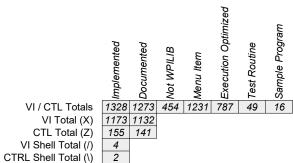
Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

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...



| X | X | X | X | I | X | X | X | SI |

Doc completed Pct 95.86% Optimization Pct 59.26%

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

'======== AUTONOMOUS '========

> Function Prototype Notes AutoHelper DelayedAction.vi AUTO HELPER X Similar to interpolated tree map. AutoHelper_Sequence_Execute.vi

'======= BASE '=======

FunctionGenerator Execute.vi FunctionGenerator_New.vi

ANALOG DELAY		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
BUMPLESS TRANSFER	X Implemented	X Documented	X Not WPILIB	X Menu Item	- Execution Optimized	Test Routine		VI Name BumplessTransfer_Execute.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
FUNCTION GENERATOR	X X Implemented	X X X Documented	Not WPILIB	X X Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name FunctionGenerator_Add_Value.vi FunctionGenerator_Add_XY.vi FunctionGenerator_Calculate.vi	Function Prototype	Notes Similar to interpolated tree map Similar to interpolated tree map Similar to interpolated tree map	Code Review	Test Program	Error Checking
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Similar to interpolated tree map.

Similar to interpolated tree map.

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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	XX	′ X	X	X		LinearFilter_LowPassBW2.vi					
	X X X X	_	X	X		LinearFilter_MovingAverage.vi LinearFilter_New.vi					
	XX		X	SI	ı	LinearFilter_Reset.vi					
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		. X	X	- 1	Test Routii	WedianFilter_Execute.vi	Function Prototype	Notes Labview style helper	Code Review	Test Program	Error Checking
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23 - Added edge detect, bool cmd, dr	um sequence	,		u puis							
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	XX	X	X			Timer_HasPeriodPassedOnce.vi					
	X X X X		X			Timer_New.vi Timer_Reset.vi					
	X X	X	No			Timer ResetInternal		Internal (private) only			
	XX	X	X			Timer_Restart.vi					
	X X X X	X	X		X	Timer_Start.vi Timer StartInternal.vi					
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X

DoubleSolenoid Pulse Execute.vi

DOUBLE SOLENOID X

	Implemented	Documented Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program In Manage Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DRUM SEQUENCE	X		X			DrumSequence_Cont_Execute.vi					
	X		X			DrumSequence_Pulse_Execute.vi					

Function Prototype

Function Prototype

Notes

'====== COMMAND '=======

> Function Prototype Notes BoolCmd Multiplexor.vi BoolCmd_Multiplexor_Array.vi No BoolCmd_ObtainQueue.vi Χ BoolCmd_Recv.vi BoolCmd_RecvInternal.vi No Χ BoolCmd_Send.vi BoolCmd_Send_Internal.vi No Χ BoolCmd_Send_OnEdge.vi

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	X			No				NumCmd_ObtainQueue_Generic.vi					
	Χ			No				NumCmd_ObtainQueue_OneDbl.vi					
	Χ			No				NumCmd_ObtainQueue_TwoDbl.vi					
	Χ			Χ				NumCmd_Recv_Array.vi					
	Χ			Χ				NumCmd_Recv_Chassis.vi					
	Χ			Χ			, i	NumCmd_Recv_Generic					
	Χ			Χ				NumCmd_Recv_OneDbl.vi					

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		NumCmd_Recv_TwoDbl.vi		
	Χ		X		NumCmd_Send_Array.vi		
	Χ		X		NumCmd_Send_Chassis.vi		
	Χ		X		NumCmd_Send_Generic		
	Χ		X		NumCmd_Send_OneDbl.vi		
	X		X		NumCmd Send TwoDbl.vi		

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		X	X	X	X	1	Ramsete_Execute_Ext_Odom.vi					
		X	X	X	X	1	Ramsete Execute Ext Odom ENG.vi					
				X		SI	Ramsete_Execute_PackTuning_ENG.vi					
				X		SI	Ramsete_Execute_PackTuning.vi					
				X	X	1	Ramsete Execute.vi					
			X		X		Ramsete New B Z.vi	new(b, zeta)				
			X			SI	Ramsete New.vi	new				
			X	-+	\overline{X}	SI	Ramsete_SetEnabled.vi	SetEnabled				
			X	-+	X	SI	Ramsete SetTolerance.vi	SetTolerance				
	-	X	$\frac{1}{X}$	-+	X		Ramsete SINC.vi		internal		$\overline{}$	
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SIMPLE N	NOTOR FEEDFORWARD	\overline{X}	\overline{x}	X	\overline{X}	SI	SimpleMotorFF_Calculate_CalcAccel.vi	71				
			X		X	-	SimpleMotorFF Calculate NextV Dt.vi					
			X		X	SI	SimpleMotorFF Calculate.vi	public double calculate(double velocity, double acceleration)				
			X	-		SI	SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)				
				Χ	X	-	SimpleMotorFF_Ka_AutoTune.vi					
			X		X	X	SimpleMotorFF_MaxAchieveAccel.vi	public double maxAchievableAcceleration(double maxVoltage,				
		,	, l		^`		- India toliaro, toolii	double velocity)				
		X	X		X	X	SimpleMotorFF_MaxAchieveVel.vi	public double maxAchievableVelocity(double maxVoltage, double acceleration)				
		X	X		X	X	SimpleMotorFF_MinAchieveAccel.vi	public double minAchievableAcceleration(double maxVoltage, double velocity)				
		X	X		X	X	SimpleMotorFF_MinAchieveVel.vi	public double minAchievableVelocity(double maxVoltage, double				
	-	+	+	-+	V	01	OinseleMeterFF Neuroi	acceleration)				
		X	X		X	SI	SimpleMotorFF_New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)				
	-	$\overline{\mathbf{Y}}$	+	X	Y	SI	SimpleMotorFF Pack Ka Tune Params.vi					
		^	^		^	JI	Omperiori i _r aok_r\a_rune_Farams.vi	public SimpleMotorFeedforward(double ks, double kv)				
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	COORDINATE AXIS		Χ			SI	CoordAxis_D.vi					
		X	X			SI	CoordAxis_E.vi					
						~	CoordAxis N.vi		1			
			X		Χ							
		X	Χ		X	SI	CoordAxis_New.vi					
		X X	X X		X X	SI SI	CoordAxis New.vi CoordAxis_S.vi					
		X X X	Χ		X	SI SI	CoordAxis_New.vi					

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etect, bool cmd, dru			i, aca										
		X		X	SI			Rotation3d_Minus.vi					
	X			X	SI			Rotation3d_Plus.vi					
	X			X			-	Rotation3d_RotateBy.vi					
	X	X		X	SI		-	Rotation3d_Times.vi Rotation3d ToRotation2d.vi					
	$\frac{\lambda}{X}$			X	SI		+	Rotation3d UnaryMinus.vi					
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TRANSFORM2D			_ <	X	SI	_		Transform2d Create PosePose.vi	transform2d new(pose2d, pose2d)	Notes		7	
TRANSI ORWIZD	\hat{x}			X	SI			Transform2d Create TransRot.vi	transform2d new(posezu, posezu) transform2d new(translation2d, rotation2d)				
	X			X	SI			Transform2d Div.vi	transformed new (transferioriza, rotationed)				
	X	X		X	SI		1	Transform2d Equals.VI	boolean equals(other transform2d)				
	X	X		X	SI			Transform2d GetRotation.VI	rotation2d getRotation()	use cluster unpack			
	X			Χ	SI			Transform2d GetTranslation.VI	translation2d getTranslation()	use cluster unpack			
	Χ	X	X	X	SI			Transform2d_GetXY.vi					
	X	X	X	X	SI			Transform2d_GetXYAngle.vi					
	X	X		X	SI			Transform2d_Inverse.vi	transform inverse()	new			
	X	X		X				Transform2d_Plus.vi					
	X	Χ		Χ	SI			Transform2d_Times.vi	transform2d times(double scalar)				
									transform2d new()	can use cluster constant			
	Implementec	Documentec	Not WPILIB	Menu Item	Execution	Test Routine	Sample Progr	VI Name	Function Prototype	Notes	Code Rev	Test Prog	
TRANSFORM3D	X		$\overline{}$	X	SI	T	T ,	Transform3d Create Default.vi				•	
	X	X		X	SI	L		Transform3d_Create_Pose3dPose.3dvi					
	X	X		X	SI			Transform3d_Create_Trans3dRot3d.vi					
	_ ^			X	SI			Transform3d_Div.vi					
	X	X			31								
	X	X		X	SI			Transform3d_Equals.VI					
	X X X	X X X		X	SI			Transform3d_GetRotation3d.VI					
	X X X	X X X		X X X	SI SI			Transform3d_GetRotation3d.VI Transform3d_GetTranslation3d.VI					
	X X X X	X X X X X	X	X X X	SI SI SI			Transform3d_GetRotation3d.VI Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi					
	X X X X X	X X X X X	X	X X X X	SI SI SI SI			Transform3d_GetRotation3d.VI Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi					
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TDANICI ATIONICO	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	Execution Optimized 99 99 99 99	Test Routine	Sample Program	Transform3d_GetRotation3d.VI Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi	Function Prototype	Notes	Code Review	Test Program	
TRANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	9 Execution Optimized 9 9 9 9 9		Sample Program	Transform3d_GetRotation3d.VI Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi VI Name Translation2d_Create_DistAng.vi		Notes	Code Review	Test Program	
TRANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		X Wenu Item	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9		Sample Program	Transform3d_GetRotation3d.VI Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi VI Name Translation2d_Create_DistAng.vi Translation2d_Create.vi	Function Prototype translation2d new(double x, double y)	Notes	Code Review	Test Program	
TRANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X			Sample Program	Transform3d GetRotation3d.VI Transform3d GetXYZ.vi Transform3d Inverse.vi Transform3d Plus.vi Transform3d Times.vi VI Name Translation2d Create DistAng.vi Translation2d Div.vi Translation2d Equals.vi		Notes	Code Review	Test Program	
TRANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		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	Transform3d GetRotation3d.VI Transform3d GetXYZ.vi Transform3d Inverse.vi Transform3d Plus.vi Transform3d Times.vi VI Name Translation2d Create DistAng.vi Translation2d Create.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetAngle.vi	translation2d new(double x, double y) boolean equals(translation other)	Notes	Code Review	Test Program	
TRANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X X X X X X		X X 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		Sample Program	Transform3d_GetRotation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi VI Name Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Div.vi Translation2d_Div.vi Translation2d_GetAngle.vi Translation2d_GetAngle.vi Translation2d_GetDistance.vi	translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other)		Code Review	Test Program	
TRANSLATION2D	X X X X X X X X X X X X X X X X X X X	X		X X 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		Sample Program	Transform3d GetRotation3d.VI Transform3d GetXYZ.vi Transform3d Inverse.vi Transform3d Plus.vi Transform3d Times.vi VI Name Translation2d Create DistAng.vi Translation2d Div.vi Translation2d Div.vi Translation2d GetAngle.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI	translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other) double getNorm()	can use cluster unpack	Code Review	Test Program	
TRANSLATION2D	X X X X X X X X 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	10 10 10 10 10 10 10 10		Sample Program	Transform3d GetRotation3d.VI Transform3d GetXYZ.vi Transform3d Inverse.vi Transform3d Plus.vi Transform3d Times.vi VI Name Translation2d Create DistAng.vi Translation2d Div.vi Translation2d Div.vi Translation2d Div.vi Translation2d GetAngle.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetX.VI	translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other)		Code Review	Test Program	
TRANSLATION2D	X	X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X			Sample Program	Transform3d_GetRotation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi VI Name Transform3d_Times.vi VI Name Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Div.vi Translation2d_Equals.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetNorm.VI Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetX.VI Translation2d_GetX.VI	translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other) double getNorm() double getX()	can use cluster unpack can use cluster unpack	Code Review	Test Program	
TRANSLATION2D	X	X	Not WPILIB	X X X X X X X X X X X X X X X X X X X			Sample Program	Transform3d_GetRotation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi VI Name Transform3d_Times.vi VI Name Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Div.vi Translation2d_Equals.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetY.VI Translation2d_GetX.VI Translation2d_GetX.VI Translation2d_GetX.VI Translation2d_GetY.VI Translation2d_GetY.VI	translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other) double getNorm()	can use cluster unpack	Code Review	Test Program	
TRANSLATION2D	X	X	Not WPILIB	X X 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		Sample Program	Transform3d_GetRotation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi VI Name Translation2d_Create_DistAng.vi Translation2d_Create.vi Translation2d_Div.vi Translation2d_Equals.vi Translation2d_GetAngle.vi Translation2d_GetAngle.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetXY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_Interpolate.vi	translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other) double getNorm() double getX() double getY()	can use cluster unpack can use cluster unpack	Code Review	Test Program	
TRANSLATION2D	X	X	Not WPILIB	X X 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		Sample Program	Transform3d GetRotation3d.VI Transform3d GetXYZ.vi Transform3d Inverse.vi Transform3d Plus.vi Transform3d Times.vi VI Name Transform3d Times.vi VI Name Translation2d Create DistAng.vi Translation2d Create.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetDistance.vi Translation2d GetNorm.VI Translation2d GetXV.VI Translation2d GetXY.VI Translation2d GetY.VI Translation2d Interpolate.vi	translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other) double getNorm() double getX() double getY() translation2d minus(translation2d other)	can use cluster unpack can use cluster unpack	Code Review	Test Program	
TRANSLATION2D	X	X	Not WPILIB	X	10 10 10 10 10 10 10 10		Sample Program	Transform3d GetRotation3d.VI Transform3d GetXYZ.vi Transform3d Inverse.vi Transform3d Plus.vi Transform3d Times.vi VI Name Transform3d Times.vi VI Name Translation2d Create DistAng.vi Translation2d Create.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetOistance.vi Translation2d GetNorm.VI Translation2d GetXV.VI Translation2d GetXY.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d Interpolate.vi Translation2d Interpolate.vi Translation2d Interpolate.vi Translation2d Interpolate.vi Translation2d Minus.vi Translation2d Plus.vi	translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other) double getNorm() double getX() double getY() translation2d minus(translation2d other) translation2d plus(translation2d other)	can use cluster unpack can use cluster unpack	Code Review	Test Program	
TRANSLATION2D	X	X	Not WPILIB	X			Sample Program	Transform3d GetRotation3d.VI Transform3d GetXYZ.vi Transform3d Inverse.vi Transform3d Plus.vi Transform3d Times.vi VI Name Translation2d Create DistAng.vi Translation2d Create.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetNorm.VI Translation2d GetNorm.VI Translation2d GetXY.VI Translation2d GetXY.VI Translation2d GetXY.VI Translation2d GetY.VI Translation2d Minus.vi Translation2d Minus.vi Translation2d Plus.vi Translation2d RotateBy.vi	translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other) double getNorm() double getX() double getY() translation2d minus(translation2d other) translation2d plus(translation2d other) translation2d rotateBy(rotation2d other)	can use cluster unpack can use cluster unpack	Code Review	Test Program	
TRANSLATION2D	X	X	Not WPILIB	X	10 10 10 10 10 10 10 10		Sample Program	Transform3d GetRotation3d.VI Transform3d GetXYZ.vi Transform3d Inverse.vi Transform3d Plus.vi Transform3d Times.vi VI Name Transform3d Times.vi VI Name Translation2d Create DistAng.vi Translation2d Create.vi Translation2d Div.vi Translation2d Equals.vi Translation2d GetAngle.vi Translation2d GetOistance.vi Translation2d GetNorm.VI Translation2d GetXV.VI Translation2d GetXY.VI Translation2d GetY.VI Translation2d GetY.VI Translation2d Interpolate.vi Translation2d Interpolate.vi Translation2d Interpolate.vi Translation2d Interpolate.vi Translation2d Minus.vi Translation2d Plus.vi	translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other) double getNorm() double getX() double getY() translation2d minus(translation2d other) translation2d plus(translation2d other)	can use cluster unpack can use cluster unpack	Code Review	Test Program	

		Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
СН	ASSIS SPEEDS	X	X		X	SI			ChassisSpeeds_FromFieldRelativeChassisSpeeds.VI	, , , , , , , , , , , , , , , , , , ,				
		X	X		X	SI			ChassisSpeeds_FromFieldRelativeSpeeds.VI	chassisspeeds fromFieldRelativeSpeeds(double x, double y, double angvel, rotation2d robotangle)				
		X	Χ	Χ	X	SI			ChassisSPeeds_GetXYOmega.vi	· · · · · · · · · · · · · · · · · · ·				
		X	X		Χ	SI			ChassisSpeeds_New.vi	chassisspeeds new (double xvel, double yvel, double angvel)				
									· - -	chassisspeeds new ()	can use cluster constant			

Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse Function Prototype DIFFERENTIAL DRIVE KINEMATICS X X DiffKinematics New.vi diffDriveKine new(double trackWidth) XX X X X DiffKinematics toChassisSpeed.vi chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) XX DiffKinematics ToTwist2d.vi X SI XX X SI X DiffKinematics_toWheelSpeed.vi diffDriveWheelSpeed toWheelSpeeds(chassisSpeeds) Function Prototype Notes **DIFFERENTIAL DRIVE ODOMETRY** DiffOdometry Execute.vi DONT NEED DiffOdometry_Update.vi pose2d update(rotation2d gyro, double leftdist, double right dist) Incorporates enhanced reset diffDrOdom new(rotation gyro, pose initial) diffDrOdom new(rotation gyro) void resetPosition(pose2d, rotation2d) incorporated into "update" pose2d getPoseMeters() Function Prototype DIFFERENTIAL DRIVE ODOMETRY 2 X DiffDrvOdom2 Execute.vi Replacement for orig diff drive DiffDrvOdom2 GetPose.vi X SI XI DiffDrvOdom2 New.vi XX DiffDrvOdom2 Reset.vi X SI DiffDrvOdom2 Update.vi Function Prototype Notes DIFFERENTIAL DRIVE WHEEL SPEEDS diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) XX Χ DiffWheel Normalize.vi void normalize(double maxVel) Function Prototype Notes MECANUM DRIVE KINEMATICS X X MecaKinematics New.vi Χ MecaKinematics SetInverseKinematics.vi XX X MecaKinematics ToChassisSpeeds.vi MecaKinematics ToTwist2d.vi $X \mid X$ X MecaKinematics_ToWheelSpeeds.vi XX Χ MecaKinematics ToWheelSpeedsZeroCenter.vi

Function Prototype Notes MECANUM DRIVE MOTOR VOLTAGE nothing done Function Prototype Notes MECANUM DRIVE ODOMETRY X X X MecaOdometry Execute.vi X X X X SI MecaOdometry_GetKinematics.vi X SI MecaOdometry_GetPose.vi MecaOdometry_New.vi XX XI MecaOdometry NewDefaultPose.vi $X \mid X$ X SI MecaOdometry Reset.VI XX XI MecaOdometry_Update.vi MecaOdometry_UpdateWithTime.vi Removed Function Prototype Notes MECANUM DRIVE WHEEL POSITION X X MecaWheelPos Get.vi SI $X \mid X$ X SI MecaWheelPos New.vi MecaWheelPos Sub.vi $X \mid X$ X SI Function Prototype VI Name Notes MECANUM DRIVE WHEEL SPEEDS X MecaWheel New.Vi public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond) MecaWheel GetAll.vi X X X X SI MecaWheel Normalize.vi public void normalize(double attainableMaxSpeedMetersPerSecond) Function Prototype SWERVE DRIVE KINEMATICS X X X X For 4 module drives SwerveKinematics New4.VI SwerveKinematics NewX.VI $X \mid X \mid X \mid X$ uses array as input SwerveKinematics_NormalizeWheelSpeeds.vi public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond) X X X X SwerveKinematics_ToChassisSpeeds4.VI For 4 module drives $X \mid X \mid X \mid X$ SwerveKinematics_ToChassisSpeedsX.VI uses array as input SwerveKinematics ToSwerveModuleStates.VI public SwerveModuleState[] XX X toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters) SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI $X \mid X$ Χ public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds) XX X SwerveKinematics_ToTwist2d4.VI

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimizea	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
CUBIC HERMITE SPLINE							`	protected SimpleMatrix getCoefficients()	not needed, use cluster unpack			
	X	X		X			CubicHermiteSpline_getControlVectorFromArrays.vi	private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector)				
	Χ	X		Χ			CubicHermiteSpline_makeHermiteBasis.vi	private SimpleMatrix makeHermiteBasis()				

Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse public CubicHermiteSpline(double[] xInitialControlVector, double[] CubicHermiteSpline New.vi xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) VI Name Function Prototype Notes POSE WITH CURVATURE X public PoseWithCurvature(Pose2d poseMeters, double SI PoseWithCurve_New.vi curvatureRadPerMeter) public PoseWithCurvature() can use cluster constant public Pose2d poseMeters not needed, use cluster unpack public double curvatureRadPerMeter not needed, use cluster unpack Function Prototype Notes QUINTIC HERMITE SPLINE X QuinticHermiteSpline_getControlVectorFromArrays.vi private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector)
private SimpleMatrix makeHermiteBasis() X QuinticHermiteSpline makeHermiteBasis.vi X public QuinticHermiteSpline(double[] xInitialControlVector, QuinticHermiteSpline_New.vi double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)
protected SimpleMatrix getCoefficients() not needed, use cluster unpack Function Prototype Notes SPLINE (Abstract class) X X Spline_getPoint.vi public PoseWithCurvature getPoint(double t) Spline(int degree) public static class ControlVector public ControlVector(double[] x, double[] y) implemented as data structure Function Prototype Notes SPLINE HELPER X private static Spline.ControlVector getCubicControlVector(double SplineHelp GetCubicCtrlVector.vi Χ SI scalar, Pose2d point) SplineHelp GetCubicCtrlVectorsFromWayPts.vi $X \mid X$ public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints(Pose2d start, Translation2d[] interiorWaypoints, Pose2d end) SplineHelp GetCubicCtrlVectorsFromWeightedWayPts.vi X X X X SplineHelp GetCubicSpline Calc1.vi X X X No internal SplineHelp_GetCubicSpline_Calc2.vi X X X No internal X X X No X X X SplineHelp GetCubicSpline Calc3.vi internal SplineHelp_getCubicSplinesFromControlVectors.vi public static CubicHermiteSpline[] getCubicSplinesFromControlVectors(Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end)
private static Spline.ControlVector getQuinticControlVector(double X SI SplineHelp GetQuinticCtrlVector.vi $X \mid X$ scalar, Pose2d point) public static List<Spline.ControlVector> REMOVED 2762 SplineHelp GetQuinticCtrlVectorsFromWayPts.vi getQuinticControlVectorsFromWaypoints(List<Pose2d> SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi REMOVED 2762 SplineHelp_getQuinticSplinesFromControlVectors.vi public static QuinticHermiteSpline[] X getQuinticSplinesFromControlVectors(Spline.ControlVector[] controlVectors) SplineHelp GetQuinticSplinesFromWeightedWayPts.vi New 2762 XX SplineHelp_GetQuinticSplinesFromWayPts.vi X New 2762

TrajectoryConfig_AddConstraint.vi

Function Prototype

constraint)

public TrajectoryConfig addConstraint(TrajectoryConstraint

Implemented differently, can't

TRAJECTORY CONFIG X

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

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X	X		X			TrajectoryConfig_AddConstraints.vi	public TrajectoryConfig addConstraints(List extends<br TrajectoryConstraint> constraints)	Implemented differently, can't duplicate.	
X	X		X	SI		TrajectoryConfig_Create.vi	public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq)		
X	X		X			TrajectoryConfig_GetCentripetalAccel.vi			
X	X	X	X			TrajectoryConfig_GetConstraints.vi	public List <trajectoryconstraint> getConstraints()</trajectoryconstraint>	Implemented differently, can't duplicate.	
X	X		X			TrajectoryConfig_GetEndVelocity.vi	public double getEndVelocity()	can use cluster unpack	
X	X		Χ			TrajectoryConfig GetKinematicsDiffDrive.vi	-	·	
X	X		Χ			TrajectoryConfig GetKinematicsMecanumfDrive.vi			
X	X		Χ			TrajectoryConfig_GetKinematicsSwerveDrive.vi			
X	X	X	Χ			TrajectoryConfig_GetMaxVelAccel.vi			
X	X		Χ			TrajectoryConfig_GetStartVelocity.vi	public double getStartVelocity()	can use cluster unpack	
X	X		Χ			TrajectoryConfig_GetVoltageDiffDrive.vi			
X	X		Χ			TrajectoryConfig_IsReversed.vi	public boolean isReversed()	can use cluster unpack	
X	X	X	Χ	SI		TrajectoryConfig_setCentripetalAccel.vi	"		
X	X		X			TrajectoryConfig_SetEndVelocity.vi	public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond)		
X	X		X	SI		TrajectoryConfig_setKinematicsDiffDrive.vi	public TrajectoryConfig setKinematics(DifferentialDriveKinematics kinematics)		
X	X		X	SI		TrajectoryConfig_setKinematicsMecanumfDrive.vi	public TrajectoryConfig setKinematics(MecanumDriveKinematics kinematics)		
X	X		X	SI		TrajectoryConfig_setKinematicsSwerveDrive.vi	public TrajectoryConfig setKinematics(SwerveDriveKinematics kinematics)		
X	X		Χ	SI		TrajectoryConfig_setReversed.vi	public TrajectoryConfig setReversed(boolean reversed)		
X	X		X			TrajectoryConfig_SetStartVelocity.vi	public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond)		
X	X	X	Χ	SI		TrajectoryConfig_setVoltageDiffDrive.vi			
							public double getMaxVelocity()	Created function to return both	
							public double getMaxAcceleration()	Created function to return both	
							NOTE ADD OTHER COST DOLLTIMES FOR STUED		

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

									SPECIFIC AND NOT GENERIC.				
	Implemented	Documented	07 110/101	Non Hem	3	Execution Optimized Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRAJECTORY GENERATE	X	X		>	(TrajectoryGenerate_Make_Cubic_CtrlVect.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end. TrajectoryConfig config)</translation2d>	uses cubic splines			
	X	X		>	<			TrajectoryGenerate_Make_Cubic.vi	end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List <translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config)</translation2d>	uses cubic splines			
	Χ	X	7	()	₹			TrajectoryGenerate Make Generic.vi	TrajectoryConfig config) Helper to bring these all together	Use this one!!!			
	X			>	<			TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config)	uses quintic splines			
	X	X	7	()	<			TrajectoryGenerate Make Quintic Weighted.vi	, , , , , , , , , , , , , , , , , , , ,	New 2762			
	X	X		>	<			TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(List <pose2d> waypoints, TrajectoryConfig config)</pose2d>	uses quintic splines			
	X	X)	(TrajectoryGenerate_splinePointsFromSplines.vi	waypoints, TrajectoryConfig config) public static List <posewithcurvature> splinePointsFromSplines(Spline∏ splines)</posewithcurvature>				
RAJECTORY GENERATE (Control Vector)	Implemented	Documented	0,10,41	Meni Hem	יאפווס ונפוון	Execution Optimized Test Routine	Sample Program	VI Name	Function Prototype public ControlVectorList(int initialCapacity)	Notes may not need, just data	Code Review	Test Program	Error Checking
•									public ControlVectorList()	may not need, just data			
									public ControlVectorList(Collection extends<br Spline.ControlVector> collection)	may not need, just data			

TRAJECTORY PARAMETERIZE V						_	7						
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A	TRAJECTORY PARAMETERIZE	X	X	X	No			TrajectoryParam_calcStuffFwd.vi	,				
W PARAMETERSZE CONSTRAINED STATE TALECTORY UTL TA					No								
TRAJECTORY UTI. TRAJEC		X	X		No			TrajectoryParam_enforceAccel.vi	private static void enforceAccelerationLimits(boolean reverse,				
TRAJECTORY UTIL TRAJEC		\vdash				\rightarrow			List <trajectoryconstraint> constraints, ConstrainedState state)</trajectoryconstraint>				
AX X X X X X X X X X X X X X X X X X X		X	X	X	No			TrajectoryParam_enforceVelocity.vi		This routines needs to be changed			
TRAJECTORYUTI TRAJEC		X	X		X			TrajectoryParam_timeParam.vi	timeParameterizeTrajectory(List <posewithcurvature> points. List<trajectoryconstraint> constraints, double startVelocitvMetersPerSecond, double</trajectoryconstraint></posewithcurvature>	when new constraints are added.			
RY PARAMETERIZE CONSTRAINED STATE X X X X X X Constrained State New vi distance Actions (constrained State) New vi distance Actions (constrained Actions (endVelocityMetersPerSecond, double maxVelocitvMetersPerSecond, double				
TRAJECTORY UTIL X X X X X X X X X X X X X X X X X X X						timizea	am						
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X	RY PARAMETERIZE CONSTRAINED STATE								minAccelerationMetersPerSecondSq, double				
X		X	X	X	X				"				
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TRAJECTORY UTL TRAJECTORY UTL		X	X	X	Χ			ConstrainedState_SetVelocity.vi					
TRAJECTORY UTIL X X X X X X TrajectoryUtil from PathwaverJSON vi public static Trajectory from PathwaverJson(Path path) X X X X X X X X X TrajectoryUtil MakeWeightedWayPoint_ENG.vi public static void to PathwaverJson(Trajectory trajectory, Path path) X X X X X X X X X X X TrajectoryUtil_toPathWeaverJSON.vi public static Trajectory deserialize Trajectory (String json) public static String serialize Trajectory(Trajectory trajectory) TRAPEZOID PROFILE X X X X X TrajectoryUtil_toPathWeaverJSON.vi public static String serialize Trajectory(Trajectory trajectory) TRAPEZOID PROFILE X X X X X TrajectoryUtil_toPathWeaverJSON.vi public static String serialize Trajectory(Trajectory trajectory) TRAPEZOID PROFILE X X X X X TrajectoryUtil_toPathWeaverJSON.vi public static Trajectory deserialize Trajectory(String json) public static String serialize Trajectory(Trajectory trajectory) TrapeTotilopath Trajectory	l	$\overline{}$							ConstrainedState()				
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Dublic static String serializeTrajectory(Trajectory trajectory) Dublic static String serializeTrajectory(Trajectory trajectory)						^		TrajectoryUtil_toPathWeaverJSON.vi	path)				
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X X X SI TrapProfile_Execute_AtGoal.vi X X X X X TrapProfile_IsFinished.vi X X X X TrapProfile_New_DefInitial.vi X X X X TrapProfile_New.vi X X No TrapProfile_ShouldFlipAcceleration.vi Private, remove from menu X X X X TrapProfile_TimeLeftUntil.vi X X X TrapProfile_TotalTime.vi	TRAPEZOID PROFILE	X X	X X X		No No	Execution Op Test Routine	Sample Prog	TrapProfConstraint_New.vi TrapProfile_Calculate.vi TrapProfile_Direct.vi	Function Prototype				
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X X No TrapProfile_ShouldFlipAcceleration.vi Private, remove from menu X X X X X X X X X X X X	TRAPEZOID PROFILE	X X X X X	X X X X X	X	X No X X X	Execution Test Routi	Sample Prog	TrapProfConstraint_New.vi TrapProfile_Calculate.vi TrapProfile_Direct.vi TrapProfile_Execute.vi TrapProfile_Execute_AtGoal.vi TrapProfile_IsFinished.vi	Function Prototype				
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X X X TrapProfile_TotalTime.vi X X X X	TRAPEZOID PROFILE	X X X X X X X X	X X X X X X X X	XXX	X Wenu Item X X X X X X X X X X X X X X X X X X X	Execution Test Routi	Sample Prog	TrapProfConstraint_New.vi TrapProfile_Calculate.vi TrapProfile_Direct.vi TrapProfile_Execute.vi TrapProfile_Execute_AtGoal.vi TrapProfile_IsFinished.vi TrapProfile_New_DefInitial.vi TrapProfile_New.vi TrapProfile_ShouldFlipAcceleration.vi	Function Prototype	Private, remove from menu			
X X X X TrapProfState Equals vi	TRAPEZOID PROFILE	X X X X X X X X X	X X X X X X X X X X X X X X X X X X X	X X	X X X X X X X X X X X X X X X X X X X	Execution Test Routi	Sample Prog	TrapProfConstraint_New.vi TrapProfile_Calculate.vi TrapProfile_Direct.vi TrapProfile_Execute.vi TrapProfile_Execute_AtGoal.vi TrapProfile_IsFinished.vi TrapProfile_New_DefInitial.vi TrapProfile_New.vi TrapProfile_ShouldFlipAcceleration.vi TrapProfile_TimeLeftUntil.vi	Function Prototype	Private, remove from menu			
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Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse

'======== TRAJECTORY CONSTRAINT '========= Function Prototype VI Name Notes CENTRIPETAL ACCELERATION CONSTRAINT X CentripetalAccelConstraint getMaxVelocity.vi public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)
public MinMax XX Χ CentripetalAccelConstraint_getMinMaxAccel.vi getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public CentripetalAccelerationConstraint(double XX CentripetalAccelConstraint New.vi X SI Can use cluster pack for now maxCentripetalAccelerationMetersPerSecondSq) Function Prototype Notes public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double DIFF DRIVE KINEMATIC CONSTRAINT X DiffDriveKinematicsConstraint_getMaxVelocity.vi velocityMetersPerSecond)
public MinMax XX DiffDriveKinematicsConstraint getMinMaxAccel.vi getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public DifferentialDriveKinematicsConstraint(final DiffDriveKinematicsConstraint_New.vi Χ Χ SI DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond) Function Prototype VI Name Notes DIFF DRIVE VOLTAGE CONSTRAINT X DiffDriveVoltageConstraint getMaxVelocity.vi public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) XX Χ DiffDriveVoltageConstraint_getMinMaxAccel.vi public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) XX X SI DiffDriveVoltageConstraint_New.vi DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage) Function Prototype Notes ELLIPTICAL REGION CONSTRAINT X X EllipRegionConstraint_getMaxVelocity.vi X EllipRegionConstraint_getMinMaxAccel.vi XX Χ EllipRegionConstraint_IsPoseInRegion.vi EllipRegionConstraint New.vi

JERK CONSTRAINT		mplemented	Documented	Not WPILIB	1enu Item	Execution Optimized	Test Routine Semple Program	VI Name	Function Prototype	Notes
MECANUM DRIVE KINEMATICS CONSTRAINT X X X X X X X X X		X	X		X	SI		SwerveDriveKinematicsConstraint_New.vi	SwerveDriveKinematics kinematics, double	Can use cluster pack for now
JERK CONSTRAINT		X	X		X			SwerveDriveKinematicsConstraint_getMinMaxAccel.vi	public MinMax qetMinMaxAccelerationMetersPerSecondSq(Pose2d poseMe	eters, ond)
JERK CONSTRAIN	VERVE DRIVE KINEMATICS CONSTRAINT	X							public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double	110000
JERK CONSTRAINT		mplemented	<i>Documented</i>	Vot WPILIB	Menu Item	Execution Optimized	Test Routine	VI Name	Function Prototype	Notes
JERK CONSTRAINT X		X	X		Χ			RectRegionConstraint IsPoseInRegion.vi		
JERK CONSTRAINT Constraint	RECTANGULAR REGION CONSTRAINT	ejdwi X	Χ	Not	X Menu	Execution Optimized	Test Routine	RectRegionConstraint_getRectRegion.vi	Function Prototype	Notes
JERK CONSTRAINT JERK C		X	X		Х	SI		MecaDriveKinematicsConstraint_getMinMaxAccel.vi		
JERK CONSTRAINT	CANUM DRIVE KINEMATICS CONSTRAINT	<u>E</u>	Ğ	Not WPILIB	Menu	Execution Optimized	Test Routine	VI Name	Function Prototype	Notes
JERK CONSTRAINT Jerk Constraint Jerk Constr	MAX VELOCITY CONSTRAINT	X	X		X	SI	Test R	MaxVelocityConstraint_getMaxVelocity.vi MaxVelocityConstraint_getMinMaxAccel.vi	Function Prototype	Notes
JERK CONSTRAINT		ented	ented	ІГІВ	em	on Optimized	utine			
ディー・ディー・ディー・ディー・ディー・ディー・ディー・ディー・ディー・ディー・		/		X		SI		JerkConstraint getMinMaxAccel.vi	Routine exists, it is just a shell	FUTURE
ogram ggram	JERK CONSTRAINT	/ Implemented	Documented		Menu Item	Execution Optimi	Test Routine			Notes FUTURE

WPILib LabVIEW Math Library – VI Implementation List

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

TRAJECTORY CONSTRAINT X X X X X

rum	sequ	lence	i, doui	ne soi	lenoid	puise	5	
Г	X	Χ	Χ	Χ			TrajConstraint_GetMaxVelocity.vi	
	X	Χ	X	Χ			TrajConstraint_GetMinMaxAccel.vi	
	X	Χ	Χ	Χ			TrajConstraint_GetType.vi	

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

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UTILITY '========

THESE ROUTINES ARE SPECIFIC TO LABVIEW. THEY DO NOT HAVE A

JAVA / C++ WPILIB EQUIVALENT

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimizea	Test Routine	Sample Program	VI Name	Function Prototype Notes	
UTIL		X	X	X	SI			Util ApproxEqual.vi	,,	
	Χ	X	X	X				Util Array PoseWCurv to XY.vi		
	Χ	Χ	Χ	Χ	SI			Util CalcDist.vi		
	Χ	Χ	Х	Χ	SI			Util GetLibraryVersion.vi		
	Χ	Χ	X	X	SI			Util GetLibUsage.vi		
	Χ	X	Х	Х				Util_GetTime.vi	Once tes be optim	sted completely, this should nized!
	Χ	X	X	No	1			Util GetTime U32.vi		
	Χ	Χ	Χ	No	1			Util GetTime U64.vi		
	Χ	Χ	Χ	No	N/A			Util LibraryGlobals.vi	Global V	/ariables – no block diag.
	Χ	Χ	Χ	X				Util Trajectory Absolute To Relative.vi		
	Χ	Χ	X	Χ				Util_Trajectory_ReadFile.vi		
	Χ	Χ	Χ	X				Util_Trajectory_to_XY.vi		
	Χ	X	X	No				Util_Trajectory_WriteFile_Config.vi	internal	
	Χ	Χ	X	No				Util_Trajectory_WriteFile_OneState.vi	internal	
	Χ	Χ	Χ	X				Util_Trajectory_WriteFile_PathFinder.vi		
	Χ	Χ	X	No				Util_Trajectory_WriteFile_PathFinderConfig.vi	internal	
	Χ	Χ	X	X				Util_Trajectory_WriteFile_Pathweaver.vi		
	Χ	X	X	No				Util_Trajectory_WriteFile_States.vi	internal	
	Χ	Χ	X	No				Util_Trajectory_WriteFile_WayPoints.vi	internal	
	Χ	Χ	X	X				Util_Trajectory_WriteFile.vi		
	Χ	Χ	X	X				Util_TrajectoryState_Meters_To_Inches.vi		
	Χ	X	X	X				Util_TrajState_to_DiffDrive_WheelPos.vi		
	Χ	Χ	X	X				Util_DispWaypoint_Eng_To_SI.vi		
	Χ	X	X	X				Util_DispWaypoint_To_CubicInput.vi		
	Χ	X	X	X				Util_DispWaypoint_To_QuinticInput.vi		
[Χ	X	X	X				Util_DispWeightedWaypiont_Eng_To_WeightedWaypoint		
	Χ	X	X	No				Util_DispWeightedWayPoint_To_WeightedWayPoint.vi	Sorry ab	oout the confusing name

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CONVERSIONS

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THESE ROUTINES ARE SPECIFIC TO LABVIEW. THEY DO NOT HAVE A

JAVA / C++ WPILIB EQUIVALENT

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype	Notes
CONV	X	X	X	X	SI		Conv_AngleDegrees_Heading.vi		
	Χ	Χ	Χ	X	SI		Conv_AngleRadians_Heading.vi		

WPILib LabVIEW Math Library – VI Implementation List Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse X X X X SI Conv Centimeters Meters.vi X X X X SI Conv_Deg_Radians.vi X X X X SI X X X X X SI X X X X X SI Conv_Deg_Rotations.vi Conv Feet Meters.vi Conv_GyroDegrees_Heading.vi X X X X SI Conv_Heading_AngleRadians.vi Conv Inches Meters.vi X X X X SI X X X X SI X X X X SI Conv Kilograms Pounds.vi Conv_Meters_Feet.vi X X X X SI Conv Meters Inches.vi X X X X SI Conv Pose2d SI Eng.vi X X X X SI Conv_Pounds_Kilograms.vi X X X X SI X X X X SI Conv_Radians_Deg.vi Conv Radians Rotations.vi X X X X SI X X X X SI Conv_Rotations_Deg.vi Conv_Rotations_Radians.vi X X X X SI Conv_Yards_Meters.vi Notes VI Name Function Prototype X SI X SI UNITS X X Units DegreesToRadians.vi Units_DegreesToRotations.vi $X \mid X$ XX X SI Units FeetToMeters.vi Units_InchesToMeters.vi XX X SI Units MetersToFeet.vi XX X SI X SI X SI Units MetersToInches.vi XX Units_MillisecondsToSeconds.vi XX X SI Units RadiansPerSecondToRotationsPerMinute.vi Units_RadiansToDegrees.vi XX X SI XX X SI Units RadiansToRotations.vi X SI X SI Units RotationsPerMinuteToRadiansPerSecond.vi XX Units_RotationsToDegrees.vi XX X SI Units RotationsToRadians.vi X SI Units_SecondsToMilliseconds.vi XX '======== PATHFINDER UTIL '----THESE ROUTINES ARE SPECIFIC TO LABVIEW. THEY DO NOT HAVE A JAVA / C++ WPILIB EQUIVALENT Function Prototype Notes PathfinderUtil Continuous Heading Difference.vi PathfinderUtil OptimizeTrajectoryStates.vi X X X X PathfinderUtil_ToTrajectory.vi PathfinderUtil_ToTrajectoryStates.vi '======== STATE SPACE MODEL '=========

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

drum seq	uence	r, double sol	enoid pul	lse			
X	X	X	SI	DCMotor_GetAndymarkAM3493.vi			
X	X	X	SI	DCMotor_GetAndymarkRs775_125.vi			
X	X	X	SI	DCMotor_GetBag.vi			
X	X	X	SI	DCMotor_GetBanebotsRs550.vi			
X	X	X	SI	DCMotor_GetBanebotsRs775.vi			
X	X	X	SI	DCMotor_GetCIM.vi			
X	X	X	SI	DCMotor_GetCurrent.vi			
X	X	X	SI	DCMotor_GetFalcon500.vi			
X	X	X	SI	DCMotor_GetMiniCIM.vi			
X	X	X	SI	DCMotor_GetNEO.vi			
X	X	X	SI	DCMotor_GetNEO550.vi			
X	X	X	SI	DCMotor_GetRomiBuiltIn.vi			
X	X	X	SI	DCMotor_GetSpeed.vi			
X	X	X	SI	DCMotor_GetTorque.vi			
X	X	X	SI	DCMotor_GetVex775Pro.vi			
X	X	X	SI	DCMotor_New.vi			
X	X	X	SI	DCMotor_PickMotor.vi	·		
X	X	X	SI	DCMotor_WithReduction.vi	·		

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

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STATE SPACE ESTIMATION

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Implemented Documented	NOT WIFILID Man:: Itam		Execution Optimized Test Routine	Sample Program	VI Name Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATOR X X	×	(DiffDrivePoseEst_AddVisionMeasurement.vi				
XX	X	(DiffDrivePoseEst_FillStateVector.vi				
XX	X	(DiffDrivePoseEst_GetEstimatedPosition.vi				
XX	X	(DiffDrivePoseEst_Kalman_F_Callback.vi				
XX	X	(DiffDrivePoseEst_Kalman_H_Callback.vi				
XX	X	(DiffDrivePoseEst_New.vi				
XX	X	(DiffDrivePoseEst_ResetPosition.vi				
XX	X	(DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi				
$X \mid X$	X	(DiffDrivePoseEst_Update.vi				
XX	X	(DiffDrivePoseEst_UpdateWithTime.vi				
$X \mid X$	×	(DiffDrivePoseEst_VisionCorrect_Callback.vi				
XX	<i>></i>	(DiffDrivePoseEst VisionCorrect Kalman H Callback.vi				

Revision 3.08 11/07/2023 - Added edge detect, bool cmd, drum sequencer, double solenoid pulse Function Prototype DIFFERENTIAL DRIVE POSE ESTIMATOR 2 X X X DiffDrivePoseEst2 AddVisionMeasurement.vi X X X NO SI DiffDrivePoseEst2 BufferDuration.vi DiffDrivePoseEst2 Execute.vi X X X X DiffDrivePoseEst2_GetEstimatedPosition.vi X X X SI X X X No SI DiffDrivePoseEst2 InterpRecord ExtractFromVar.vi No DiffDrivePoseEst2 InterpRecord Interp.vi DiffDrivePoseEst2_InterpRecord_New.vi No SI XX X DiffDrivePoseEst2 New.vi DiffDrivePoseEst2_Pack_Config.vi $X \mid X \mid X \mid X \mid SI$ XX X SI DiffDrivePoseEst2 ResetPosition.vi X SI XX DiffDrivePoseEst2 SetVisionMeasurementStdDevs.vi XX DiffDrivePoseEst2_Update.vi XX X DiffDrivePoseEst2 UpdateWithTime.vi Function Prototype EXTENDED KALMAN FILTER X X ExtendedKalmanFilter Correct OnlyUY.vi X ExtendedKalmanFilter Correct.vi X X X X Just a shell, not functional! ExtendedKalmanFilter_GetP_Single.vi XX X ExtendedKalmanFilter_GetP.vi ExtendedKalmanFilter GetXHat Single.vi XX X $X \mid X$ Χ ExtendedKalmanFilter GetXHat.vi XX ExtendedKalmanFilter New.vi X X ExtendedKalmanFilter Predict.vi ExtendedKalmanFilter_Reset.vi XX Х ExtendedKalmanFilter SetP.vi XX Χ ExtendedKalmanFilter SetXHat Single.vi ExtendedKalmanFilter_SetXHat.vi XX VI Name Function Prototype Notes KALMAN FILTER X X KalmanFilter Correct.vi Χ KalmanFilter GetK XX X KalmanFilter GetK Single.vi KalmanFilter_GetXHat $X \mid X$ X KalmanFilter_GetXHaT_Single XX Χ X XX X KalmanFilter New.vi X KalmanFilter_Predict.vi XX Χ KalmanFilter Reset.vi XX Χ KalmanFilter SetXHat KalmanFilter SetXHat Single $X \mid X$ X Χ Function Prototype Notes KALMAN FILTER LATENCY COMPENSATOR X X KalmanFilterLatencyComp AddObserverState.vi

/07/2023 – Added edge detect, bool cmd, drum se			طار ده له	آمم ماء					-				
$\frac{\hat{x}}{x}$	equer		doub	X	enola	puise		KalmanFilterLatencyComp ApplyPastGlobalMeas FuncGroup.vi					
1 1		}	\rightarrow	X				KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi					
			\rightarrow	X				KalmanFilterLatencyComp_Applyr astolobalivicasurement.vi					
			\rightarrow	X		\rightarrow		KalmanFilterLatencyComp_FindClosestMeasurement.vi KalmanFilterLatencyComp_New.vi					
			\rightarrow	X		\rightarrow							
			\longrightarrow	X		\longrightarrow		KalmanFilterLatencyComp_Observer_New.vi					
<u> </u>		<u> </u>		X				KalmanFilterLatencyComp_Reset.vi					
plemented		nea	Not WPILIB	E	n Optimized	Routine	Program				view	gram	ecking
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le.	وَ وَ	Ę	3	2	ລູ	τ. Σ	ď				e	# T	2
n de	= }	<u> క</u>	Ş	Menu	ı.X	Test	Sample	VI Name	Function Prototype	Notes	Ö	မိ	Ĭ.
MECANUM DRIVE POSE ESTIMATOR		1	_			\vdash		MecaDrivePoseEst AddVisionMeasurement StdDev.vi		110103			
	()	_	\rightarrow	Х				MecaDriver oseEst_AddVisionMeasurement.vi					
			\rightarrow	X				MecaDrivePoseEst_AddvisionMeasurement.vi MecaDrivePoseEst GetEstimatedPosition.vi					
			\rightarrow	No									
						\longrightarrow		MecaDrivePoseEst_Kalman_F_Callback.vi					
			\longrightarrow	No				MecaDrivePoseEst_Kalman_H_Callback.vi					
				Χ				MecaDrivePoseEst_New.vi					
				Χ				MecaDrivePoseEst_ResetPosition.vi					
				Χ				MecaDrivePoseEst_SetVisionMeasurementStdDevs.vi					
				Χ				MecaDrivePoseEst_Update.vi					
X		X		Χ				MecaDrivePoseEst_UpdateWithTime.vi					
X		X		No				MecaDrivePoseEst_VisionCorrect_Callback.vi					
				No				MecaDrivePoseEst VisionCorrect Kalman H Callback.vi					
olemented		ocumented	ot WPILIB	Menu Item	Execution Opti	st Routine	Sample Progra				de Review	st Program	or Checking
Ti di		Š	Š	₩	Ж	Test	Sai	VI Name	Function Prototype	Notes	Ö	je Je	Ē
MECANUM DRIVE POSE ESTIMATOR 2 X		×Τ	$\overline{}$	X		$\overline{}$		MecaDrivePoseEst2_AddVisionMeasurement.vi	71				
		`	X	NO	SI			MecaDrivePoseEst2_BufferDuration.vi					
		`	X	X	<u> </u>			MecaDrivePoseEst2 Execute.vi					
		X		X	SI			MecaDrivePoseEst2 GetEstimatedPosition.vi					
			X	No	SI			MecaDrivePoseEst2 InterpRecord ExtractFromVar.vi					
				No				MecaDrivePoseEst2 InterpRecord Interp.vi					
				No		-		MecaDriver oscEst2_Interpreced_Interp.vi MecaDrivePoseEst2_InterpRecord_New.vi					
			\rightarrow	X	31	\longrightarrow		MecaDriver oseEst2_Interprecord_New.vi MecaDrivePoseEst2_New.vi					
	, (\rightarrow	$\overline{}$	X	CI	\rightarrow		MecaDrivePoseEst2_New.vi MecaDrivePoseEst2_Pack_Config.vi					
		\hat{x}	^	X				MecaDriver oseEst2_rack_cornig.vi MecaDrivePoseEst2_ResetPosition.vi					
			\rightarrow	X		\rightarrow		MecaDrivePoseEst2_ResetFosition.vi MecaDrivePoseEst2_SetVisionMeasurementStdDevs.vi					
	_	_	\rightarrow		31	, 1		MecaDrivePoseEst2_SetVisionivieasurementstuDevs.vi MecaDrivePoseEst2_Update.vi					
			!					MecabrivePoseEst2 Update.vi					
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		<u> </u>		X				MecaDrivePoseEst2_UpdateWithTime.vi					
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X		ented	ot WPILIB	Item X	xecution Optimized	est Routine	Program	MecaDrivePoseEst2_UpdateWithTime.vi	Function Prototune	Notes	ode Review	est Program	rror Checking
X		0	Not WPILIB	X	Execution Optimized	Test Routine	Sample Program	MecaDrivePoseEst2_UpdateWithTime.vi VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR		Documented	Not WPILIB	Menu Item X		Test Routine	Sample Program	MecaDrivePoseEst2_UpdateWithTime.vi VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR		Documented	Not WPILIB	X Menu Item	7	Test Routine	Sample Program	WecaDrivePoseEst2_UpdateWithTime.vi VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR X X		X X Documented	Not WPILIB	X Menu Item	F	Test Routine	Sample Program	VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR X X X X		Documented X X X X	Not WPILIB	X X Menu Item	F	Test Routine	Sample Program	VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR X X X X X		N 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	F	Test Routine	Sample Program	VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR X X X X X X		Documented 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	F	Test Routine	Sample Program	VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi SwerveDrivePoseEst_New.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR X X X X X X X		X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	F	Test Routine	Sample Program	VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_ResetPosition.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR X X X X X X X		X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	F	Test Routine	Sample Program	VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR X X X X X X X X X X		Doccumented X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	F	Test Routine	Sample Program	VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE POSE ESTIMATOR X X X X X X X X X X X X X		Doccumented X X X X X X X X X X X X X X X X X X X		X X X X X X X X X X X X X X X X X X X	F	Test Routine	Sample Program	VI Name SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_AddVisionMeasurement.vi SwerveDrivePoseEst_GetEstimatedPosition.vi SwerveDrivePoseEst_Kalman_F_Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi SwerveDrivePoseEst_New.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_ResetPosition.vi SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi SwerveDrivePoseEst_Update.vi	Function Prototype	Notes	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 SWERVE DRIVE POSE ESTIMATOR 2 X X X SwerveDrivePoseEst2 AddVisionMeasurement.vi X X X No SI SwerveDrivePoseEst2 BufferDuration.vi SwerveDrivePoseEst2_Execute.vi $X \mid X \mid X \mid X$ SwerveDrivePoseEst2_GetEstimatedPosition.vi X X X SI X X X No SI SwerveDrivePoseEst2 InterpRecord ExtractFromVar.vi SwerveDrivePoseEst2 InterpRecord Interp.vi No No SI SwerveDrivePoseEst2 InterpRecord New.vi SwerveDrivePoseEst2 New.vi $X \mid X \mid$ X X X X X SI SwerveDrivePoseEst2 Pack Config.vi SwerveDrivePoseEst2 ResetPosition.vi XX X SI SwerveDrivePoseEst2 SetVisionMeasurementStdDevs.vi $X \mid X$ X SwerveDrivePoseEst2_Update.vi SwerveDrivePoseEst2_UpdateWithTime.vi $X \mid X$ X Function Prototype Notes UNSCENTED KALMAN FILTER X X UnscentedKalmanFilter Correct FuncGroup.vi XX X UnscentedKalmanFilter Correct OnlyUY.vi XX X UnscentedKalmanFilter Correct OnlyUYR.vi UnscentedKalmanFilter_Correct.vi XX X UnscentedKalmanFilter_GetP_Single.vi XX X X XX UnscentedKalmanFilter GetP.vi UnscentedKalmanFilter GetXHat Single.vi XX Χ UnscentedKalmanFilter GetXHat.vi XX X UnscentedKalmanFilter New Default.vi UnscentedKalmanFilter_New_FuncGroup.vi XX X Χ UnscentedKalmanFilter New.vi UnscentedKalmanFilter Predict.vi $\frac{X}{X}$ XX UnscentedKalmanFilter Reset.vi XX Χ UnscentedKalmanFilter SetP.vi UnscentedKalmanFilter_SetXHat_Single.vi $X \mid X$ Χ UnscentedKalmanFilter_SetXHat.vi $X \mid X$ X Χ UnscentedKalmanFilter Transform.vi '----STATE SPACE CONTROL '======== Function Prototype Notes CONTROL AFFINE PLANT INVERSION FEEDFORWARD Function Prototype Notes Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse DIFFERENTIAL DRIVE ACCELERATION LIMITER X X DiffDrvAccelLimit Calculate.vi X $X \mid X \mid$ DiffDrvAccelLimit New.vi Function Prototype Notes IMPLICIT MODEL FOLLOWER X ImplModelFollow Calculate.vi Χ X ImplModelFollow GetU.vi XX ImplModelFollow GetU Single.vi XX Χ Χ ImplModelFollow_New.vi XX ImplModelFollow_New_Plant.vi X X XX ImplModelFollow Reset.vi X Χ Function Prototype LINEAR PLANT INVERSION FEEDFORWARD X X LinearPIntInvFF Calculate NextR.vi XX Χ LinearPIntInvFF Calculate.vi LinearPIntInvFF_GetR_Single.vi XX Χ XX LinearPIntInvFF GetR.vi Χ XX Χ LinearPIntInvFF GetUff Single.vi LinearPIntInvFF GetUff.vi X XX X LinearPIntInvFF New Plant.vi $X \mid X$ Χ LinearPIntInvFF New.vi LinearPIntInvFF Reset Initial.vi $X \mid X$ X LinearPIntInvFF Reset Zero.vi XX Χ Function Prototype Notes LINEAR QUADRATIC REGULATOR X X X LinearQuadraticRegulator_Calculate_NextR.vi XX X LinearQuadraticRegulator Calculate.vi LinearQuadraticRegulator_GetK_Single.vi NOT ORIGINAL.. XX X XX LinearQuadraticRegulator_GetK.vi Χ LinearQuadraticRegulator_GetR_Single.vi XX Χ LinearQuadraticRegulator GetR.vi XX Χ LinearQuadraticRegulator GetU Single.vi LinearQuadraticRegulator_GetU.vi $X \mid X$ X X LinearQuadraticRegulator LatencyCompensate.vi Coutine exists, but it only has terger raise matrix to power. XX LinearQuadraticRegulator_New_ELMS.vi X $X \mid X$ Χ LinearQuadraticRegulator New N.vi LinearQuadraticRegulator New Raw.vi XX X LinearQuadraticRegulator_New_SystemELMS.vi X XX Χ LinearQuadraticRegulator New.vi LinearQuadraticRegulator_Reset.vi $X \mid X$ X Function Prototype Notes LINEAR SYSTEM X X LinearSystem_CalculateX.vi X LinearSystem_CalculateY.vi

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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 XX StateSpaceUtil MakeWhiteNoiseVector.vi StateSpaceUtil NomalizeInputVector.vi XX X XX StateSpaceUtil PoseTo3dVector.vi Χ StateSpaceUtil PoseTo4dVector.vi StateSpaceUtil PoseToVector.vi XX Χ SIMULATION '======== Function Prototype Notes BatterySim CalculateDefaultBatteryLoadedVoltage.vi BATTERY SIM X X X SI BatterySim_CalculateLoadedVoltage.vi X SI $X \mid X$ BatterySim Execute.vi X X X X SI VI Name Function Prototype Notes DC MOTOR SIM $\begin{array}{c|c} X & X \\ \hline X & X \end{array}$ DCMotorSim Execute.vi XX DCMotorSim_getAngularPositionRad.vi XX X DCMotorSim_getAngularPositionRotations.vi DCMotorSim getAngularVelocityRadPerSec.vi $X \mid X$ Χ DCMotorSim_getAngularVelocityRPM.vi XX X XX DCMotorSim GetCurrentDrawAmps.vi Χ X DCMotorSim_New_MOI.vi XX X DCMotorSim New Plant.vi X X X X SI DCMotorSim Pack Simulation Params.vi DCMotorSim_SetInputVoltage.vi $X \mid X$ X DCMotorSim Update.vi Function Prototype DIFFERENTIAL DRIVE TRAIN SIM X X DiffDriveTrainSim_ClampInput.vi XX X DiffDriveTrainSim CreateKitbotSim EstMass.vi DiffDriveTrainSim CreateKitbotSim EstMassMOI.vi XX X XX DiffDriveTrainSim_CreateKitbotSim.vi Χ XX XX DiffDriveTrainSim Execute.vi DiffDriveTrainSim GetCurrentDrawAmps.vi XX X DiffDriveTrainSim GetCurrentGearing.vi XX Χ DiffDriveTrainSim GetDynamics.vi XX X DiffDriveTrainSim_GetHeading.vi DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi XX X X DiffDriveTrainSim GetLeftPositionMeters.vi XX Χ DiffDriveTrainSim GetLeftVelocityMetersPerSecond.vi DiffDriveTrainSim_GetOutput_Single.vi XX Χ XX X DiffDriveTrainSim GetPose.vi XX DiffDriveTrainSim_GetRightCurrentDrawAmps.vi X XX DiffDriveTrainSim GetRightPositionMeters.vi X DiffDriveTrainSim GetRightVelocityMetersPerSecond.vi XX X DiffDriveTrainSim GetState Single.vi XX X DiffDriveTrainSim GetState.vi

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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 XX LinearSystemSim_GetOutput.vi XX X LinearSystemSim_New LinearSystemSim_New_NoNoise.vi XX X LinearSystemSim SetInput Array.vi Doesn't use clamp? LinearSystemSim_SetInput_Single.vi X XX X LinearSystemSim SetInput.vi LinearSystemSim Setstate.vi $X \mid X$ X LinearSystemSim Update.vi XX Χ No LinearSystemSim UpdateX.vi XX LinearSystemSim UpdateY.vi X X X No Function Prototype Notes SngJntArmSim_EsitmateMOI.vi SINGLE JOINT ARM SIM X X X X X X SngJntArmSim Execute.vi SngJntArmSim GetAngleRads.vi $X \mid X$ X X X X X SngJntArmSim_GetCurrentDraw.vi Χ X SngJntArmSim_GetVelocityRadsPerSec.vi XX SngJntArmSim_HasHitLowerLimit.vi XX X SngJntArmSim HasHitUpperLimit.vi XX X SngJntArmSim New.vi SngJntArmSim_Pack_Simulation_Params.vi X X X X SI XX SngJntArmSim Rkf45 Func.vi No SngJntArmSim SetInputVoltage.vi XX X SngJntArmSim_SetState.vi XX Χ SngJntArmSim Update.vi SngJntArmSim_UpdateX.vi XX Χ SngJntArmSim_WouldHitLowerLimit.vi XX X XX X SngJntArmSim_WouldHitUpperLimit.vi '======= MATRIX UTILITIES '======== VI Name Function Prototype Notes MAT BUILDER X X X SI MatBuilder Create.vi $X \mid X$ X SI MatBuilder Fill.vi VI Name Function Prototype Notes MATRIX X X Matrix AssignBlock.vi X SI X SI Matrix Block.vi Matrix_ChangeBoundsUnchecked.vi XX X SI Matrix Create.vi Matrix Det.vi XX Matrix_Diag.vi X SI Matrix_Div_Scalar.vi labview has function Matrix_ElementPower.vi XX X SI Matrix ElementSum.vi

Matrix_ElementTimes.vi Matrix_Equals.vi

Matrix Exp.vi

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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 Matrix ExtractColumnVector.vi XX X SI XX X SI Matrix_ExtractFrom.vi Matrix ExtractMatrix.vi X SI X SI Matrix ExtractRowVector.vi XX Matrix Fill.vi Matrix Get.vi labview has function Matrix_Ident.vi XX WPILIB calls this EYE X I Matrix Inv.vi X SI Matrix_IsEqual.vi Matrix IsIdentical.vi Matrix_LLTDecompose.vi XX XI Matrix_Max.vi Matrix MaxAbs.vi Matrix Mean.vi Matrix MinInternal.vi Matrix Minus Matrix.vi Matrix_Minus_Scalar.vi XI Matrix NormF.vi Matrix NormIndP1.vi Matrix Plus Matrix.vi Matrix Plus Scalar.vi XX Matrix Pow.vi THIS NEEDS WORK!!!! XI XX X SI Matrix SetColumn.vi XX Χ THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT SI Matrix_SetRow.vi SHOULD BE INCLUDED HERE FOR ISOLATION. Matrix Solve.vi Matrix Times Matrix.vi Matrix_Times_Scalar.vi Matrix_Trace.vi XX X SI Matrix Transpose.vi X X X X Matrix WithinTolerance.vi VI Name Function Prototype Notes SIMPLE MATRIX X X SimpleMatrix ExtractMatrix.vi NOTE Matrix also has an ExtractMatrix with different calling parameters.... YUK. Function Prototype Notes
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Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse Function Prototype Notes NUMERICAL INTEGRATION X X NumIntegrate Func Ax Bu K.vi NOT USED. Should this be used or abandoned??? NumIntegrate Rk4 Dbl X U.vi XX X NumIntegrate_Rk4_Dbl_X.vi XX Х NumIntegrate Rk4 Mat X U.vi NumIntegrate_Rk4_Mat_X.vi $X \mid X$ X NumIntegrate_Rkdp_Func_A.vi X X No SI No SI NumIntegrate Rkdp Func B1.vi XX No SI NumIntegrate Rkdp Func B1B2.vi XX No SI NumIntegrate_Rkdp_Func_B2.vi $X \mid X$ No I Numintegrate_Rkdp_Impl.vi X X X X NumIntegrate RKDP Mat X U.vi New replacement for RKF45 Χ NumIntegrate_Rkf45_Func_A.vi No SI XX NumIntegrate Rkf45 Func B1.vi No SI NumIntegrate Rkf45 Func B1B2.vi XX No SI NumIntegrate_Rkf45_Func_B2.vi $X \mid X$ No SI NumIntegrate_RKf45_Func_Bs.vi Removed. Replaced with newer functions. NumIntegrate_RKf45_Func_Ch.vi Removed. Replaced with newer functions. NumIntegrate_RKf45_Func_Ct.vi Removed. Replaced with newer functions. XX No I NumIntegrate Rkf45 Impl.vi Note that this Feinberg method has NumIntegrate Rkf45 Mat X U.vi been changed and a Dormand Price method has been implemented.... TODO Removed. Never used. NumIntegrate_RKf45_New.vi X X X X SI NumIntegrate_Trap_Dbl.vi NumIntegrate_Trap_Mat.vi $X \mid X \mid X \mid X \mid I$ Function Prototype Notes RUNGE KUTTA TIME VARYING X XNo RungeKuttaTimeVarying RK4 Mat T Y.vi VI Name Function Prototype Notes NUMERICAL JACOBIAN X X NumJacobian U.vi X NumJacobian_X.vi XX VI Name Function Prototype Notes RICCATI X X Riccati Check Detectable.vi Routine exists, it is just a shell Riccati Check Stabilizable.vi X Not really done !!! $X \mid X$ Riccati DARE Choose.vi Intended to allow DARE method X X X X X Riccati DARE Iterate.vi

WPILib LabVIEW Math Library - VI Implementation List Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse Riccati_DARE_StructDoubling.vi X X X X X XX X Riccati_DARE_N.vi XX Χ Riccati DARE.vi Χ XX X Riccati Input Check.vi VISION '======== Function Prototype Notes X CompVisionUtil CalculateDistanceToTarget.vi CompVisionUtil_EstimateCameraToTarget.vi X X X CompVisionUtil_EstimateFieldToCamera.vi X X X X X X CompVisionUtil EstimateFieldToRobot.vi Χ Χ CompVisionUtil_EstimateFieldToRobot_Alt.vi Χ CompVisionUtil ObjectToRobotPose.vi Function Prototype Notes AprilTag_Equals.vi AprilTag_GetAll.vi APRIL TAG X X X SI X X X X SI XX X SI AprilTag_New.vi

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optin	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
APRIL TAG FIELD LAYOUT	X	X		Χ	SI		AprilTagFieldLayout_GetField.vi					
	X	Χ		Χ	SI		AprilTagFieldLayout_GetOriginPosition.vi					
	X	Χ		Χ	SI		AprilTagFieldLayout_GetTagPose.vi					
	X	Χ		Χ	SI		AprilTagFieldLayout_GetTags.vi					
	X	Χ		Χ	SI		AprilTagFieldLayout_New.vi					
	X	X		X	SI		AprilTagFieldLayout_New2022.vi					
	X	Χ		Χ	SI		AprilTagFieldLayout_New2023.vi					
	X	X		Χ	SI		AprilTagFieldLayout_NewSelect.vi					
	Χ	Χ		Χ	SI		AprilTagFieldLayout_SetOrigin.vi					
	Χ	Χ		Χ	SI		AprilTagFieldLayout_SetOrigin_Position.vi					

WPILib LabVIEW Math Library - VI Implementation List Revision 3.08 11/07/2023 – Added edge detect, bool cmd, drum sequencer, double solenoid pulse Function Prototype Notes X FieldDisp_Element_Disp.vi X FieldDisp_Element_Prepare.vi FieldDisp_Element_Rotate.vi X no FieldDisp_Element_Rotate_Init.vi FieldDisp_Field_Crop_and_Scale.vi X FieldDisp_Field_Disp.vi | X | X | X | X | X | X | X | X | No X FieldDisp_Field_Selector_Prepare.vi FieldDisp_Get_Field_Info.vi X no X no FieldDisp_Open_Field_Info_File.vi FieldDisp_Read_Field_Pic.vi X no FieldDisp_Read_Image_File.vi '======== COMMUNICATIONS '=======

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
NETWORK UDP	X	Χ	X	X	SI		NetworkUDP_Close.vi					
	Χ	Χ	X	Χ	1		NetworkUDP_Receive.vi					
	X	Χ	X	X	1		NetworkUDP_Send.vi					

'========										
TYPE DEFINITIONS										
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Implemented		Not WPILIB	: 6	Test Routine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
TypeDef Z		X X			AprilTag.ctl					
Z	Z		N/A		AprilTagFieldLayout,ctl					
Z			N/A		AprilTagFieldLayoutOriginPosition_ENUM.ctl					
<u>Z</u>			N/A		AprilTagFields_ENUM.ctl					
Z			N/A		AprilTagPoseEstimate.ctl					
<u>Z</u>			N/A		ARM_FF.CTL					
Z			N/A		BANG_BANG.CTL					
1		X X			BICon-Matrix_FUNC_TYPE.CTL		NOT USED. Should this be deleted or abandoned???			
Z			N/A		CALLBACK_FUNC_TYPE.CTL					
Z			N/A		CHASSIS_SPEEDS.CTL					
Z		$X \mid X$			CONTRAINED_STATE.CTL					
Z	Z	$X \mid X$	N/A		COORDINATE_AXIS.CTL					
Z		$X \mid X$	N/A		COORDINATE_SYSTEM.CTL					
Z	Z	$X \mid X$	N/A		DCMOTOR_SIM.CTL					
		/	/		DCMOTOR_SIM_MODEL_PARAMS.CTL		OBSOLETE – Removed			
Z		$Z \mid X$			DCMOTOR_SIM_SIMULATION_PARAMS.CTL					
Z			N/A		DCMOTOR_TYPES_ENUM.CTL					
Z		X X			DCMOTOR.CTL					
<u>Z</u>		$X \mid X$			DEBOUNCER_TYPE_ENUM.Ctl					
Z	Z	$X \mid X$	N/A		DEBOUNCER.CTL					
Z	Z	$X \mid X$	N/A		DIFF_DRIVE_ACCEL_LIMIT.CTL					
Z	Z	X X	N/A		DIFF_DRIVE_KINEMATICS.CTL					

um seqi	uence	r doul	ole sol	enoid i	se	
Z	Z	X	X	N/A	DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl	
Z	Z	X	X		DIFF DRIVE ODOM2.ctl	
Z	Z	X	X	N/A	DIFF_DRIVE_Pose_EST.ctl	
Z	Z	X	X	N/A	DIFF_DRIVE_POSE_EST2.ctl	
Z	Z	X	X	N/A	DIFF DRIVE POSE EST2 CONFIG.CTL	
Z	Z	X	No	N/A	DIFF_DRIVE_POSE_EST2_INTERP_RECORD.CTL	
Z	Z	X	X	N/A	DIFF DRIVE ToughBoxMini GearChoice ENUM.ctl	
Z	Z	X	X	N/A	DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl	
		Z		_		
Z			X	N/A	DIFF_DRIVE_SIM_MODEL_PARAMS	
Z	_	Z	X	N/A	DIFF_DRIVE_SIM_SIMULATION_PARAMS.CTL	
Z	Z	X	X	N/A	DIFF_DRIVE_TRAIN_SIM_STATE_ENUM.CTL	
Z	Z	X	X	N/A	DIFF_DRIVE_TRAIN_SIM.ctl	
Z	Z	X	X	NA	DISPLAY_WAYPOINT.ctl	Was UTIL_WAYPOINT.VI
Z	Z	X	X	NA	DISPLAY_WEIGHTED_WAYPOINT.ctl	New V1.5. was
						UTIL_WEIGHTED_WAYPOINIT.VI
7		X		NA	DrumSequence State ENUM.vi	
Z		X				
<u>Z</u>	7		V	NA N/A	DrumSequence_Step_ENUM.vi	
Z	Z	X	X		ELEV_FF.CTL	
Z	Z	X	X	N/A	ELEVATOR_SIM.CTL	
Z	Z	Z	X	N/A	ELEVATOR_SIM_SIMULATION_PARAMS.CTL	
Z	Z	Χ	Χ	N/A	EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL	
Z		Ζ	X	N/A	EXTENDED_KALMAN_FILTER.CTL	
Z		Ζ	X	N/A	FieldDisp_ElementPicture.ctl	
Z		Ζ		N/A	FieldDisp_FieldElement.ctl	
Z		Ζ		N/A	FieldDisp_Field_Info.ctl	
Z	Ζ	Χ	Χ	N/A	FLYWHEEL_SIM.ctl	
Z	Z	Z	Χ	N/A	FLYWHEEL SIM SIMULATION PARAMS.CTL	
Z	Z	Х	Χ	N/A	FUNCTION GENERATOR MATRIX.ctl	
Z	Z	X	X	N/A	FUNCTION GENERATOR.ctl	
Z	Ζ	Х	X	N/A	HOLONOMIC DRV_CTRL.CTL	New 1/26/21
Z	Z	X	X	N/A	KALMAN FILTER LATENCY COMP FUNC GROUP.CTL	1001 1/20/21
Z	Z	X	X	N/A	KALMAN FILTER LATENCY COMP.CTL	
Z	Z	X	X	N/A	KALMAN FILTER.ctl	
Z	Z	X	X	N/A	LINEAR FILTER.CTL	
Z	Z	X	X	N/A	LINEAR_FICTER.CTL LINEAR PLANT INV FF.ctl	
		X	X	N/A	LINEAR_PEANT_INV_FF.cti	
Z	Z			N/A N/A		
Z	Z	Z	X		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	X	N/A	LINEAR_SYSTEM_LOOP.ctl	
Z	Z	Z	X	N/A	LINEAR_SYSTEM_LOOP_CTRL_PARAMS.CTL	
Z	Ζ	Z	X	N/A	LINEAR_SYSTEM_LOOP_DCMOTOR_CTRL_PARAMS.CL	
Z	Z	Ζ	Χ	N/A	LINEAR_SYSTEM_LOOP_DIFF_DRV_CTRL_PARAMS.CTL	
Z	Z	Ζ	X	N/A	LINEAR_SYSTEM_LOOP_ELEVATOR_CTRL_PARAMS.CTL	
Z	Z	Z	X	N/A	LINEAR_SYSTEM_LOOP_FLYWHEEL_CTRL_PARAMS.CTL	
Z	Z	Z	X	N/A	LINEAR_SYSTEM_LOOP_SNGJNTARM_CTRL_PARAMS.CTL	
Z	Z	X	Χ	N/A	LINEAR SYSTEM SIM.ctl	
Z	Ζ	Х	Χ	N/A	LINEAR_SYSTEM.ctl	
Z	Z	Z	X	N/A	LTV DIFF DRIVE CTRL CONTROL PARAMS.CTL	
Z	Z	Z	X	N/A	LTV DIFF DRIVE CTRL MODEL PARAMS.CTL	
Z	Z	X	X	N/A	LTV DIFF DRIVE CTRL STATE ENUM.ctl	
Z	Z	Z	X	N/A	LTV DIFF DRIVE CTRL TOLERANCE.CTL	
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_MODEL_TAICAMO.OTE	
Z	Z	Z	X	N/A	LTV_UNICYCLE_CONTROLLER_STATE_ENOM.cti	
	Z	X	X	N/A	LTV_UNICYCLE_CONTROLLER_TOLERANCE.CTL LTV_UNICYCLE_CONTROLLER.CTL	
Z						
Z	Z	X	X	N/A	MECA_DRIVE_COOMETRY CTI	
Z	Z	X	X	N/A	MECA_DRIVE_ODOMETRY.CTL	
Z	Z	X	X	N/A	MECA_DRIVE_POSE_EST.CTL	
Z	Z	X	X	N/A	MECA_DRIVE_POSE_EST2.ctl	
Z	Z	X	Χ	N/A	MECA_DRIVE_POSE_EST2_CONFIG.CTL	
Z		Χ	X	N/A	MECA_DRIVE_POSE_EST2_INTERP_RECORD.CTL	
Z	Ζ	X	X	N/A	MECA_WHEEL_POSITIONS.CTL	
Z	Ζ	Χ	Χ	N/A	MECA_WHEEL_SPEEDS.CTL	
Z	Ζ	X	Χ	N/A	MEDIAN_FILTER.CTL	
Z	Ζ	X	Χ	N/A	MERWE_SCALED_SIGMA_PTS.ctl	
Z	Ζ	X	Х	N/A	OBSERVER SNAP LIST ITEM.CTL	
Z	Z	X	X	N/A	OBSERVER SNAPSHOT.CTL	
Z	Z	X	X		PARAM STACK ITEM.CTL	
				14//	p / no ma_o i / to it_it_em.ore	

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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

rum sequ	iencei	r, doul	ole sol	enoid p	ulse	
Z	Ζ	X	Χ	N/A	PARAM STACK.CTL	
Z	Ζ		X		PID ADV LIMITS.CTL	
Z	Z	X		N/A	PID ADV TUNING.CTL	
				N/A		
Z	Z	X			PID_CONTROLLER.CTL	
Z	Z	X		N/A	PID_ERROR_TOLERANCE.CTL	
Z	Ζ	Χ		N/A	PID_INPUT_LIMITS.CTL	
Z	Ζ	X		N/A	PID_TUNING.CTL	
	Ζ	X	X	N/A	POSE2D.CTL	
Z	Ζ	Χ		N/A	POSE3D.CTL	
Z	Ζ	X		N/A	POSEwCURVATURE.CTL	
Z	Z	X		N/A	PROFILED PID CONTROLLER.CTL	
Z	Z	X		N/A	QUATERNION.CTL	
Z	Z	X			RAMSETE_EXE_TUNING.CTL	
Z	Ζ	Χ		N/A	RAMSETE.CTL	
Z	Ζ	X		N/A	ROTATION2D.CTL	
	Ζ	X	Χ	N/A	ROTATION3D.CTL	
Z	Ζ	Z	X	N/A	SIMPLE MOTOR FF KA TUNE PARAMS.CTL	
Z	Ζ	Χ		N/A	SIMPLE_MOTOR_FF.CTL	
Z	Z	X			SINGLE JOINT ARM SIM.CTL	
Z	Z	X		N/A	SINGLE JOINT ARM SIM SIMULATION PARAMS.CTL	
Z	Z	X		N/A	SLEW_RATE_LIMITER.CTL	
Z	Z	Χ		N/A	SPLINE_CTRL_VECTOR.CTL	
Z	Ζ	X		N/A	SPLINE.CTL	
Z	Ζ	Χ		N/A	SWERVE_DRIVE_KINEMATICS.CTL	
Z	Ζ	Χ	Χ	N/A	SWERVE DRIVE MODULE POSITION.CTL	
Z	Ζ	Х	X	N/A	SWERVE DRIVE MODULE STATE.CTL	
Z	Z	X		N/A	SWERVE DRIVE ODOMETRY.CTL	
Z	Z	X		N/A	SWERVE_DRIVE_OSE_EST.CTL	
Z		X		N/A	SWERVE_DRIVE_POSE_EST2.ctl	
Z	Ζ	Χ	Χ	N/A	SWERVE_DRIVE_POSE_EST2_CONFIG.CTL	
Z			No		SWERVE_DRIVE_POSE_EST2_INTERP_RECORD.CTL	
Z	Ζ	X	X	N/A	TIME_INTERPOLATABLE_BOOLEAN.CTL	
Z	Ζ	X	X	N/A	TIME INTERPOLATABLE DOUBLE.CTL	
Z	Ζ	Χ		N/A	TIME_INTERPOLATABLE_POSE2D.CTL	
Z	Z	X		N/A	TIME INTERPOLATABLE ROTATION2D.CTL	
Z	Z	Z		N/A	TIME INTERPOLATABLE VARIANT.CTL	
Z	Z	X		N/A		
					TIMER.CTL	
Z	Ζ	X		N/A	TRAJ_CONFIG.CTL	
Z	Ζ	X			TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL	
Z	Ζ	Χ		N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_KINEMATICS.CTL	
	Ζ	X	X	N/A	TRAJ_CONSTRAINT_DIIF_DRIVE_VOLTAGE.CTL	
Z	Ζ	X	X	N/A	TRAJ CONSTRAINT ELLIP REGION.CTL	
1		Χ		N/A	TRAJ_CONSTRAINT_JERK.CTL	Routine exists, it is just a shell
Z	Ζ	X	Х	N/A	TRAJ CONSTRAINT MAX VELOCITY.CTL	
Z	Z	X			TRAJ CONSTRAINT MECA DRIVE KINEMATICS.CTL	
				N/A	TRAJ CONSTRAINT MICKA DRIVE KINEMATICS.CTL TRAJ CONSTRAINT MINMAX.CTL	
Z	Z	X				
Z	Z		X	N/A	TRAJ_CONSTRAINT_RECT_REGION.CTL	
Z	Ζ	Χ	Χ		TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	
Z	Ζ	X		N/A	TRAJ_STATE.CTL	
Z	Ζ	X		N/A	TRAJECTORY_SPLINE_TYPE_ENUM.CTL	
Z	Ζ	Χ		N/A	TRAJECTORY.CTL	
Z	Ζ	X		N/A	TRANSFORM2D.CTL	
Z	Z	X		N/A	TRANSFORM3D.CTL	
Z	Z	X		N/A	TRANSLATION2D.CTL	
					TRANSLATION2D.CTL TRANSLATION3D.CTL	
Z	Z	X		N/A		
Z	Z	X		N/A	TRAPEZOID_PROFILE_CONSTRAINT.CTL	
Z	Ζ	X		N/A	TRAPEZOID_PROFILE_STATE.CTL	
Z	Ζ	X	Χ	N/A	TRAPEZOID_PROFILE.CTL	
Z	Ζ	Χ	Χ	N/A	TWIST2D.CTL	
Z	Ζ	Χ		N/A	TWIST3D.CTL	
Z	Z	X		N/A	UNSCENTED KALMAN CORRECT FUNC GROUP.CTL	
Z	Z	X		N/A	UNSCENTED KALMAN FILTER.ctl	
Z	Z	X		N/A	UNSCENTED KALMAN NEW FUNC GROUP.CTL	
Z	Ζ	X	Χ	N/A	UTIL_PATHFINDER_CONFIG.CTL	
N/A		N/A		N/A	WAYPOINTS.CTL	Delete – obsolete
Z	Ζ		Χ	NA	WEIGHTED_WAYPOINT.CTL	New V1.5
N/A		N/A		N/A	X_Y_HEADINGS.CTL	Delete – obsolete
Z	Ζ	X	Χ	N/A	X_Y_PAIR.CTL	

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