation3d_Equals.vi					
	X X	X	SI	Translation3d_GetDistance.vi Translation3d GetNorm.VI					
	XX	X	1 .51	Translationso Gennotti Vi					
	X X X X	(X	SI	Translation3d_GetXYZ.vi					
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	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	SI SI SI SI SI SI	Translation3d_GetXYZ.vi Translation3d_Interpolate.vi Translation3d_Minus.vi Translation3d_Plus.vi Translation3d_RotateBy.vi Translation3d_Times.vi Translation3d_ToTranslation2d.vi					
	X X X X X X X X X X X X X X X X X X X	X X X X X X X X	SI SI SI SI SI SI	Translation3d_GetXYZ.vi Translation3d_Interpolate.vi Translation3d_Minus.vi Translation3d_Plus.vi Translation3d_RotateBy.vi Translation3d_Times.vi					
	Documented X X X X X X X X X X X X X X X X X X X		Execution Optimized 99 <td>Translation3d_GetXYZ.vi Translation3d_Interpolate.vi Translation3d_Minus.vi Translation3d_Plus.vi Translation3d_RotateBy.vi Translation3d_Times.vi Translation3d_ToTranslation2d.vi Translation3d_UnaryMinus.vi</td> <td>Function Prototype</td> <td>Notes</td> <td>Code Review</td> <td>Test Program</td> <td></td>	Translation3d_GetXYZ.vi Translation3d_Interpolate.vi Translation3d_Minus.vi Translation3d_Plus.vi Translation3d_RotateBy.vi Translation3d_Times.vi Translation3d_ToTranslation2d.vi Translation3d_UnaryMinus.vi	Function Prototype	Notes	Code Review	Test Program	
TWIST2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		Translation3d_GetXYZ.vi Translation3d_Interpolate.vi Translation3d_Minus.vi Translation3d_Plus.vi Translation3d_RotateBy.vi Translation3d_Times.vi Translation3d_ToTranslation2d.vi Translation3d_UnaryMinus.vi	twist new(x, y, theta)	Notes	Code Review	Test Program	
TWIST2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		Translation3d_GetXYZ.vi Translation3d_Interpolate.vi Translation3d_Minus.vi Translation3d_Plus.vi Translation3d_RotateBy.vi Translation3d_Times.vi Translation3d_ToTranslation2d.vi Translation3d_UnaryMinus.vi		Notes	Code Review	Test Program	
TWIST2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		Translation3d_GetXYZ.vi Translation3d_Interpolate.vi Translation3d_Minus.vi Translation3d_Plus.vi Translation3d_RotateBy.vi Translation3d_Times.vi Translation3d_ToTranslation2d.vi Translation3d_UnaryMinus.vi	twist new(x, y, theta)	Notes	Code Review	Test Program	
	Maplemented May Wall In State Control of the Contro	Ween tem	Execution Optimized 99 99 99 99 99 99 99 99 99 99 99 99 99	Translation3d_GetXYZ.vi Translation3d_Interpolate.vi Translation3d_Minus.vi Translation3d_Plus.vi Translation3d_Plus.vi Translation3d_Times.vi Translation3d_ToTranslation2d.vi Translation3d_UnaryMinus.vi ###################################	twist new(x, y, theta)	Notes	Code Review Code Review	Test Program Test Program	
TWIST2D	Maplemented Maplemented M	X X X X X X X X X X X X X X X X X X X	© Execution Optimized © © © © © © © © © © © © © © © © © © ©	Translation3d_GetXYZ.vi Translation3d_Interpolate.vi Translation3d_Minus.vi Translation3d_Plus.vi Translation3d_Plus.vi Translation3d_Times.vi Translation3d_ToTranslation2d.vi Translation3d_UnaryMinus.vi ###################################	twist new(x, y, theta) boolean equals(obj other)		3	Program	

abVIEW Math Library – VI Implementation Li 08 11/07/2023 – Added edge detect, bool cmd, dr	IST um sec	nuence	r doubl	le solen	oid nuls	е						
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====	plemented	ocumented	ot WPILIB	anu Item	Execution Optimized Test Routine	₹				ode Review	st Program	
CHASSIS SPEED	s X	_ ŏ X	ž		IS EXE	S	VI Name ChassisSpeeds FromFieldRelativeChassisSpeeds.VI	Function Prototype	Notes	ŭ		T
ONAGGIO GI EED	X	X			SI		ChassisSpeeds_FromFieldRelativeSpeeds.VI	chassisspeeds fromFieldRelativeSpeeds(double x, double y,				
	X	X	X	X .	SI		ChassisSPeeds_GetXYOmega.vi	double angvel, rotation2d robotangle)				+-
	Χ	Х		X .	SI		ChassisSpeeds_New.vi	chassisspeeds new (double xvel, double yvel, double angvel)				
								chassisspeeds new ()	can use cluster constant			
	Implemented	Documented	Not WPILIB		Execution Optimized Test Routine	Sam	VI Name	Function Prototype	Notes	Code Review	Test Program	
DIFFERENTIAL DRIVE KINEMATIC	S X			X	I X X X		DiffKinematics_New.vi DiffKinematics_toChassisSpeed.vi	diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds)				
	X	X		X .	SI		DiffKinematics_ToTwist2d.vi					
	X			X .			DiffKinematics_toWheelSpeed.vi	diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds)				
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optin Test Routine	Ē	VI Name	Function Prototype	Notes	Code Review	Test Program	
DIFFERENTIAL DRIVE ODOMETRY	X	X	X	X	X		DiffOdometry_Execute.vi DiffOdometry_Update.vi	pose2d update(rotation2d gyro, double leftdist, double right dist	DONT NEED) Incorporates enhanced reset			-
							7- 1	diffDrOdom new(rotation gyro, pose initial)	, ,			
								diffDrOdom new(rotation gyro)				
								void resetPosition(pose2d, rotation2d) pose2d getPoseMeters()	incorporated into "update"			
					ď			posezu gerrosemeters()				
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize Test Routine	Ē	VI Name	Function Prototype	Notes	Code Review	Test Program	
DIFFERENTIAL DRIVE ODOMETRY 2	X	X	X	X	1		DiffDrvOdom2_Execute.vi		Replacement for orig diff drive odom			
	X			X .			DiffDrvOdom2_GetPose.vi		55011			
	X	X		X X	I SI		DiffDrvOdom2_New.vi DiffDrvOdom2_Reset.vi					
	X	X			1		DiffDrvOdom2_Update.vi					
					70		1					
	mplemented	Documented	Vot WPILIB	Menu Item	Execution Optimizec Test Routine	Ē	VI Name	Function Prototype	Notes	Sode Review	Test Program	
DIFFERENTIAL DRIVE WHEEL SPEED	S	7				3,		diffDrWheelSpeeds new()				
								diffDrWheelSpeeds new(double leftVel, double rightVel)				
	X	X		X	X		DiffWheel_Normalize.vi	diffDrWheelSpeeds new(double leftVel, double rightVel) void normalize(double maxVel)				_

	-			Sole	noid pu	ise						
	Implemented	Documented		Menu Item	Exec	Test Routine		Function Prototype	Notes	Code Review	Test Program	Error Checking
MECANUM DRIVE KINEMATICS	X	X		X	1		MecaKinematics_New.vi					
	X	X	_	X X	X X		MecaKinematics_SetInverseKinematics.vi MecaKinematics ToChassisSpeeds.vi					
	X	X		X	^		MecaKinematics_ToChassisopeeus.vi					
	X	X		Χ			MecaKinematics_ToWheelSpeeds.vi					
	X	Χ		Χ	X		MecaKinematics_ToWheelSpeedsZeroCenter.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Tigothame	Function Prototype	Notes	Code Review	Test Program	Error Checking
MECANUM DRIVE MOTOR VOLTAGE	thing do											
MECANUM DRIVE ODOMETRY		Documented	X Not WPILIB	Menu Item	Exec	Test Routine	MecaOdometry_Execute.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X				Χ		MecaOdometry_GetKinematics.vi					
	X	X		X			MecaOdometry_GetPose.vi MecaOdometry_New.vi					
	X	X		$\frac{x}{x}$			MecaOdometry_NewDefaultPose.vi					+
	X	Χ		X			MecaOdometry_Reset.VI					
	Χ	X		Χ			MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi		D .			-
							ivicca odonica y_opaate vviti i i inic.vi		Removed			
MECANUM DRIVE WHEEL POSITION	X X Implemented	X X Documented	Not WP		SI SI	Test Routine	mpe Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
MECANUM DRIVE WHEEL POSITION	X Implemented X X X Implem	X X X X	Not WPILIB Not W	X X Menu Item	9 Execution Optimized 9 9 9 Execution	Test Routine Test Routine	VI Name MecaWheelPos_Get.vi MecaWheelPos_New.vi MecaWheelPos_Sub.vi MecaWheelPos_Sub.vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearl eftMetersPerSecond.		Code Review		rror
	X Implemented X X X Implem	X X X X	X Not WPILIB Not W	X X Menu Item	9 Execution Optimized 9 9 9 Execution	Routine	VI Name MecaWheelPos_Get.vi MecaWheelPos_New.vi MecaWheelPos_Sub.vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond,	Notes	Review	t Program Test	ror Checking Error

Revision 3.08

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	ente	Documented Not WPILIB	֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓	em o	:	Koutine ple Prog				evié	ogre	
	lem'	u di	± ۲۸	Menu Item Execution	3 (lest Kol Sample				Ta Ta	Ā	
	ldιι	Doc	کِ کِ	جَ هَ		rest i Samp	VI Name	Function Prototype	Notes	Code	Test	
SWERVE DRIVE KINEMATICS	$\frac{1}{X}$				1 ,		SwerveKinematics New4.VI		For 4 module drives			\top
OVERVE BRIVE RINEMATION			$\frac{\hat{x}}{\hat{x}}$				SwerveKinematics NewX.VI		uses array as input			+
			Xλ				SwerveKinematics_NormalizeWheelSpeeds.vi	public static void normalizeWheelSpeeds(SwerveModuleState[]				
								moduleStates, double attainableMaxSpeedMetersPerSecond)				┷
		X X					SwerveKinematics_ToChassisSpeeds4.VI		For 4 module drives			+
-		X X		X X			SwerveKinematics_ToChassisSpeedsX.VI SwerveKinematics_ToSwerveModuleStates.VI	public SwerveModuleState[]	uses array as input			+
	^	^		`			Swervermematics_roswervermodulestates.vr	toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) public SwerveModuleState[]				
	X	X)	X			SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI	public SwerveModuleState[]				
-			Щ,				2 16 6 7 7 1 10 14 14	toSwerveModuleStates(ChassisSpeeds chassisSpeeds)				
-	X			X			SwerveKinematics_ToTwist2d4.VI					+
	X	Χ		X			SwerveKinematics_ToTwist2dX.VI	public SwerveDriveKinematics(Translation2d wheelsMeters)	variable parameters (replace with			+-
								public SwerveDriveKinematics(Translation2d wheelsivieters) public ChassisSpeeds toChassisSpeeds(SwerveModuleState	array and "4" calls) variable parameters (replace with			\perp
								wheelStates)	array and "4" calls)			
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SWERVE DRIVE ODOMETRY		-	+	-			SwerveOdometry_Execute4.vi					+
		_		_			SwerveOdometry_ExecuteX.vi	nublic Decedd getDeceMaters()				+-
-		X		X X		-	SwerveOdometry_GetPosition.VI SwerveOdometry_New.VI	public Pose2d getPoseMeters() public SwerveDriveOdometry(SwerveDriveKinematics kinematics	s l			+
	X			x			SwerveOdometry_NewZeroCenter.VI	Rotation2d gyroAngle, Pose2d initialPose) public SwerveDriveOdometry(SwerveDriveKinematics kinematics				-
-			 ,				0 01 1 0 10 11 11	Rotation2d gyroAngle)				-
-		X X		X S	1		SwerveOdometry_ResetPosition.VI	public void resetPosition(Pose2d pose, Rotation2d gyroAngle)	For 4 mondrille drives			+-
	\rightarrow			_		_	SwerveOdometry_Update4.VI SwerveOdometry_UpdateWithTime4.VI		For 4 module drives REMOVED			+
							SwerveOdometry_UpdateWithTimeX.VI		REMOVED			+-
	X	X X	x ->	X			SwerveOdometry_UpdateX.VI		uses array as input			+
							onervoodemeny_opaaro, u v	public Pose2d updateWithTime(double currentTimeSeconds,	variable parameters (replace with			+
								Rotation2d gyroAngle, SwerveModuleState moduleStates)	array and "4" calls)			
								public Pose2d update(Rotation2d gyroAngle, SwerveModuleState moduleStates)	variable parameters (replace with			
l								SwerveModuleState moduleStates)	array and "4" calls)			
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EVE DRIVE MODULE POSITIONS	$X \mid$	$X \mid X$		<u> </u>	<u> </u>	- V)	SwerveModulePosition CompareTo.vi	. unoutin rototypo	. 15100			Т
		X	+5	X S	1		SwerveModulePosition Equals.vi					+
		X	7	X S	1		SwerveModulePosition_Get.vi					\top
		X		X S	1		SwerveModulePosition_New.vi					
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	E.	Doc	Not Not) I	Sample		Function Prototype	Notes	Code F	Test P.	
WERVE DRIVE MODULE STATE	X	X X Documente	Not X	X X Menu Ite		Sample	VI Name SwerveModuleState_CompareTo.vi SwerveModuleState Equal.vi	Function Prototype public int compareTo(SwerveModuleState o)	Notes	Code F	Test P.	T

SplineHelp_GetCubicCtrlVector.vi

Function Prototype

scalar, Pose2d point)

private static Spline.ControlVector getCubicControlVector(double

Notes

SPLINE HELPER X

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Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse 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 SplineHelp GetCubicSpline Calc2.vi X X X No internal X X X No SplineHelp GetCubicSpline Calc3.vi internal public static CubicHermiteSpline[] $X \mid X$ SplineHelp getCubicSplinesFromControlVectors.vi getCubicSplinesFromControlVectors(Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end)
private static Spline.ControlVector getQuinticControlVector(double SplineHelp GetQuinticCtrlVector.vi X SI X X scalar, Pose2d point) SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi public static List<Spline.ControlVector> REMOVED 2762 getQuinticControlVectorsFromWaypoints(List<Pose2d> waypoints) SplineHelp GetQuinticCtrlVectorsFromWeightedWayPts.vi REMOVED 2762 SplineHelp_getQuinticSplinesFromControlVectors.vi public static QuinticHermiteSpline[] X getQuinticSplinesFromControlVectors(Spline.ControlVector[] controlVectors) XXXX SplineHelp GetQuinticSplinesFromWeightedWayPts.vi New 2762 SplineHelp_GetQuinticSplinesFromWayPts.vi $X \mid X$ X New 2762 SplineHelp ThomasAlgorithm.vi private static void thomasAlgorithm(double[] a, double[] b, double[] internal X No c, double[] d, double[] solutionVector) VI Name 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) XX Χ X X X No SplineParam StackGet.vi internal X X X No SplineParam StackPop.vi internal $X \mid X \mid X \mid No$ SplineParam StackPush.vi internal '======== TRAJECTORY ======== VI Name Function Prototype Notes TRAJECTORY X X Х Trajectory Concatenate.vi **FUTURE** $X \mid X$ Χ Trajectory_equals.vi boolean equals(other obj) Trajectory_GetStates.vi XX public List<State> getStates() X SI not needed, use unpack Trajectory GetTotalTime.vi public double getTotalTimeSeconds() XX X SI not needed, use unpack X No SI Trajectory_lerp_double.vi private static double lerp(double startValue, double endValue, XX No SI Trajectory lerp Pose.vi private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t) XX X SI Trajectory_New_Empty.vi Trajectory_New.vi $X \mid X$ X SI public Trajectory(final List<State> states) public Trajectory relativeTo(Pose2d pose) Χ Trajectory_RelativeTo.vi XX Х public State sample(double timeSeconds) Trajectory Sample.vi X X X X Trajectory_SampleReverse.vi Sample in reverse order. Negate XX Χ Trajectory TransformBy.vi public Trajectory transformBy(Transform2d transform) public Pose2d getInitialPose() can use cluster unpack, array index g WPILIB Function Prototype Notes

WPILib LabVIEW Math Library - VI Implementation List Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse TRAJECTORY STATE X X TrajectoryState_Equals.vi X SI boolean equals(other obj) $X \mid X \mid X \mid X \mid SI$ TrajectoryState GetAll.vi X SI XX TrajectoryState GetPose.vi TrajectoryState Interpolate.vi State interpolate(State endValue, double i) $X \mid X$ X X SI public State(double timeSeconds, double X TrajectoryState_New.vi velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter) Revie VI Name Function Prototype Notes Implemented differently, can't TRAJECTORY CONFIG public TrajectoryConfig addConstraint(TrajectoryConstraint X TrajectoryConfig AddConstraint.vi X X constraint) duplicate TrajectoryConfig AddConstraints.vi public TrajectoryConfig addConstraints(List<? extends Implemented differently, can't $X \mid X$ Χ TrajectoryConstraint> constraints) duplicate. X SI FrajectoryConfig Create.vi public TrajectoryConfig(double maxVelocityMetersPerSecond, Χ X double maxAccelerationMetersPerSecondSq) XX TrajectoryConfig_GetCentripetalAccel.vi X TrajectoryConfig GetConstraints.vi public List<TrajectoryConstraint> getConstraints() Implemented differently, can't X Χ duplicate. XX TrajectoryConfig GetEndVelocity.vi public double getEndVelocity() can use cluster unpack X X X TrajectoryConfig GetKinematicsDiffDrive.vi XX TrajectoryConfig GetKinematicsMecanumfDrive.vi X TrajectoryConfig GetKinematicsSwerveDrive.vi $X \mid X$ X TrajectoryConfig_GetMaxVelAccel.vi $X \mid X \mid X \mid X$ TrajectoryConfig_GetStartVelocity.vi X X public double getStartVelocity() X can use cluster unpack TrajectoryConfig GetVoltageDiffDrive.vi XX X TrajectoryConfig_IsReversed.vi public boolean isReversed() can use cluster unpack X X X X SI TrajectoryConfig setCentripetalAccel.vi Χ X TrajectoryConfig SetEndVelocity.vi public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond) TrajectoryConfig setKinematicsDiffDrive.vi public TrajectoryConfig setKinematics(DifferentialDriveKinematics $X \mid X$ X SI kinematics) XX X SI TrajectoryConfig setKinematicsMecanumfDrive.vi public TrajectoryConfig setKinematics(MecanumDriveKinematics kinematics) X X X SI TrajectoryConfig_setKinematicsSwerveDrive.vi public TrajectoryConfig setKinematics(SwerveDriveKinematics kinematics) TraiectoryConfig setReversed.vi public TrajectoryConfig setReversed(boolean reversed) X X Χ SI TrajectoryConfig SetStartVelocity.vi public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond) X X X X SI TrajectoryConfig setVoltageDiffDrive.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. Function Prototype TrajectoryGenerate_Make_Cubic_CtrlVect.vi public static Trajectory generateTrajectory(Spline.ControlVector uses cubic splines TRAJECTORY GENERATE X Χ initial, List<Translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<Translation2d> interiorWaypoints, Pose2d end, TrajectoryGenerate Make Cubic.vi uses cubic splines TrajectoryConfig config)
Helper to bring these all together. X X X X TrajectoryGenerate Make Generic.vi Use this one!!! TrajectoryGenerate Make Quintic CtrlVect.vi public static Trajectory generateTrajectory(ControlVectorList X X X uses quintic splines controlVectors, TrajectoryConfig config) XXXX TrajectoryGenerate Make Quintic Weighted.vi New 2762

public static Trajectory generateTrajectory(List<Pose2d>

waypoints, TrajectoryConfig config) public static List<PoseWithCurvature>

. splinePointsFromSplines(Spline[] splines)

uses quintic splines

TrajectoryGenerate Make Quintic.vi

TrajectoryGenerate splinePointsFromSplines.vi

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Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse Function Prototype Notes public ControlVectorList(int initialCapacity) TRAJECTORY GENERATE (Control Vector) may not need, just data public ControlVectorList() may not need, just data public ControlVectorList(Collection<? extends may not need, just data Spline.ControlVector> collection) Function Prototype Notes TRAJECTORY PARAMETERIZE X X TrajectoryParam calcStuffFwd.vi X No X No TrajectoryParam calcStuffRev.vi X X X TrajectoryParam_enforceAccel.vi private static void enforceAccelerationLimits(boolean reverse, his routines needs to be changed List<TrajectoryConstraint> constraints, ConstrainedState state) hen new constraints are added. X X No TrajectoryParam enforceVelocity.vi This routines needs to be changed public static Trajectory timeParameterizeTrajectory(List<PoseWithCurvature> points. X TrajectoryParam timeParam.vi List<TrajectoryConstraint> constraints, double startVelocityMetersPerSecond, double endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq, boolean reversed) VI Name Function Prototype Notes TRAJECTORY PARAMETERIZE CONSTRAINED STATE X X ConstrainedState New.vi ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq) X X X X ConstrainedState SetMaxAccel.vi ConstrainedState SetMinAccel.vi ConstrainedState SetVelAccel.vi X X X X ConstrainedState SetVelocity.vi ConstrainedState() Function Prototype Notes TRAJECTORY UTIL X X public static Trajectory fromPathweaverJson(Path path) TrajectoryUtil_fromPathWeaverJSON.vi X X X X X TrajectoryUtil_MakeWeightedWayPoint_ENG.vi X X X X X TrajectoryUtil_MakeWeightedWayPoint.vi XX Χ TrajectoryUtil toPathWeaverJSON.vi public static void toPathweaverJson(Trajectory trajectory, Path public static Trajectory deserializeTrajectory(String json) public static String serializeTrajectory(Trajectory trajectory)

ision 3.08 11/07/2023 – Added edge detect, bool cmd, dru	um sec	quenc	er, doı	uble s	olenoi	l pulse			
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TRADEZOID DROCII I						<u> </u>	δ VI Name	Function Prototype	Notes
TRAPEZOID PROFILE	E X			X			TrapProfConstraint_New.vi TrapProfile Calculate.vi		
	X			No			TrapProfile Direct.vi		Private, remove from menu
	Χ	X	X	X			TrapProfile_Execute.vi		,
	X		X		SI		TrapProfile_Execute_AtGoal.vi		
	X	_		X			TrapProfile_IsFinished.vi TrapProfile New DefInitial.vi		
	X			$\frac{1}{X}$			TrapProfile New.vi		
	Χ	X		No)		TrapProfile_ShouldFlipAcceleration.vi		Private, remove from menu
	X			X			TrapProfile_TimeLeftUntil.vi		
	X			X			TrapProfile_TotalTime.vi TrapProfState_Equals.vi		
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CENTRIPETAL ACCELERATION CONSTRAINT	T X			<u>≥</u>			VI Name CentripetalAccelConstraint_getMaxVelocity.vi	Function Prototype public double getMaxVelocityMetersPerSecond(Pose2d	Notes
CENTRI ETAL AGGLERATION GONGTRAIN	' ^	^		^			Ochtripetai/Accordoristraint_getiviaxvelocity.vi	poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X						O and this state and the state in the state	velocityMetersPerSecond) public MinMax	
	\ X	X		X			CentripetalAccelConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSg(Pose2d poseMeters	3.
								getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters double curvatureRadPerMeter, double velocityMetersPerSecond))
	Y	X	+	Y	SI		CentripetalAccelConstraint New.vi	public CentripetalAccelerationConstraint(double	Can use cluster pack for now
				^			Centripotal/ toccioonistraint_rew.vi	maxCentripetalAccelerationMetersPerSecondSq)	our use diaster pack for now
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DIFF DRIVE KINEMATIC CONSTRAINT	T X	X		X			DiffDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double	
		\perp		\perp		\perp		velocityMetersPerSecond)	
	X	X		X			DiffDriveKinematicsConstraint_getMinMaxAccel.vi	velocityMetersPerSecond) public MinMax	
								getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters double curvatureRadPerMeter, double velocityMetersPerSecond)	۶, ۱
									′
	X	X		X	SI		DiffDriveKinematicsConstraint_New.vi	public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double	
								maxSpeedMetersPerSecond)	
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	ient	ent	אורו	ltem	ion	Routine	P.O.		
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	du,	900	Not	Mer	Exe	Test	S VI Name	Function Prototype	Notes
DIFF DRIVE VOLTAGE CONSTRAIN	T X			\overline{x}	~	T	DiffDriveVoltageConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d	
								poseMeters, double curvatureRadPerMeter, double	
	X	X	+	X		1	DiffDriveVoltageConstraint_getMinMaxAccel.vi	velocityMetersPerSecond) public MinMax	+
	^`	``		``				getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters double curvatureRadPerMeter, double velocityMetersPerSecond)	š,
								double curvatureRadPerMeter, double velocityMetersPerSecond)
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PILib LabVIEW Math Library – VI Implementation Li	st						
vision 3.08 11/07/2023 – Added edge detect, bool cmd, dru	im sequencer,	double solenoid	pulse	DiffDriveVoltageConstraint_New.vi	public		٦
				Dilibilite voltage constituint_item.vi	DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double		
		ρ6			maxVoltage)		
	_	otimize	8				
	ented ented	'PILIB Item tion Op	Routine ole Prog				
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ELLIPTICAL REGION CONSTRAINT	X X	X X	F 0	EllipRegionConstraint_getMaxVelocity.vi	Function Prototype	Notes	
	X X X X X X X X X X	X X X		EllipRegionConstraint_getMinMaxAccel.vi EllipRegionConstraint_IsPoseInRegion.vi			_
	X X	X Q		EllipRegionConstraint_New.vi			
		ıtimize	5				
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JERK CONSTRAIN	/	X	Tes	JerkConstraint getMaxVelocity.vi	Function Prototype Routine exists, it is just a shell	Notes 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	
		pe			· · · · · · · · · · · · · · · · · · ·		-
	_	otimiz	2				
	ented	'PILIB Item tion Op	Routine				
	Implementec Documentec	Not WPI Menu Ite Executic	Test Ro				
MAX VELOCITY CONSTRAINT	XX	X SI	₽ 0	MaxVelocityConstraint_getMaxVelocity.vi	Function Prototype	Notes	
	X X X X	X SI X SI		MaxVelocityConstraint_getMinMaxAccel.vi MaxVelocityConstraint_New.vi			
		mized	8				
	nted	-IB m n Optii	utine				
	Implementec Documentea	Not WPILIB Menu Item Execution C	Test Routine				
MECANUM DRIVE KINEMATICS CONSTRAIN		Not Wer Not Exe	Tes	VI Name MecaDriveKinematicsConstraint_getMaxVelocity.vi	Function Prototype	Notes	٦
MECANUM DRIVE RINEMATICS CONSTRAIN	XX	X		MecaDriveKinematicsConstraint_getMinMaxAccel.vi			_
	XX	IS X		MecaDriveKinematicsConstraint_New.vi	<u> </u>		_
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	nted	LIB 'm 'n Opt	Routine				
	Impleme	Vot WPILIB Menu Item Execution O	st Rou				
RECTANGULAR REGION CONSTRAINT		Not Not Exe	Test	VI Name RectRegionConstraint_getRectRegion.vi	Function Prototype	Notes	٦
REGIANGSEAR REGION GONG INAME	X X X X	X		RectRegionConstraint_getMinMaxAccel.vi RectRegionConstraint_lsPoseInRegion.vi			-
	XXX	X		RectRegionConstraint_IsPoseinRegion.vi RectRegionConstraint_New.vi			
		ized	_				
	<i>p</i> ,	B Optim	ЭС	n			
	Implementec Documentea	Not WPILIB Menu Item Execution C	Test Routine				
	Implemer	Not WPILI Menu Item Execution	Test Rou Sample	VI Name	Function Prototype	Notes	
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AINT	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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes
TRAJECTORY CONSTRAINT	X	Χ	X	X			TrajConstraint_GetMaxVelocity.vi		
	Χ	Χ	X	X			TrajConstraint_GetMinMaxAccel.vi		
	Χ	Χ	X	Χ			TrajConstraint_GetType.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Nample Program	Function Prototype	Notes
TRAJECTORY CONSTRAINT (Min Max)	X	X		X	SI		Constraint_MinMax_New.vi	Constraint_MinMax_New	
	Χ	X		X	SI		Constraint_MinMax_NewMinMax.VI	Constraint_MinMax_New	

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UTILITY

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
UTIL	X	Χ	X	X	SI			Util_ApproxEqual.vi		
	Χ	Χ	X	Χ				Util_Array_PoseWCurv_to_XY.vi		
	X	Χ	Χ	X	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!
	X	Χ	X	No	1			Util_GetTime_U32.vi		
	X	Χ	X	No	1			Util_GetTime_U64.vi		
	X	Χ	X	No	N/A			Util_LibraryGlobals.vi		Global Variables – no block diag.
	X	Χ	Χ	X				Util_Trajectory_Absolute_To_Relative.vi		
	X	Χ	Χ	X				Util_Trajectory_ReadFile.vi		
	X	Χ	X	X				Util_Trajectory_to_XY.vi		
	X	Χ	X	No				Util_Trajectory_WriteFile_Config.vi		internal
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_OneState.vi		internal
	X	Χ	Χ	X				Util_Trajectory_WriteFile_PathFinder.vi		
	X	Χ	Χ	No				Util_Trajectory_WriteFile_PathFinderConfig.vi		internal
	X	Χ	Χ	X				Util_Trajectory_WriteFile_Pathweaver.vi		
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_States.vi		internal
	X	Χ	Χ	No				Util_Trajectory_WriteFile_WayPoints.vi		internal
	X	Χ	Χ	X				Util_Trajectory_WriteFile.vi		
	X	Χ	Χ	X				Util_TrajectoryState_Meters_To_Inches.vi		
	X	Χ	X	X				Util_TrajState_to_DiffDrive_WheelPos.vi		
	X	Χ	X	X				Util_DispWaypoint_Eng_To_Sl.vi		
	Χ	Χ	Χ	X				Util_DispWaypoint_To_CubicInput.vi		
	X	Χ	Χ	Χ				Util_DispWaypoint_To_QuinticInput.vi		
	X	Χ	Χ	X				Util_DispWeightedWaypiont_Eng_To_WeightedWaypoint		

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Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

| X | X | No | | Util_DispWeightedWayPoint_To_WeightedWayPoint.vi Sorry about the confusing name..

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CONVERSIONS '=====

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 NI Name	Function Prototype	Notes
CONV	X	Χ	X	Χ	SI		Conv_AngleDegrees_Heading.vi		
	X	Χ	Χ	Χ	SI		Conv_AngleRadians_Heading.vi		
	X	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	Χ	Χ	Χ	SI		Conv_Feet_Meters.vi		
	Χ	Χ	Χ	Χ	SI		Conv_GyroDegrees_Heading.vi		
	Χ	Χ	X	Χ	SI		Conv_Heading_AngleRadians.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Inches_Meters.vi		
	X	Χ	Χ	Χ	SI		Conv_Kilograms_Pounds.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Meters_Feet.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Meters_Inches.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Pose2d_SI_Eng.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Pounds_Kilograms.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Radians_Deg.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Radians_Rotations.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Rotations_Deg.vi		
	Χ	Χ	Χ	Χ	SI		Conv_Rotations_Radians.vi		
	X	Χ	X	Χ	SI		Conv_Yards_Meters.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Sample Program	Function Prototype	Notes
UNITS	Χ	X		Χ	SI		Units_DegreesToRadians.vi		
	Χ	Χ		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	X		Χ	SI		Units_RotationsToDegrees.vi		
	Χ	X		Χ	SI		Units_RotationsToRadians.vi		
	Χ	X		Χ	SI		Units_SecondsToMilliseconds.vi		

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PATHFINDER UTIL

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

Implemented Documented Not WPILIB Menu Item Execution Optimizec	Nample Program	Function Prototype	Notes
PATHFINDERUTIL X X X X X	PathfinderUtil_Continuous_Heading_Difference.vi		

Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

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DCMotor WithReduction.vi

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	Χ	X	X	X			PathfinderUtil_OptimizeTrajectoryStates.vi	
	Χ	X	X	X			PathfinderUtil_ToTrajectory.vi	
	X	X	X	X			PathfinderUtil ToTrajectoryStates.vi	

'====== STATE SPACE MODEL '=======

> VI Name Function Prototype Notes DC MOTOR X X DCMotor GetAndymark9015.vi X SI X SI X SI DCMotor GetAndymarkAM2235A.vi XX DCMotor GetAndymarkAM3493.vi DCMotor GetAndymarkRs775 125.vi XX X SI XX X SI DCMotor_GetBag.vi X X X X X SI X SI DCMotor_GetBanebotsRs550.vi DCMotor_GetBanebotsRs775.vi XX X SI DCMotor GetCIM.vi DCMotor_GetCurrent.vi X SI XX DCMotor_GetFalcon500.vi X SI X X X X X SI X SI DCMotor GetMiniCIM.vi DCMotor GetNEO.vi X SI X SI XX DCMotor_GetNEO550.vi DCMotor_GetRomiBuiltIn.vi XX XX X SI DCMotor GetSpeed.vi X X X X X SI X SI DCMotor GetTorque.vi DCMotor_GetVex775Pro.vi X X X X X SI X SI DCMotor New.vi DCMotor_PickMotor.vi

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM ID	X	Χ		Χ			LinearSystemId_CreateDCMotorSystem.vi					
	X	Χ		Χ			LinearSystemId_CreateDriveTrainVelocitySystem.vi		Update to use create matrix			
	Χ	Χ		Χ			LinearSystemId_CreateElevatorSystem.vi		Update to use create matrix			
	X	Χ		Χ			LinearSystemId_CreateFlywheelSystem.vi		Update to use create matrix			
	Χ	Χ		Χ			LinearSystemId_CreateSingleJointedArmSystem.vi		Update to use create matrix			
	X	Χ	X	Χ	SI		LinearSystemId_DCMotor_Pack_Model_Params.vi					
	X	Χ	X	X	SI		LinearSystemId_DiffDrv_ID_Pack_Model_Params.vi					
	X	Χ	X	X	SI		LinearSystemId_DiffDrv_Pack_Model_Params.vi					
	Χ	Χ	X	X	SI		LinearSystemId_Elevator_Pack_Model_Params.vi					
	Χ	Χ	X	Χ	SI		LinearSystemId_FlyWheel_Pack_Model_Params.vi					
	X	Χ		Χ			LinearSystemId_IdentifyDriveTrainSystem.vi		Update to use create matrix			
	Χ	Χ		Χ			LinearSystemId_IdentifyPositionSystem.vi		Update to use create matrix			
	Χ	Χ		Χ			LinearSystemId_IdentifyVelocitySystem.vi		Update to use create matrix			
	Χ	Χ	X	Χ	SI		LinearSystemId_SngJntArm_Pack_Model_Params.vi					

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

Implemented
Documented
Not WPILIB
Menu Item
Execution Optimize
Test Routine
Sample Program

Function Prototype Notes Code Review Notes Supplies Suppl

Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse DIFFERENTIAL DRIVE POSE ESTIMATOR X X DiffDrivePoseEst AddVisionMeasurement.vi $X \mid X$ X DiffDrivePoseEst FillStateVector.vi DiffDrivePoseEst GetEstimatedPosition.vi XX Χ Χ DiffDrivePoseEst Kalman F Callback.vi DiffDrivePoseEst Kalman H Callback.vi XX X DiffDrivePoseEst New.vi $X \mid X$ Χ DiffDrivePoseEst ResetPosition.vi DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi XX X DiffDrivePoseEst Update.vi XX Χ X DiffDrivePoseEst UpdateWithTime.vi XX DiffDrivePoseEst_VisionCorrect_Callback.vi XX X DiffDrivePoseEst VisionCorrect Kalman H Callback.vi Function Prototype Notes DIFFERENTIAL DRIVE POSE ESTIMATOR 2 X X DiffDrivePoseEst2 AddVisionMeasurement.vi DiffDrivePoseEst2 BufferDuration.vi X X X NO SI DiffDrivePoseEst2 Execute.vi X X X X DiffDrivePoseEst2_GetEstimatedPosition.vi X X X No SI DiffDrivePoseEst2 InterpRecord ExtractFromVar.vi No DiffDrivePoseEst2 InterpRecord Interp.vi DiffDrivePoseEst2 InterpRecord New.vi No SI $X \mid X$ X X X X X SI DiffDrivePoseEst2 New.vi DiffDrivePoseEst2 Pack Config.vi X SI DiffDrivePoseEst2 ResetPosition.vi XX XX X SI DiffDrivePoseEst2 SetVisionMeasurementStdDevs.vi XX Χ DiffDrivePoseEst2 Update.vi DiffDrivePoseEst2 UpdateWithTime.vi XX Χ WPILIB Function Prototype EXTENDED KALMAN FILTER X X ExtendedKalmanFilter Correct OnlyUY.vi X XX ExtendedKalmanFilter Correct.vi Just a shell, not functional! XX Χ ExtendedKalmanFilter GetP Single.vi XX ExtendedKalmanFilter_GetP.vi X XX ExtendedKalmanFilter_GetXHat_Single.vi X Χ ExtendedKalmanFilter GetXHat.vi X ExtendedKalmanFilter New.vi XX Χ ExtendedKalmanFilter Predict.vi XX Χ ExtendedKalmanFilter Reset.vi ExtendedKalmanFilter_SetP.vi $X \mid X$ X ExtendedKalmanFilter SetXHat Single.vi XX X ExtendedKalmanFilter SetXHat.vi Function Prototype Notes KALMAN FILTER X X X KalmanFilter Correct.vi X KalmanFilter_GetK $X \mid X$ X KalmanFilter_GetK_Single.vi XX Χ X KalmanFilter GetXHat $X \mid X$ Χ KalmanFilter GetXHaT Single X KalmanFilter New.vi XX X XX X X KalmanFilter Predict.vi

.08 11/07/2023 – Added edge detect, bool cmd, drui					d pulse				<u>'</u>			
	X	X	X				KalmanFilter_Reset.vi					
	X	$\frac{X}{Y}$	X		X		KalmanFilter_SetXHat KalmanFilter_SetXHat_Single					
	^	^ +	^		^		KalmanFiller_SetAnat_Single					
· ·												
		Doc	Not WPILIB Menu Item	Execu	Test Routine		VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
KALMAN FILTER LATENCY COMPENSATOR			X				KalmanFilterLatencyComp_AddObserverState.vi					
	X		X				KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi					
	X		X				KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi					
	X	$\frac{x}{x}$	X				KalmanFilterLatencyComp_FindClosestMeasurement.vi					
	X	$\frac{x}{x}$	X	,			KalmanFilterLatencyComp_New.vi					
	X	* +	X				KalmanFIlterLatencyComp_Observer_New.vi KalmanFilterLatencyComp_Reset.vi					
	^		^				KalmanrillerLatericyComp_Reset.vi					
	mplemented	Documented	Not WPILIB Menu Item	Execution Optimize	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	est Program	rror Checking
MECANUM DRIVE POSE ESTIMATOR		<u> </u>	< _ <	<u> </u>			MecaDrivePoseEst AddVisionMeasurement StdDev.vi	1 unction 1 tototype	Notes			Ш
MESANSM BRIVE I GGE ESTIMATOR	Х	\overline{X}	X	,			MecaDriver osciat_AddVisionMeasurement.vi					
	X	$\frac{2}{X}$	X				MecaDrivePoseEst GetEstimatedPosition.vi					
	X	X	No	2			MecaDrivePoseEst Kalman F Callback.vi					
	X	X	No	2			MecaDrivePoseEst_Kalman_H_Callback.vi					
	X		X				MecaDrivePoseEst_New.vi					
	X		X				MecaDrivePoseEst_ResetPosition.vi					
	X		X				MecaDrivePoseEst_SetVisionMeasurementStdDevs.vi					
	X	$\frac{x}{x}$	X				MecaDrivePoseEst_Update.vi MecaDrivePoseEst_UpdateWithTime.vi					
	X	* +	X No				MecaDrivePoseEst_UpdateWithTime.vi MecaDrivePoseEst_VisionCorrect_Callback.vi					
	X	$\frac{}{x}$	No	2			MecaDriver oseEst_visionCorrect_Caliback.vi MecaDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi					
			740	<i>-</i>			Wiccaphiver oscest_visionooneet_Raiman_F1_Camback.vi					
MECANUM DRIVE POSE ESTIMATOR 2	X	N	X No No No X X X X		Test		VI Name MecaDrivePoseEst2_AddVisionMeasurement.vi MecaDrivePoseEst2_BufferDuration.vi MecaDrivePoseEst2_Execute.vi MecaDrivePoseEst2_GetEstimatedPosition.vi MecaDrivePoseEst2_InterpRecord_ExtractFromVar.vi MecaDrivePoseEst2_InterpRecord_Interp.vi MecaDrivePoseEst2_InterpRecord_New.vi MecaDrivePoseEst2_New.vi MecaDrivePoseEst2_Pack_Config.vi MecaDrivePoseEst2_ResetPosition.vi MecaDrivePoseEst2_SetVisionMeasurementStdDevs.vi MecaDrivePoseEst2_Update.vi MecaDrivePoseEst2_Update.vi MecaDrivePoseEst2_UpdateWithTime.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	Implemented	Documented	Not WPILIB	Execution Optimized		Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking

WPILib LabVIEW Math Library – VI Implementation List Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse SWERVE DRIVE POSE ESTIMATOR SwerveDrivePoseEst AddVisionMeasurement StdDev.vi SwerveDrivePoseEst AddVisionMeasurement.vi X X SwerveDrivePoseEst GetEstimatedPosition.vi Χ SwerveDrivePoseEst Kalman F Callback.vi XX X SwerveDrivePoseEst Kalman H Callback.vi XX Χ SwerveDrivePoseEst New.vi SwerveDrivePoseEst ResetPosition.vi $X \mid X$ X X X SwerveDrivePoseEst SetVisionMeasurementStdDevs.vi X X SwerveDrivePoseEst Update.vi XX X SwerveDrivePoseEst UpdateWithTime.vi SwerveDrivePoseEst VisionCorrect Callback.vi XX Χ SwerveDrivePoseEst VisionCorrect Kalman H Callback.vi XX Function Prototype Notes SWERVE DRIVE POSE ESTIMATOR 2 X X SwerveDrivePoseEst2 AddVisionMeasurement.vi X X X No SI SwerveDrivePoseEst2 BufferDuration.vi SwerveDrivePoseEst2 Execute.vi X X X X
 X
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 SI

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 No
 SI
 SwerveDrivePoseEst2 GetEstimatedPosition.vi SwerveDrivePoseEst2 InterpRecord ExtractFromVar.vi SwerveDrivePoseEst2 InterpRecord Interp.vi XX No XX No SI SwerveDrivePoseEst2 InterpRecord New.vi SwerveDrivePoseEst2_New.vi XX X SwerveDrivePoseEst2 Pack Config.vi X X X X SI X SI X SI SwerveDrivePoseEst2 ResetPosition.vi XX SwerveDrivePoseEst2_SetVisionMeasurementStdDevs.vi XX X SwerveDrivePoseEst2 Update.vi SwerveDrivePoseEst2 UpdateWithTime.vi $X \mid X$ X VI Name Function Prototype Notes UNSCENTED KALMAN FILTER X UnscentedKalmanFilter Correct FuncGroup.vi UnscentedKalmanFilter_Correct_OnlyUY.vi XX X UnscentedKalmanFilter Correct OnlyUYR.vi UnscentedKalmanFilter Correct.vi $X \mid X$ X UnscentedKalmanFilter_GetP_Single.vi XX X XX UnscentedKalmanFilter GetP.vi X XX X UnscentedKalmanFilter GetXHat Single.vi XX X UnscentedKalmanFilter GetXHat.vi XX X UnscentedKalmanFilter New Default.vi $X \mid X$ Χ UnscentedKalmanFilter_New_FuncGroup.vi XX X UnscentedKalmanFilter New.vi Χ UnscentedKalmanFilter Predict.vi XX X UnscentedKalmanFilter Reset.vi XX Χ UnscentedKalmanFilter SetP.vi UnscentedKalmanFilter_SetXHat_Single.vi XX X UnscentedKalmanFilter SetXHat.vi XX Χ

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

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UnscentedKalmanFilter Transform.vi

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Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse Function Prototype Notes CONTROL AFFINE PLANT INVERSION FEEDFORWARD Function Prototype Notes DIFFERENTIAL DRIVE ACCELERATION LIMITER X X Χ X DiffDrvAccelLimit Calculate.vi DiffDrvAccelLimit New.vi Function Prototype Notes IMPLICIT MODEL FOLLOWER X ImplModelFollow Calculate.vi X ImplModelFollow GetU.vi ImplModelFollow_GetU_Single.vi XX Х Χ XX Χ X ImplModelFollow New.vi ImplModelFollow_New_Plant.vi XX Χ Χ ImplModelFollow Reset.vi Function Prototype Notes LINEAR PLANT INVERSION FEEDFORWARD X X X LinearPIntInvFF Calculate NextR.vi XX LinearPIntInvFF Calculate.vi LinearPIntInvFF_GetR_Single.vi XX X X X X X X LinearPIntInvFF GetR.vi LinearPIntInvFF_GetUff_Single.vi XX Χ LinearPIntInvFF_GetUff.vi XX X LinearPIntInvFF New Plant.vi LinearPIntInvFF New.vi $X \mid X$ Χ XX LinearPIntInvFF Reset Initial.vi Χ LinearPIntInvFF Reset Zero.vi Function Prototype Notes \overline{X} LINEAR QUADRATIC REGULATOR X X LinearQuadraticRegulator_Calculate_NextR.vi LinearQuadraticRegulator Calculate.vi XX Χ LinearQuadraticRegulator_GetK_Single.vi NOT ORIGINAL. XX Χ X LinearQuadraticRegulator_GetK.vi LinearQuadraticRegulator_GetR_Single.vi XX X LinearQuadraticRegulator GetR.vi LinearQuadraticRegulator_GetU_Single.vi $X \mid X$ X XX LinearQuadraticRegulator_GetU.vi

WPILib LabVIEW Math Library - VI Implementation List Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse LinearQuadraticRegulator LatencyCompensate.vi outine exists, but it only has XX terger raise matrix to power XX Χ LinearQuadraticRegulator New ELMS.vi LinearQuadraticRegulator New N.vi XX Χ LinearQuadraticRegulator_New_Raw.vi XX LinearQuadraticRegulator New SystemELMS.vi Χ Χ X LinearQuadraticRegulator New.vi X X LinearQuadraticRegulator_Reset.vi Function Prototype Notes LINEAR SYSTEM X X LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi X $X \mid X$ X SI LinearSystem GetA.vi X SI LinearSystem GetAElement.vi XX X SI LinearSystem GetB.vi XX X SI LinearSystem GetBElement.vi LinearSystem_GetC.vi $X \mid X$ X SI LinearSystem GetCElement.vi XX X SI X SI LinearSystem GetD.vi XX X SI LinearSystem GetDElement.vi XX X SI LinearSystem New.vi VI Name Function Prototype Notes LINEAR SYSTEM LOOP X X X X X X LinearSystemLoop ClampInput.vi LinearSystemLoop Correct.vi X X X X LinearSystemLoop DCMotor Execute.vi X X X X SI LinearSystemLoop_DCMotor_Pack_Ctrl.vi LinearSystemLoop_DiffDrv_Execute.vi X X X X X X X X SI LinearSystemLoop DiffDrv Pack Ctrl.vi LinearSystemLoop_Elevator_Execute.vi LinearSystemLoop_Elevator_Pack_Ctrl.vi $X \mid X \mid X \mid X$ LinearSystemLoop Execute.vi LinearSystemLoop_FlyWheel_Execute.vi $X \mid X \mid X \mid X$ LinearSystemLoop FlyWheel Pack Ctrl.vi X X X X SI LinearSystemLoop GetClampFunction.vi LinearSystemLoop_GetController.vi XX XX X LinearSystemLoop GetError Single.vi $X \mid X$ Χ LinearSystemLoop_GetError.vi XX LinearSystemLoop_GetFeedForward.vi X XX X LinearSystemLoop GetNextR Single.vi LinearSystemLoop_GetNextR.vi XX Х LinearSystemLoop GetObserver.vi XX Χ LinearSystemLoop_GetU_Row.vi LinearSystemLoop_GetU.vi $X \mid X$ X LinearSystemLoop GetXHat Single.vi X X X Χ LinearSystemLoop_GetXHat.vi LinearSystemLoop_New_BBB LinearSystemLoop New LinearSystem ClampFunc XX LinearSystemLoop New LinearSystem ClampVal.vi X LinearSystemLoop_New.vi XX Χ X X X X SI LinearSystemLoop Pack Ctrl Params.vi LinearSystemLoop_Predict.vi $X \mid X$ X LinearSystemLoop Reset.vi XX X

> LinearSystemLoop SetClampFunction.vi LinearSystemLoop_SetNextR_Some.vi

LinearSystemLoop SetNextR.vi

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EW Math Library – VI Implementation Lis	t												
1/07/2023 - Added edge detect, bool cmd, dru	m sequ	uence	r, dou	ble sol	lenoid	pulse			_				
								_inearSystemLoop_SetXHat_Single.vi					
	У	Y	Y	X				_inearSystemLoop_SetXHat.vi _inearSystemLoop_SngJntArm_Execute.vi					
	\hat{X}	$\frac{\hat{x}}{x}$	$\frac{\hat{x}}{x}$	X	SI			_inearSystemLoop_SngJntArm_Pack_Ctrl.VI					
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sion 3.08 11/07/2023 – A	Added edge detect, bool cmd, drum	Joque	<u> </u>		ElvMhoolQine Navy LinQva NaNai		Ft			
	_	X	_	X	FlyWheelSim_New_LinSys_NoNoise FlyWheelSim_New_MOI.vi		Future			
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		X		X	LinearSystemSim_Setstate.vi LinearSystemSim_Update.vi					
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		X	X X	X	SngJntArmSim_EsitmateMOI.vi SngJntArmSim_Execute.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
		X X X	X X X X X	X X X	SngJntArmSim_EsitmateMOI.vi SngJntArmSim_Execute.vi SngJntArmSim_GetAngleRads.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
		X X X X X	X X X X X X X X X X X X X X X X X X X	X X X	SngJntArmSim_EsitmateMOI.vi SngJntArmSim_Execute.vi SngJntArmSim_GetAngleRads.vi SngJntArmSim_GetCurrentDraw.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
		X X X X X	X	X X X X X	SngJntArmSim_EsitmateMOI.vi SngJntArmSim_Execute.vi SngJntArmSim_GetAngleRads.vi SngJntArmSim_GetCurrentDraw.vi SngJntArmSim_GetVelocityRadsPerSec.vi SngJntArmSim_HasHitLowerLimit.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
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		X X X X X X X X X	X	X	SngJntArmSim_EsitmateMOI.vi SngJntArmSim_Execute.vi SngJntArmSim_GetAngleRads.vi SngJntArmSim_GetCurrentDraw.vi SngJntArmSim_GetVelocityRadsPerSec.vi SngJntArmSim_HasHitLowerLimit.vi SngJntArmSim_HasHitUpperLimit.vi SngJntArmSim_New.vi SI SngJntArmSim_Pack_Simulation_Params.vi SngJntArmSim_Rkf45_Func.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
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		X X X X X X X X X X X X X X X X X X X	X	X	SngJntArmSim_EsitmateMOI.vi SngJntArmSim_Execute.vi SngJntArmSim_GetAngleRads.vi SngJntArmSim_GetCurrentDraw.vi SngJntArmSim_GetVelocityRadsPerSec.vi SngJntArmSim_HasHitLowerLimit.vi SngJntArmSim_HasHitUpperLimit.vi SngJntArmSim_New.vi SI SngJntArmSim_Pack_Simulation_Params.vi SngJntArmSim_Pack_Simulation_Params.vi SngJntArmSim_SetInputVoltage.vi SngJntArmSim_SetState.vi SngJntArmSim_Update.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
		X	X	X	SngJntArmSim_EsitmateMOI.vi SngJntArmSim_Execute.vi SngJntArmSim_GetAngleRads.vi SngJntArmSim_GetCurrentDraw.vi SngJntArmSim_GetVelocityRadsPerSec.vi SngJntArmSim_HasHitLowerLimit.vi SngJntArmSim_HasHitUpperLimit.vi SngJntArmSim_New.vi Si SngJntArmSim_Pack_Simulation_Params.vi SngJntArmSim_Rkf45_Func.vi SngJntArmSim_SetInputVoltage.vi SngJntArmSim_SetState.vi SngJntArmSim_Update.vi SngJntArmSim_Update.vi SngJntArmSim_Update.vi SngJntArmSim_Update.vi SngJntArmSim_WouldHitLowerLimit.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
		X X X X X X X X X X X X X X X X X X X	X	X	SngJntArmSim_EsitmateMOI.vi SngJntArmSim_Execute.vi SngJntArmSim_GetAngleRads.vi SngJntArmSim_GetCurrentDraw.vi SngJntArmSim_GetVelocityRadsPerSec.vi SngJntArmSim_HasHitLowerLimit.vi SngJntArmSim_HasHitUpperLimit.vi SngJntArmSim_HasHitUpperLimit.vi SngJntArmSim_Pack_Simulation_Params.vi SngJntArmSim_Pack_Simulation_Params.vi SngJntArmSim_SetInputVoltage.vi SngJntArmSim_SetState.vi SngJntArmSim_Update.vi SngJntArmSim_UpdateX.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
		X	X	X	SngJntArmSim_EsitmateMOI.vi SngJntArmSim_Execute.vi SngJntArmSim_GetAngleRads.vi SngJntArmSim_GetCurrentDraw.vi SngJntArmSim_GetVelocityRadsPerSec.vi SngJntArmSim_HasHitLowerLimit.vi SngJntArmSim_HasHitUpperLimit.vi SngJntArmSim_New.vi Si SngJntArmSim_Pack_Simulation_Params.vi SngJntArmSim_Rkf45_Func.vi SngJntArmSim_SetInputVoltage.vi SngJntArmSim_SetState.vi SngJntArmSim_Update.vi SngJntArmSim_Update.vi SngJntArmSim_Update.vi SngJntArmSim_Update.vi SngJntArmSim_WouldHitLowerLimit.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
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IX UTILITIES		X X X X X X X X X X X X X X X X X X X	Documented Not WPILIB	X	SngJntArmSim_EsitmateMOI.vi SngJntArmSim_Execute.vi SngJntArmSim_GetAngleRads.vi SngJntArmSim_GetCurrentDraw.vi SngJntArmSim_GetVelocityRadsPerSec.vi SngJntArmSim_HasHitLowerLimit.vi SngJntArmSim_HasHitUpperLimit.vi SngJntArmSim_New.vi Sl SngJntArmSim_Pack_Simulation_Params.vi SngJntArmSim_Rkf45_Func.vi SngJntArmSim_SetInputVoltage.vi SngJntArmSim_SetState.vi SngJntArmSim_Update.vi SngJntArmSim_UpdateX.vi SngJntArmSim_WouldHitLowerLimit.vi SngJntArmSim_WouldHitUpperLimit.vi	Function Prototype Function Prototype	Notes	Code Review Code Review	Test Program Test Program	ecking

Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse Function Prototype Notes X SI X SI MATRIX XX Matrix AssignBlock.vi XX Matrix Block.vi Matrix_ChangeBoundsUnchecked.vi Matrix Create.vi XX X SI Matrix Det.vi XX X SI Matrix_Diag.vi Matrix_Div_Scalar.vi
Matrix_ElementPower.vi labview has function XX Matrix ElementSum.vi X SI Matrix ElementTimes.vi Matrix_Equals.vi XX X I Matrix_Exp.vi XX X SI Matrix_ExtractColumnVector.vi XX X SI Matrix ExtractFrom.vi Matrix_ExtractMatrix.vi XX X SI Matrix ExtractRowVector.vi XX X SI Matrix_Fill.vi Matrix_Get.vi labview has function XX X Matrix Ident.vi WPILIB calls this EYE Matrix Inv.vi XX X SI Matrix IsEqual.vi Matrix_IsIdentical.vi XX Matrix_LLTDecompose.vi X I Matrix Max.vi Matrix_MaxAbs.vi Matrix Mean.vi Matrix_MinInternal.vi Matrix Minus Matrix.vi Matrix Minus Scalar.vi XX XI Matrix NormF.vi Matrix NormIndP1.vi Matrix_Plus_Matrix.vi Matrix Plus Scalar.vi HIS NEEDS WORK!!!! Matrix Pow.vi XX X SI Matrix SetColumn.vi Matrix SetRow.vi THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT X SI SHOULD BE INCLUDED HERE FOR ISOLATION. Matrix Solve.vi Matrix Times Matrix.vi Matrix_Times_Scalar.vi Matrix Trace.vi X SI Matrix Transpose.vi X X X X Matrix WithinTolerance.vi S VI Name Function Prototype NOTE Matrix also has an SIMPLE MATRIX X SimpleMatrix ExtractMatrix.vi SI ExtractMatrix with different calling parameters.... YUK.

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	₹	ă	≥	Ž	щ	⊬ S VI Name	Function Prototype	Notes	ర	7e	Щ
MATRIX HELPER	X	Χ	Χ	Χ	SI	MatrixHelper_CooerceSize.vi					
	X	Χ	Χ	Χ	SI	MatrixHelper_MultCooerceBSize.vi					
	X	Χ	Χ	Χ	SI	MatrixHelper_Zero.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Sample Program	/I Name Function Prototype Notes	Code Review	Test Program	Error Checking
VECTOR BUILDER	Χ	Χ		Χ	SI			/ecBuilder_1x1Fill.vi			
	Χ	Χ		Χ	SI			/ecBuilder_2x1Fill.vi			
	X	Χ		X	SI			/ecBuilder_3x1Fill.vi			
	Χ	Χ		Χ	SI			/ecBuilder_4x1Fill.vi			
	X	Χ		X	SI			/ecBuilder_5x1Fill.vi			
	Χ	Χ		Χ	SI			/ecBuilder_6x1Fill.vi			
	Χ	Χ		Χ	SI			/ecBuilder_7x1Fill.vi			
	Χ	Χ		Χ	SI			/ecBuilder_8x1Fill.vi			
								/ecBuilder_9x1Fill.vi			
								/ecBuilder_10x1Fill.vi			
	Χ	Χ	X	Χ	SI			/ecBuilder_ArrayBy1Fill.vi			
					_						

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine	Sample Program NI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
VECTOR	X	X		Χ	SI		Vector_Dot.vi					
	X	X		Χ	Si		Vector_Norm.vi					

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimi	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking	
ANGLE STATISTICS	S X	X	X	X	X			AngleStats_AngleAdd_CallbackHelp.vi						Х
	X	X		Χ	1	Χ		AngleStats_AngleAdd.vi						Х
	X	X	X	Χ	X			AngleStats_AngleMean_CallbackHelp.vi						Х
	X	X		Χ	1	Χ		AngleStats_AngleMean.vi						Х
	X	X	X	X	X			AngleStats_AngleResidual_CallbackHelp.vi						Х
	X	X		X	1	X		AngleStats_AngleResidual.vi						Х
														Х
	Implemented	. Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program		Function Prototype	Notes	Code Review	Test Program	Error Checking	x x
MATH UTILITY	YX	X		X	SI			MathUtil_AngleModulus.vi						Х

	n sequencer	, double st	Jieriola puise							
	XX	X	SI		MathUtil_ApplyDeadband.vi					_
	X X	X	SI		MathUtil_Clamp_Int.vi					
	XX	X	SI		MathUtil_Clamp.vi					\perp
	XX		SI		MathUtil_InputModulus.vi					
-	X X	X	Si		MathUtil_Interpolate.vi					_
			75							
	ת ת		ptimize	gram				8	E	
	smentec ımentec	WPILIB nu Item	cution O t Routine	ple Prog				e Revie	Prograi	
	Ітрік Docu	Not I Men	Exec Test	Sam	VI Name	Function Prototype	Notes	Code	Test	
MERWE SCALED SIGMA POINTS		X	1		MerweScSigPts_ComputeWeights.vi					
	XX	X	SI		MerweScSigPts_GetNumSigmas.vi					\perp
	XX	X	SI		MerweScSigPts_GetWc_Single.vi					
	X X	X	SI		MerweScSigPts_GetWc.vi					
	XX	<u> </u>	SI		MerweScSigPts_GetWm_Single.vi					
	X X	X	SI	1	MerweScSigPts_GetWm.vi					_
_	X X	X	1		MerweScSigPts_New_Default.vi					+
-	XX		1	1	MerweScSigPts_New.vi					_
	X X	X	1		MerweScSigPts_SigmaPoints.vi					+
_			pez							
	ם ק)ptimi. e	gram				W	Ē	
	nte	2 E	n C	0,0				νie	gra	
	me ne	/PILII	ution C Routin	ole F				Re	õ	
	olei	2 2		īdu.				qe	st F	
	1mt 200	Not Men	Exec Test	Sar	VI Name	Function Prototype	Notes	Cod	Test	
NUMERICAL INTEGRATION		X			NumIntegrate_Func_Ax_Bu_K.vi		NOT USED. Should this be used or abandoned???			
	XX	X			NumIntegrate_Rk4_Dbl_X_U.vi					1
	XX	X			NumIntegrate_Rk4_Dbl_X.vi					_
	X X	X			NumIntegrate_Rk4_Mat_X_U.vi					4
-	X X	X	6.		NumIntegrate_Rk4_Mat_X.vi					\perp
_	XX	No	SI		NumIntegrate_Rkdp_Func_A.vi					+
	XX	No.	SI	+	NumIntegrate_Rkdp_Func_B1.vi					\perp
	XX	No	SI		NumIntegrate_Rkdp_Func_B1B2.vi					+
-	X X		SI		NumIntegrate_Rkdp_Func_B2.vi					+
-	XX	No	I	+	Numintegrate_Rkdp_Impl.vi		11 1 2 2 2 2 2 2			+
-	XX	X	0/	+	NumIntegrate_RKDP_Mat_X_U.vi		New replacement for RKF45			+
-	XX	No	SI	-	NumIntegrate_Rkf45_Func_A.vi					+
-	XX		SI	+	NumIntegrate_Rkf45_Func_B1.vi					+
-	XX	No No	SI		NumIntegrate_Rkf45_Func_B1B2.vi					+
	X X	No	SI	+	NumIntegrate Rkf45 Func B2.vi		Democrad Devices design			+
					NumIntegrate_RKf45_Func_Bs.vi		Removed. Replaced with newer functions.			
					NumIntegrate_RKf45_Func_Ch.vi		Removed. Replaced with newer functions.			T
					NumIntegrate_RKf45_Func_Ct.vi		Removed. Replaced with newer functions.			
	XX		I		NumIntegrate_Rkf45_Impl.vi					
	XX	X			NumIntegrate_Rkf45_Mat_X_U.vi		Note that this Feinberg method has been changed and a Dormand Price method has been			
				1			implemented TODO			\bot
					NumIntegrate_RKf45_New.vi		Removed. Never used.			_
	XX	XX	SI		NumIntegrate_Trap_Dbl.vi					_
-	X X	$X \mid X$			NumIntegrate_Trap_Mat.vi					+
	מ ס		Optimized	ogram				iew	am	
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	olemente cumente	WPILIE nu Item	ecution Op st Routine	ηρle Pr				Code Rev	t Progi	

 $X \mid X \mid X \mid X \mid SI$

X SI

AprilTag_GetAll.vi AprilTag_New.vi

Sept 2	d, drum sequ	uencer	r, douk	ole sol	enoid pulse		
Z				X			
Z							
2							
7							
2							
							NOT USED. Should this he
2	,		^	^	N/A	BICOT-WALITY_1 ONC_111 E.OTE	
Z	Z	Ζ	Χ	Χ	N/A	CALLBACK_FUNC_TYPE.CTL	word or warrant
7	Z				N/A		
Z	Z						
7							
7		Z	X	X		COORDINATE_SYSTEM.CTL	
2			X	Х	N/A		OPSOLETE Domovod
Z	7	7	7	Y	N/Δ		OBSOLETE - Removed
Z							
Z							
Z							
Z	Z	Ζ		Χ	N/A	DEBOUNCER.CTL	
Z	Z						
Z							
Z							
Z							
Z							
Z							
Z						DIFF_DRIVE_POSE_EST2_CONFIG.CTL	
Z							
Z							
Z		_				DIFF DRIVE SIM MODEL PARAMS	
Z							
Z		Ζ					
DISPLAY_WEIGHTED_WAYPOINT.VI	Z	Ζ	Χ	Χ	N/A		
Z							New V1.5. was
Z							UTIL_WEIGHTED_WAYPOINIT.VI
Z	7		X		NA	DrumSequence State FNUM vi	
Z							
Z	Z	Ζ		Χ	N/A		
Z	Z	Ζ	X	Χ	N/A		
Z	Z						
Z		Ζ					
Z			Z	Χ			
Z				X		FieldDisp_ElementPicture.ctl	
Z							
Z		7		_			
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Z							
Z							
Z							New 1/26/21
Z							
Z Z X N/A LINEAR_FILTER.CTL Z Z X X N/A LINEAR_PLANT_INV_FF.cll Z Z X X N/A LINEAR_QUADRATIC_REGULATOR.ctl Z Z X N/A LINEAR_SYSTEM_ID_DCMOTOR_MODEL.CTL Z Z X N/A LINEAR_SYSTEM_ID_ELEVATOR_MODEL.CTL Z Z X N/A LINEAR_SYSTEM_ID_FLYWHEEL_MODEL.CTL Z Z X N/A LINEAR_SYSTEM_ID_SINGLE_JOINT_ARM_MODEL.CTL Z Z X N/A LINEAR_SYSTEM_LOOP.ctl Z Z X N/A LINEAR_SYSTEM_LOOP.ctl Z Z X N/A LINEAR_SYSTEM_LOOP_DCMOTOR_CTRL_PARAMS.CTL Z Z X N/A LINEAR_SYSTEM_LOOP_DIFF_DRV_CTRL_PARAMS.CTL Z Z X N/A LINEAR_SYSTEM_LOOP_ELEVATOR_CTRL_PARAMS.CTL Z Z X N/A LINEAR_SYSTEM_LOOP_SNGJNTARM_CTRL_PARAMS.CTL Z Z X	Z	Ζ	Χ		N/A	KALMAN_FILTER_LATENCY_COMP.CTL	
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Z Z X X N/A LINEAR_SYSTEM_SIM.ctl		Z	Ζ	Χ		LINEAR_SYSTEM_LOOP_SNGJNTARM_CTRL_PARAMS.CTL	
	Z	Ζ	Χ	X	N/A	LINEAR_SYSTEM_SIM.ctl	

rum seqi	uencei	r. dou	ble so	lenoid	ulse	
Z	Z	X	X	N/A	LINEAR SYSTEM.ctl	
Z	Z	Z	X		LTV DIFF DRIVE CTRL CONTROL PARAMS.CTL	
Z	Z	Z	X		LTV DIFF DRIVE CTRL MODEL PARAMS.CTL	
Z	Z	X	X	N/A	LTV DIFF DRIVE CTRL STATE ENUM.ctl	
		Z	X	N/A	LTV_DIFF_DRIVE_CTRL_STATE_ENOW.CII LTV_DIFF_DRIVE_CTRL_STATE_ENOW.CII	
Z	Z					
Z	Z	X	X	N/A	LTV_DIFF_DRIVE_CTRL.ctl	
Z	Z	Z	X	N/A	LTV_UNICYCLE_CONTROLLER_MODEL_PARAMS.CTL	
Z	Z	X	X	N/A	LTV_UNICYCLE_CONTROLLER_STATE_ENUM.ctl	
Z	Z	Z	X	N/A	LTV_UNICYCLE_CONTROLLER_TOLERANCE.CTL	
Z	Z	X	X	N/A	LTV UNICYCLE CONTROLLER.CTL	
Z	Z	Χ	X	N/A	MECA DRIVE KINEMATICS.CTL	
Z	Z	X	X	N/A	MECA DRIVE ODOMETRY.CTL	
Z	Ζ	X	X	N/A	MECA DRIVE POSE EST.CTL	
Z	Z	X	X	N/A	MECA DRIVE POSE EST2.ctl	
Z	Z	X	X	N/A	MECA_DRIVE_FOSE_EST2.CONFIG.CTL	
Z	_	X	X	N/A	MECA_DRIVE_POSE_EST2_INTERP_RECORD.CTL	
Z	Z	X	X	N/A	MECA_WHEEL_POSITIONS.CTL	
Z	Ζ	X	X	N/A	MECA_WHEEL_SPEEDS.CTL	
Z	Ζ	X	X	N/A	MEDIAN_FILTER.CTL	
Z	Z	X	X	N/A	MERWE_SCALED_SIGMA_PTS.ctl	
Z	Ζ	Χ	X	N/A	OBSERVER_SNAP_LIST_ITEM.CTL	
Z	Ζ	Х	X	N/A	OBSERVER SNAPSHOT.CTL	
Z	Z	X	X	N/A	PARAM STACK ITEM.CTL	
Z	Z	X	X	N/A	PARAM STACK.CTL	
Z	Z	X	X	N/A	PID ADV LIMITS.CTL	
	Z	X	X	N/A	PID ADV TUNING.CTL	
<u>Z</u>		_		_	PID_ADV_TUNING.CTL PID_CONTROLLER.CTL	
Z	Z	X	X	N/A		
Z	Z	X	X	N/A	PID_ERROR_TOLERANCE.CTL	
Z	Z	X	X	N/A	PID_INPUT_LIMITS.CTL	
Z	Ζ	X	X	N/A	PID_TUNING.CTL	
Ζ	Z	X	X	N/A	POSE2D.CTL	
Z	Z	Χ	X	N/A	POSE3D.CTL	
Z	Z	X	X	N/A	POSEWCURVATURE.CTL	
Z	Ζ	Χ	X	N/A	PROFILED PID CONTROLLER.CTL	
Z	Ζ	X	X	N/A	QUATERNION.CTL	
Z	Z	X	X	N/A	RAMSETE EXE TUNING.CTL	
Z	Z	X	X	N/A	RAMSETE.CTL	
Z	Z	X	X	N/A	ROTATION2D.CTL	
				N/A	ROTATION2D.CTL ROTATION3D.CTL	
Z	Z	X	X			
Z	Z	Z	X	N/A	SIMPLE_MOTOR_FF_KA_TUNE_PARAMS.CTL	
Z	Z	X	X	N/A	SIMPLE_MOTOR_FF.CTL	
Z	Z	X	X	N/A	SINGLE_JOINT_ARM_SIM.CTL	
Z	Ζ	X	X	_	SINGLE_JOINT_ARM_SIM_SIMULATION_PARAMS.CTL	
Z	Z	X	X	N/A	SLEW_RATE_LIMITER.CTL	
Ζ	Ζ	X	X	N/A	SPLINE_CTRL_VECTOR.CTL	
Z	Z	X	X	N/A	SPLINE.CTL	
Z	Z	X	X	N/A	SWERVE DRIVE KINEMATICS.CTL	
Z	Ζ	X	X	N/A	SWERVE_DRIVE_MODULE_POSITION.CTL	
Z	Z	X	X	N/A	SWERVE DRIVE MODULE STATE.CTL	
Z	Z	X	X	N/A	SWERVE DRIVE ODOMETRY.CTL	
Z	Z	X	X	N/A	SWERVE DRIVE Pose EST.CTL	
Z		X	X	N/A	SWERVE DRIVE POSE EST2.ctl	
Z	Z	X	X	N/A	SWERVE DRIVE POSE EST2 CONFIG.CTL	
Z		X	No		SWERVE DRIVE POSE EST2 INTERP RECORD.CTL	
	7	X		_	TIME INTERPOLATABLE BOOLEAN.CTL	
Z	Z	_	X	N/A		
Z	Z	X	X		TIME_INTERPOLATABLE_DOUBLE.CTL	
Z	Z	X	X	N/A	TIME_INTERPOLATABLE_POSE2D.CTL	
Z	Z	X	X	N/A	TIME_INTERPOLATABLE_ROTATION2D.CTL	
Z	Ζ	Z	X	N/A	TIME_INTERPOLATABLE_VARIANT.CTL	
Z	Ζ	X	X	N/A	TIMER.CTL	
Z	Ζ	X	X	N/A	TRAJ_CONFIG.CTL	
Z	Ζ	X	X	N/A	TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL	
Z	Ζ	X	X	N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_KINEMATICS.CTL	
Z	Z	X	X	N/A	TRAJ CONSTRAINT DIIF DRIVE VOLTAGE.CTL	
Z	Z	X	X	N/A	TRAJ CONSTRAINT ELLIP REGION.CTL	
1		X		N/A	TRAJ CONSTRAINT JERK.CTL	Routine exists, it is just a shell
Z	Z	X	Х		TRAJ CONSTRAINT MAX VELOCITY.CTL	reduite oxides, it to just a offer
Z	Z	X	X	N/A	TRAJ CONSTRAINT MECA DRIVE KINEMATICS.CTL	
	Z	X	$\frac{\lambda}{X}$		TRAJ_CONSTRAINT_MECA_DRIVE_NINEMATICS.CTL TRAJ_CONSTRAINT_MINMAX.CTL	
Z		_				
Z	Z	X	X		TRAJ_CONSTRAINT_RECT_REGION.CTL	
Z	<u>Z</u>	X	X	N/A	TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	
Z	Z	X	X	N/A	TRAJ_STATE.CTL	

WPILib LabVIEW Math Library – VI Implementation List Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum

um seq	uence	r, douk	ole sol	enoid pu	ulse		
Z	Z	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	X	Χ	N/A		TRANSFORM3D.CTL	
Z	Ζ	X	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	Z	Χ	Χ	N/A		TRAPEZOID_PROFILE.CTL	
Z	Ζ	Χ	Χ	N/A		TWIST2D.CTL	
Z	Ζ	Χ	Χ	N/A		TWIST3D.CTL	
Z	Z	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	Z	X	X	N/A		X Y PAIR.CTL	

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