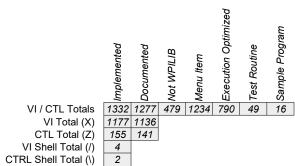
Revision 2025.0 1/7/2025 – Update april tag definitions, added new field.

This documents which Java/C++ WPILIB routines have been duplicated in LabVIEW, and which ones are not needed (for example because all that is needed is a cluster unpack function), and what isn't done....yet...



Doc completed Pct 95.87% Optimization Pct 59.31%

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

AUTONOMOUS

AUTO HELPER X X X X S AutoHelper_DelayedAction.vi

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

Category Implemented Documented Not WPILIB Menu Item Execution Optimized	Sample Program	Function Prototype	Notes Code	Test Program	Error Checking
ANALOG DELAY X X X X I	AnalogDelay_Execute.vi		Similar to interpolated tree map		
inized	un.				<i>T</i>

Implemented Documented Not WPILIB Menu Item Test Routine Sample Program on Incomplemented	Function Prototype	Notes	Code Review Test Program	Error Checking
BUMPLESS TRANSFER X X X X I BumplessTransfer_Execute.vi				
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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
FUNCTION GENERATOR	X	Χ		X	1			FunctionGenerator_Add_Value.vi		Similar to interpolated tree map			
	X	Χ		Χ	1			FunctionGenerator_Add_XY.vi		Similar to interpolated tree map			
	X	Χ		Χ	1			FunctionGenerator_Calculate.vi		Similar to interpolated tree map			
	X	Χ		Χ	SI			FunctionGenerator_Clear.vi					
	X	Χ	Χ	Χ	1			FunctionGenerator_Execute.vi		Similar to interpolated tree map			
	X	Χ		Χ	SI			FunctionGenerator_New.vi		Similar to interpolated tree map			

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

WPILib LabVIEW Math Library – VI Implementation List
Revision 2025.0 1/7/2025 – Update april tag definitions, added new field.

	Implementec	Documented	t WPILIB	Venu Item	Execution Optimized	Test Routine	mple Prograi				Code Review	st Program	ror Checking
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ON GENERATOR MATRIX	X	X	X	X	1			FunctionGeneratorMatrix_Add.vi FunctionGeneratorMatrix_Calculate.vi		Similar to interpolated tree map Similar to interpolated tree map			
	Χ	Χ	Χ	X	SI			FunctionGeneratorMatrix_New.vi		Similar to interpolated tree map			
LEAD LAG ∫	X Implemented	X Documented	X Not WPILIB	X Menu Item	- Execution Optimized	Test Routine	Sample Program	VI Name LeadLag_Execute.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
LEAD LAG	^	^						LeauLay_Execute.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 FILTER	X	Χ		X	1			LinearFilter_BackwardFiniteDifference.vi					
	X		Χ	X	SI X			LinearFilter_Calculate.vi LinearFilter_CutoffFrequency.vi					
	X	Χ	\hat{X}	X			X	LinearFilter_Execute.vi		Labview style helper			
	X	Χ		No	1			LinearFilter_Factorial.vi		AN INTERNAL ROUTINE			
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	X	Χ	Χ	X	X			LinearFilter_HighPassBW1.vi					
	X	X	X	X	X			LinearFilter_HighPassBW2.vi					
-	X	X X	X	X	X			LinearFilter_LowPassBW1.vi LinearFilter_LowPassBW2.vi					
	X	Χ		X	X			LinearFilter_MovingAverage.vi					
-	X X	X		X	SI			LinearFilter_New.vi LinearFilter_Reset.vi					
	Χ	Χ	Χ	X	SI			LinearFilter_ResetToValue.vi					
	X	Χ		X	X			LinearFilter_SinglePoleIIR.vi					
L	Χ	Χ	Χ	X	X			LinearFilter_TimeConst.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
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SI FW RATE FII TED			Ž		Ш	<u> </u>		VI Name SlewRatel imiter. Calculate vi	T direction 1 Tototype	INOLES		<u> </u>	Щ
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Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. SlewRateLimiter New.vi XX XX Χ SlewRateLimiter_NewInitialZero.vi XX SlewRateLimiter Reset.vi X XX X SI SlewRateLimiter SetRate.vi Function Prototype Notes TIMER X X Timer_Close.vi releases semaphore XX X X Timer Get.vi X X X X Timer GetAndReset.vi Timer_GetInternal.vi X X X No Internal (private) only X X X X X X X X Timer HasPeriodPassed.vi X Timer_HasPeriodPassedOnce.vi XX X X Timer New.vi X Timer Reset.vi $X \mid X \mid$ X Timer ResetInternal X X X No Internal (private) only Timer Restart.vi X Timer Start.vi X X X No Timer StartInternal.vi $X \mid X \mid X$ X Timer_Stop.vi X X X No Timer_StopInternal.vi Internal (private) only VI Name Function Prototype Notes TimeInterpBoolean_AddSample.vi Update to use create matrix TimeInterpBoolean_CleanUp.vi Update to use create matrix X X X X SI TimeInterpBoolean Clear.vi X X X X SI TimeInterpBoolean_GetNewestSample.vi TimeInterpBoolean GetSample.vi X X X X I TimeInterpBoolean GetTimeForValue.vi X X X X SI TimeInterpBoolean New.vi X X X X SI TimeInterpBoolean PopOldestSample.vi X X X X SI TimeInterpBoolean_SetMaxTime.vi Routine Function Prototype Notes TIME INTERPOLATABLE DOUBLE X X X X I TimeInterpDouble AddSample.vi Update to use create matrix TimeInterpDouble CleanUp.vi $X \mid X \mid X \mid No$ Update to use create matrix X X X X SI TimeInterpDouble Clear.vi X X X X SI TimeInterpDouble GetNewestSample.vi X X X X I TimeInterpDouble_GetSample.vi X X X X X SI X X X X X SI TimeInterpDouble GetTimeForValue.vi TimeInterpDouble New.vi TimeInterpDouble PopOldestSample.vi TimeInterpDouble SetMaxTime.vi $X \mid X \mid X \mid X \mid SI$ Function Prototype TIME INTERPOLATABLE POSE2D X X X X I TimeInterpPose2d_AddSample.vi Update to use create matrix TimeInterpPose2d CleanUp.vi Update to use create matrix X | X | X | No | I |

Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. TimeInterpPose2d Clear.vi X X X X SI X X X X SI TimeInterpPose2d_GetNewestSample.vi TimeInterpPose2d GetSample.vi $X \mid X \mid X \mid X \mid I$ TimeInterpPose2d GetTimeForValue.vi X X X X SI TimeInterpPose2d New.vi X X X X SI TimeInterpPose2d PopOldestSample.vi X X X X SI TimeInterpPose2d_SetMaxTime.vi Test Routine Menu Item Function Prototype VI Name Notes TIME INTERPOLATABLE ROTATION2D X X X X I TimeInterpRotation2d AddSample.vi Update to use create matrix TimeInterpRotation2d CleanUp.vi Update to use create matrix X X X X SI TimeInterpRotation2d Clear.vi TimeInterpRotation2d GetNewestSample.vi X X X X SI X X X X I TimeInterpRotation2d_GetSample.vi TimeInterpRotation2d GetTimeForValue.vi X X X X SI TimeInterpRotation2d_New.vi X X X X SI TimeInterpRotation2d PopOldestSample.vi TimeInterpRotation2d SetMaxTime.vi X X X X SI Not WPILIB Function Prototype Notes TIME INTERPOLATABLE VARIANT XXXXI TimeInterpVariant AddSample.vi Update to use create matrix TimeInterpVariant_CleanUp.vi Update to use create matrix X X X No X X X X SI TimeInterpVariant_Clear.vi X X X X SI TimeInterpVariant GetNewestSample.vi X X X X I TimeInterpVariant GetSample.vi TimeInterpVariant_GetTimeForValue.vi X X X X TimeInterpVariant Interpolate.vi This is a template for a user created routine. X X X X SI TimeInterpVariant New.vi X X X X SI X X X X SI TimeInterpVariant PopOldestSample.vi TimeInterpVariant SetMaxTime.vi VI Name Function Prototype Notes Time ElapsedTime.vi X X X X X X X I Time_WaitAdjust.vi Function Prototype Notes DIGITAL SEQUENTIAL LOGIC X X X X DigSeqLogic_Delay.vi | X | X | SI | X | X | SI | X | X | SI | X | SI | DigSeqLogic_Edge_Change.vi DigSeqLogic_Edge_Off.vi DigSeqLogic_Edge_On.vi X X X X DigSeqLogic_On_Delay.vi DigSeqLogic_Off_Delay.vi $X \mid X \mid X \mid X \mid$ X X X X DigSeqLogic_One_Shot.vi X X X X SI DigSeqLogic_SR_Flip_Flop.vi

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Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. Function Prototype DEBOUNCER X X X X X X X Debouncer New.vi Debouncer Calculate.vi X X X X Debouncer Execute.vi X X No Debouncer_Reset.vi Debouncer HasElapsed.vi No Function Prototype VI Name Notes DoubleSolenoid Pulse Execute.vi DOUBLE SOLENOID X Χ Function Prototype Notes DRUM SEQUENCE X DrumSequence_Cont_Execute.vi X X DrumSequence Pulse Execute.vi '======== COMMAND '======= Function Prototype Notes VI Name BOOLEAN COMMAND X
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	X		X	X		NumCmd_Send_Array.vi			
	Χ		Χ	Χ		NumCmd_Send_Chassis.vi			
	X		Χ	X		NumCmd_Send_Generic			
	X		Χ	X		NumCmd_Send_OneDbl.vi			
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PIDController_Pack_AdvTuning.vi

PIDController Pack InputLimits.vi

PIDController Pack Tuning.vi

PIDController Reset.vi

PIDController Pack ErrorTolerance.vi

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	X	V		SI		PIDController Setl.vi		DELETE			
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PROFILED PID CONTROLLER	X X X X X X X X X X X X X X X X X X X	Ğ	X	SI SI SI SI SI SI SI SI		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_Calculate_Meas.vi ProfiledPIDController_DisableContInput.vi ProfiledPIDController_EnableContInput.vi ProfiledPIDController_Execute.vi ProfiledPIDController_GetGoal.vi ProfiledPIDController_GetPeriod.vi ProfiledPIDController_GetPID.vi ProfiledPIDController_GetPlD.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetSetpoint.vi ProfiledPIDController_GetTolerance.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_GetVelocityError.vi ProfiledPIDController_New.vi ProfiledPIDController_NewPeriod.vi ProfiledPIDController_NewPeriod.vi	Function Prototype	Single call LabVIEW style function.	Code Re	Test Pro	ŏ
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FRC_LabVIEW_Trajectory_Library_Routines.xlsx Page 8 / 41 Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. Menu Item Function Prototype Notes RAMSETE X X X SI Ramsete AtReference.vi AtReference calculate_trajectory XX XX Ramsete Calculate Trajectory.vi Ramsete Calculate.vi $X \mid X \mid$ XX calculate Ramsete_Execute_ENG.vi X X X X I Use this one!! X X X X I X X X X I Ramsete Execute Ext Odom.vi Ramsete_Execute_Ext_Odom_ENG.vi X X X X SI Ramsete Execute PackTuning ENG.vi Ramsete Execute PackTuning.vi X X X X SI X X X X I Ramsete_Execute.vi X SI X SI Ramsete New B Z.vi new(b, zeta) Ramsete New.vi XX X SI Ramsete SetEnabled.vi SetEnabled Ramsete SetTolerance.vi $X \mid X \mid$ X SI SetTolerance XX Ramsete SINC.vi $X \mid X \mid$ internal sinc Test Routine ltem Function Prototype Notes SimpleMotorFF_Calculate CalcAccel.vi SIMPLE MOTOR FEEDFORWARD X X X X SI SimpleMotorFF Calculate NextV Dt.vi XX Х SimpleMotorFF Calculate.vi SI public double calculate(double velocity, double acceleration) SimpleMotorFF_CalculateVelocityOnly.vi $X \mid X$ X SI public double calculate(double velocity) SimpleMotorFF Ka AutoTune.vi $X \mid X \mid X \mid X$ SimpleMotorFF MaxAchieveAccel.vi public double maxAchievableAcceleration(double maxVoltage, Χ X double velocity) Χ SimpleMotorFF_MaxAchieveVel.vi $X \mid X$ public double maxAchievableVelocity(double maxVoltage, double acceleration) XX Χ SimpleMotorFF MinAchieveAccel.vi public double minAchievableAcceleration(double maxVoltage, double velocity) SimpleMotorFF MinAchieveVel.vi $X \mid X$ Χ public double minAchievableVelocity(double maxVoltage, double SimpleMotorFF_New.vi XX public SimpleMotorFeedforward(double ks, double kv, double ka) X SI X X X X SI SimpleMotorFF Pack Ka Tune Params.vi public SimpleMotorFeedforward(double ks, double kv) '======== GEOMETRY '======== Routine VI Name Function Prototype Notes COORDINATE AXIS X X X CoordAxis D.vi SI CoordAxis E.vi SI XX X SI CoordAxis N.vi $X \mid X$ X SI CoordAxis New.vi CoordAxis S.vi X SI $X \mid X$ SI CoordAxis U.vi X SI XX CoordAxis W.vi

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

WPILib LabVIEW Math Library – VI Implementation List
Revision 2025.0 1/7/2025 – Update april tag definitions, added new field.

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	X	Χ		Χ	SI			Pose2d_Equals.VI	boolean equals(other obj)				
	Χ	Χ		Χ	Χ			Pose2d_Exp.vi	pose2d exp(twist2d twist)				
	X	X		X	SI			Pose2d_getRotation.vi	rotation2d getRotation()	can also use cluster unpack			
	X	X		X	SI		-	Pose2d_getTranslation.vi Pose2d_getXY.vi	translation2d getTranslation()	can also use cluster unpack			
		X	X	X	SI	<u> </u>		Pose2d_getXYAngle.vi	+				
		\hat{X}	$\stackrel{\wedge}{\longrightarrow}$				_	Pose2d Interpolate.vi					
		X	$\overline{}$	X	X			Pose2d Log.vi	twist2d log(pose2d end)				
	X	Χ		Χ	SI			Pose2d Minus.vi	transform2d minus(pose2d other)				
	X	Χ	\longrightarrow	Χ	SI			Pose2d_New_TRRO.vi	pose2d new(translation2d, rotation2d)				
	X	X	\longrightarrow	X	SI			Pose2d_New.vi	pose2d new(double x, double y, rotation2d)				
	X	X	\rightarrow	X	SI SI			Pose2d_Plus.vi Pose2d RelativeTo.vi	pose2d plus(transform2d other) pose2d relativeto(pose2d other)		_		
	$\frac{\lambda}{X}$	X	\rightarrow	X	SI			Pose2d Times.vi	posezu relativeto(posezu otrier)				
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POSE3D	X	X X X X X X	X	X X X X X X	SI SI X SI SI I X	Test Routine	Sample	Pose3d_Div.vi Pose3d_Equals.VI Pose3d_Exp.vi Pose3d_getRotation.vi Pose3d_getTranslation.vi Pose3d_getXYZ.vi Pose3d_Interpolate.vi Pose3d_Log.vi	Function Prototype	Notes	UC.	<u>r</u>	
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WPILib LabVIEW Math Library – VI Implementation List Revision 2025.0 1/7/2025 – Update april tag definitions, added n

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X X X		X	SI		ଓ VI Name Quaternion_Equals.vi	Function Prototype	Notes	Ö	<u> </u>	<u> </u>
X		X			Quaternion Get All.vi					
		X	SI		Quaternion_Get_LVQuat.vi					
V		X			Quaternion_Get_Vect.vi					
		X			Quaternion_Get_W.vi					-
X		X			Quaternion_Inverse.vi Quaternion New.vi					
X		X			Quaternion New Default.vi					
X		X	SI		Quaternion New LVQuat.vi					
X		X			Quaternion_Normalize.vi					
X		X			Quaternion_Plus.vi					-
X		X			Quaternion_Times.vi Quaternion ToRotationVector.vi					
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eme	Documente	Menu Item	Execution	Ro	ple			a Ž	Pro	
du	5 6	Jen 1	Ř	esi	VI Name	Function Prototype	Notes	Code	7esi	Erroi
TATION2D X		X	SI		Rotation2d_CreateAngle.vi	rotation2d new(double value)	Notes			Щ
X	X	X	SI		Rotation2d_CreateAngleDegrees.vi	rotation2d fromDegrees(double degrees)	convert to radians then create			
X	X	X	SI		Rotation2d_CreateAngleRotations.vi					
X		X	SI		Rotation2d_CreateXY.vi	rotation2d new(double x, double y)				
X		X			Rotation2d_Div.vi	hadron on inla (votation 2d others)				
X			SI		Rotation2d_Equals.vi Rotation2d_GetAngleCosSin.vi	boolean equals(rotation2d other)	New 1/26/21			
X		X	SI		Rotation2d GetCos.VI	double getCos()	use cluster unpack			
X		X	SI		Rotation2d_GetDegrees.VI	double getDegrees()	use cluster unpack, then convert to			
X	· X	X	SI		Rotation2d GetRadians.VI	double getRadians()	degree use cluster unpack			
X		X	SI		Rotation2d_GetRotations.vi	dealers gent tautaile()	acc states anpasic			
X		X			Rotation2d_GetSin.VI	double getSin()	use cluster unpack			
X		X			Rotation2d_GetTan.VI	double getTan()	can calculate			
X		X			Rotation2d_Interpolate.vi					
X	X X	X	SI SI		Rotation2d_Minus.vi Rotation2d_Plus.vi	rotation2d minus(rotation2d other) rotation2d plus(rotation2d other)				
X	X	X	SI		Rotation2d_RotateBy.vi	rotation2d rotation2d other)				
X		X	SI		Rotation2d Times.vi	rotation2d times(double scalar)				
X	X	X	SI		Rotation2d_UnaryMinus.vi	rotation2d unaryminus()				
						rotation2d new()	can use cluster constant			<u>i</u>

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ng definitions, added												
	X	X		X	SI		Rotation3d_Minus.vi					
	X	X		X	SI	+	Rotation3d_Plus.vi					
	X	X		X	SI SI		Rotation3d_RotateBy.vi Rotation3d_Times.vi					
	X	X		X	SI		Rotation3d_Times.vi Rotation3d_ToRotation2d.vi					
	X	X		X	SI		Rotation3d_ToRotation2d.vi Rotation3d_UnaryMinus.vi					
		 ^		^	31	_	Rotation3u_onaryiviinus.vi					
TRANSFORM2D	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Sample Program	VI Name Transform2d Create PosePose.vi	Function Prototype transform2d new(pose2d, pose2d)	Notes	Code Review	Test Program	Error Checking
TITATIOI OTTINED	X	X		X	SI		Transform2d_Create_TransRot.vi	transform2d new(translation2d, rotation2d)				
	X	$\frac{x}{x}$		X	SI	_	Transform2d Div.vi	transformed flow translationed, rotationed)				
	X	X		X	SI	+-	Transform2d Equals.VI	boolean equals(other transform2d)				
	X	X		X	SI		Transform2d GetRotation.VI	rotation2d getRotation()	use cluster unpack			
	X	X		X	SI	-	Transform2d GetTranslation.VI	translation2d getTranslation()	use cluster unpack			
	X	X	X	X	SI		Transform2d GetXY.vi	J				
	X	X	X	X	SI		Transform2d GetXYAngle.vi					
	X	X		X	SI		Transform2d_Inverse.vi	transform inverse()	new			
	X	X		X	Si		Transform2d_Plus.vi	V				
	X	X		Χ	SI		Transform2d_Times.vi	transform2d times(double scalar)				
								transform2d new()	can use cluster constant			
TRANSFORM3D	X X X	X X X		X X X	SI SI SI	Sample	Transform3d_Create_Default.vi Transform3d_Create_Pose3dPose.3dvi Transform3d_Create_Trans3dRot3d.vi Transform3d_Div.vi	Function Prototype				
	X			X	SI		Transform3d_Equals.VI					
	X	X										
	X	X		Χ	SI	\perp	Transform3d_GetRotation3d.VI					
	X X X	X X X		X	SI SI	\equiv	Transform3d_GetTranslation3d.VI					
	X X X	X X X	X	X X X	SI SI		Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi					
	X X X X	X X X X	X	X X X	SI SI SI		Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi					
	X X X X X	X X X X X	X	X X X X	SI SI SI SI		Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi					
	X X X X	X X X X X	X	X X X	SI SI SI SI		Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi					
	X X X X X X	X X X X X X		X X X X X	SI S	est Koutine Sample Program	Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi	Function Prototyne	Notes	Sode Review	'est Program	error Checking
TRANSLATION2D	X	X X X X X X X	Not WPILIB	Menu Item	Execution Optimized 19 19 19 19 19 19 19 19 19 19 19 19 19	sample Program	Transform3d_GetTranslation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
TRANSLATION2D	X	X X X X X X X X X		X Wenu Item	Execution Optimized	Sample Program	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	Error Checking
FRANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X X 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_GetTranslation3d.VI Transform3d_GetXYZ.vi Transform3d_Inverse.vi Transform3d_Plus.vi Transform3d_Times.vi	Function Prototype translation2d new(double x, double y)	Notes	Code Review	Test Program	Error Checking
FRANSLATION2D	X X X X X X X X X X X X X X X X X X X	X X X X 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 Si Si	Sample Program	Transform3d_GetTranslation3d.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		Notes	Code Review	Test Program	Error Checking
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	SI S	Sample Program	Transform3d_GetTranslation3d.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 new(double x, double y) boolean equals(translation other)	Notes	Code Review	Test Program	Error Checking
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 Doccumented 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 SI SI	Sample Program	Transform3d_GetTranslation3d.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_GetDistance.vi	translation2d new(double x, double y) boolean equals(translation other) double getDistance(translation2d other)		Code Review	Test Program	Error Checking
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 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	SI SI SI SI SI SI SI SI	Sample Program	Transform3d_GetTranslation3d.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_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	Error Checking
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	SI SI SI SI SI SI SI SI	Sample Program	Transform3d_GetTranslation3d.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_GetDistance.vi Translation2d_GetNorm.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	Error Checking
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 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	SI Si Si Si Si Si Si Si	Sample Program	Transform3d_GetTranslation3d.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_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetXY.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	Error Checking
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	Not WPILIB	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 SI SI	Sample Program	Transform3d_GetTranslation3d.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_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetXY.VI Translation2d_GetXY.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	Error Checking
TRANSLATION2D	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	SI SI SI SI SI SI SI SI	Sample Program	Transform3d_GetTranslation3d.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_GetDistance.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_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	Error Checking
TRANSLATION2D	X	X	Not WPILIB	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 SI SI	Sample Program	Transform3d_GetTranslation3d.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_GetDistance.vi Translation2d_GetNorm.VI Translation2d_GetX.VI Translation2d_GetXY.VI Translation2d_GetXY.VI Translation2d_GetY.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	Error Checking
TRANSLATION2D	X	X	Not WPILIB	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 SI SI	Sample Program	Transform3d_GetTranslation3d.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_Equals.vi Translation2d_GetAngle.vi Translation2d_GetNorm.VI Translation2d_GetXV.VI Translation2d_GetXY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_Minus.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	Error Checking
TRANSLATION2D	X	X	Not WPILIB	X	SI SI SI SI SI SI SI SI	Sample Program	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_Equals.vi Translation2d_GetAngle.vi Translation2d_GetNorm.VI Translation2d_GetXy.VI Translation2d_GetXy.VI Translation2d_GetXy.VI Translation2d_GetY.VI Translation2d_Plus.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	Error Checking
TRANSLATION2D	X	X	Not WPILIB	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 SI SI	Sample Program	Transform3d_GetTranslation3d.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_Equals.vi Translation2d_GetAngle.vi Translation2d_GetNorm.VI Translation2d_GetXV.VI Translation2d_GetXY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_GetY.VI Translation2d_Minus.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	Error Checking

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

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. Function Prototype Notes DIFFERENTIAL DRIVE KINEMATICS X X DiffKinematics New.vi diffDriveKine new(double trackWidth) chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds) XX XX X DiffKinematics toChassisSpeed.vi 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 DiffDrvOdom2_New.vi X I XX DiffDrvOdom2 Reset.vi X SI DiffDrvOdom2 Update.vi Function Prototype VI Name Notes DIFFERENTIAL DRIVE WHEEL SPEEDS diffDrWheelSpeeds new() diffDrWheelSpeeds new(double leftVel, double rightVel) DiffWheel Normalize.vi void normalize(double maxVel) VI Name Function Prototype Notes MECANUM DRIVE KINEMATICS X X MecaKinematics New.vi MecaKinematics SetInverseKinematics.vi XX Χ MecaKinematics ToChassisSpeeds.vi MecaKinematics ToTwist2d.vi $X \mid X$ X MecaKinematics_ToWheelSpeeds.vi XX Χ MecaKinematics ToWheelSpeedsZeroCenter.vi

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MECANUM DRIVE ODOMETR	$\mathbf{Y} \stackrel{\leq}{X} \stackrel{Q}{X}$	<	2	<u> </u>	<u></u>	VI Name MecaOdometry Execute.vi	Function Prototype	Notes	O		Щ
WECANOW DRIVE ODOWETR		X	<u>_</u>	SI		MecaOdometry_Execute.vi MecaOdometry_GetKinematics.vi					
	X X X		<i>X X X</i>	SI		MecaOdometry_GetRinematics.vi MecaOdometry_GetPose.vi		+			
	$\begin{array}{c c} X & X \\ X & X \end{array}$			51 1		MecaOdometry_GetPose.vi MecaOdometry_New.vi		+			
	$\begin{array}{c c} X & X \\ X & X \end{array}$			1		MecaOdometry_NewDefaultPose.vi		+			
	XXX	-+		SI		MecaOdometry_NewDefaultPose.vi MecaOdometry_Reset.VI		+			
	XXX			1		MecaOdometry_Reset.vi MecaOdometry_Update.vi		+			
				,		MecaOdometry_Opdate.vi MecaOdometry_UpdateWithTime.vi		Removed			
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MECANUM DRIVE WHEEL POSITIO			X	SI		MecaWheelPos_Get.vi					
	XX			SI		MecaWheelPos_New.vi					
	XX		X	SI		MecaWheelPos_Sub.vi					
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MECANUM DRIVE WHEEL SPEEDS	s X X	Not	Menu	S Execution Test Rou	Sample	VI Name MecaWheel_New.Vi	public MecanumDriveWheelSpeeds(double	Notes	Code Re	Test Proç	Error (
MECANUM DRIVE WHEEL SPEED	S X X	Not	Menu	Exec Test	Sample	VI Name MecaWheel_New.Vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond,	Notes	Code Re	Test Proc	Error (
MECANUM DRIVE WHEEL SPEED	S X X	Not	Menu	Exec Test	Sample	VI Name MecaWheel_New.Vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double	Notes	Code Re	Test Proc	Error C
MECANUM DRIVE WHEEL SPEED	S X X	Not	X Wenu	S Exec		MecaWheel_New.Vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond,	Notes	Code Re	Test Proc	Error (
MECANUM DRIVE WHEEL SPEED	S	X	X Wenu	SI Legit		MecaWheel_New.Vi MecaWheel_GetAll.vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond)	Notes	Code Re	Test Prog	Error (
MECANUM DRIVE WHEEL SPEED	S X X	X	X Wenu	S Exec		MecaWheel_New.Vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes	Code Re	Test Pro	Error (
MECANUM DRIVE WHEEL SPEED	S	X	X Wenu	SI Legit		MecaWheel_New.Vi MecaWheel_GetAll.vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond)	Notes	Code Re	Test Prog	Error C
MECANUM DRIVE WHEEL SPEED	S	X	X Wenu	SI Legit		MecaWheel_New.Vi MecaWheel_GetAll.vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes	Code Re	Test Prog	Error C
MECANUM DRIVE WHEEL SPEED	S	X	X Wenu	SI Legit		MecaWheel_New.Vi MecaWheel_GetAll.vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes	Code Re	Test Prog	Error C
MECANUM DRIVE WHEEL SPEED	S	X	X X X	otimized X © Exec		MecaWheel_New.Vi MecaWheel_GetAll.vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes	V Code R	Test	ng Error C
MECANUM DRIVE WHEEL SPEED	S	X	X Wenu X X X	otimized X © Exec		MecaWheel_New.Vi MecaWheel_GetAll.vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double	Notes	iew Code Ri	Test	cking Error C
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								public SwerveDriveKinematics(Translation2d wheelsMeters)	variable parameters (replace with array and "4" calls)			
								public ChassisSpeeds toChassisSpeeds(SwerveModuleState	variable parameters (replace with			
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	X	X		Χ			SwerveOdometry_GetPosition.VI	public Pose2d getPoseMeters()				
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	X	X		X	SI		SwerveOdometry ResetPosition.VI	Rotation2d gyroAngle) public void resetPosition(Pose2d pose, Rotation2d gyroAngle)				
			X		1		SwerveOdometry_Update4.VI	, , , , , , , , , , , , , , , , , , , ,	For 4 module drives			
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	X	7	, , , , , , , , , , , , , , , , , , ,		,		owerveedomeny_opudiox.vr	public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState moduleStates)	variable parameters (replace with array and "4" calls)			
								public Pose2d update(Rotation2d gyroAngle,	variable parameters (replace with			
								SwerveModuleState moduleStates)	array and "4" calls)			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Nample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
SWERVE DRIVE MODULE POSITIONS			_	X			SwerveModulePosition_CompareTo.vi					
	X			X	SI		SwerveModulePosition_Equals.vi SwerveModulePosition_Get.vi					
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	X	X		X	SI		SwerveModuleState_Equal.vi					
		X			SI		SwerveModuleState_Get.vi	authlia Oussia Madula 21 1 / 1 1 1 2 2 2 2				
	X	X		X	SI		SwerveModuleState_New.vi	public SwerveModuleState(double speedMetersPerSecond, Rotation2d angle)				
	X	X		X	SI		SwerveModuleState_Optimize.vi	public SwerveModuleState optimize(SwerveModuleState desire Rotation2d angle)	d,			
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CUBIC HERMITE SPLINE		X		X			CubicHermiteSpline_getControlVectorFromArrays.vi	protected SimpleMatrix getCoefficients() private SimpleMatrix getControlVectorFromArrays(double[]	not needed, use cluster unpack			
		X		X			CubicHermiteSpline makeHermiteBasis.vi	private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector) private SimpleMatrix makeHermiteBasis()				
		1 /		_ ^			Oddis Strinto Opinio_maker termito Dasis.vi	Private ombiomativ makeriemitebasis()				

POSE WITH CURVATURE V		, x	X		X				CubicHermiteSpline_New.vi	public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)				
SPLINE LANdroid clases : I was a season of the season of t	POSE WITH CURVATURE	X Implemented		Not WPILIB	Menu	Execution	Test Routine	Sample Program		public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter)		Code Review	Test Program	Fror Checking
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SPLINE HELPER SPLINE										public static class ControlVector	implemented as data structure			
SPLINE HELPER X X X X SI SplineHelp_GetCubicCtrtVector.vi scalar, Pose2d point) X X X X X X SplineHelp_GetCubicCtrtVectorsFromWayPts.vi public static Spline ControlVector getCubicControlVectorsFromWaypoints(Pose2d start, Translation2d[] interiorWaypoints, Pose2d end) X X X X N SplineHelp_GetCubicSpline Calc1.vi internal X X X N No SplineHelp_GetCubicSpline Calc2.vi internal X X X NO SplineHelp_GetCubicSpline Calc3.vi internal X X X NO SplineHelp_GetCubicSpline Calc3.vi internal X X X X NO SplineHelp_GetCubicSpline Calc3.vi public static CubicHermiteSpline[] getCubicSplinesFromControlVector start, Translation2d[] waypoints, Pose2d end) X X X X NO SplineHelp_GetCubicSpline Calc3.vi public static CubicHermiteSpline[] getCubicSplinesFromControlVector start, Translation2d[] waypoints, Spline_ControlVector start, Translation2d[] waypoints, Pose2d start, Value s		mplemented	ocumented	lot WPILIB	Aenu Item	Optii	est Routine	Progra	VI Name	Function Prototype	Notes	æ	est Program	Error Checkina
SplineHelp_GetCubicCtrlVectorsFromWayPts.vi public static Spline_ControlVector[] getCubicControlVectorsFromWaypoints Pose2d start, Translation2d[] interiorWaypoints Pose2d start, Translation2d[] interiorWaypoints Pose2d end	SPLINE HELPER							U)		private static Spline.ControlVector getCubicControlVector(double				
SplineHelp_GetCubicSpline_Calc1.vi SplineHelp_GetCubicSpline_Calc2.vi Internal		X	X		X		X		SplineHelp_GetCubicCtrlVectorsFromWayPts.vi	public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints(Pose2d start,				
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[OUTRI OF VOCATO)		X X X	X			SI				scalar, Pose2d point) public static List <spline.controlvector> getQuinticControlVectorsFromWaypoints(List<pose2d></pose2d></spline.controlvector>				
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				\sqcup	<u> </u>				double t)				
		X	X		No	SI	.	Trajectory_lerp_Pose.vi	private static Pose2d lerp(Pose2d startValue, Pose2d endValue,	internal			
	-	X		\vdash	+ <u>Y</u>	SI	-	Trajectory_New_Empty.vi	double t)				
		X		\vdash	X	SI	-	Trajectory_New.vi	public Trajectory(final List <state> states)</state>				
		X	\overline{X}	\Box	X			Trajectory_RelativeTo.vi	public Trajectory relativeTo(Pose2d pose)				
		X			X			Trajectory_Sample.vi	public State sample(double timeSeconds)				
		Χ	Χ	Χ				Trajectory_SampleReverse.vi	i ,	Sample in reverse order. Negate			
				igspace						sample.			
		X	Χ	$\vdash \vdash$	X			Trajectory_TransformBy.vi	public Trajectory transformBy(Transform2d transform)				
		, ,			1		'	Trajectory_TransformBy.vi					
		7.		1				Trajectory_TransformBy.vi	public Pose2d getInitialPose()	can use cluster unpack, array index			
		X						Trajectory_TransformBy.vi	public Pose2d getInitialPose()	can use cluster unpack, array index			
		~				pa		Trajectory_TransformBy.vi	public Pose2d getInitialPose()	can use cluster unpack, array index			
						nized		F	public Pose2d getInitialPose()	can use cluster unpack, array index			
		7				ptimized	0	E E E E E E E E E E E E E E E E E E E	public Pose2d getInitialPose()	can use cluster unpack, array index	М	ε	ing
		nted	nted		<u> </u>	n Optimized	tine	Employ - Indiana	public Pose2d getInitialPose()	can use cluster unpack, array index	view	gram	ecking
		mented	mented	/PILIB	ltem	ıtion Optimized	Soutine	Program	public Pose2d getInitialPose()	can use cluster unpack, array index	Review	Program	Checking
		plemented	cumented	t WPILIB	nu Item	ecution Optimized	st Routine	mple Program		can use cluster unpack, array index	de Review	st Program	or Checking
		Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Program	Function Prototype	can use cluster unpack, array index	Code Review	Test Program	Error Checking
	TRAJECTORY_STATE[X Implemented		Not WPILIB	X Men	প্ৰ Execution Optimize	Test Routine	VI Name TrajectoryState _Equals.vi			Code Review	Test Program	Error Checking
		X X Implemented	Χ	X Not WPILIB	X Wen	ଦ୍ର ଓ Execution Optimize	Test Routine	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi	Function Prototype		Code Review	Test Program	Error Checking
	TRAJECTORY_STATE	X / X / X / X / X / X / X	X	Not WPILIB	X X X	ର ଓ ଆ Execution Optimize	Test Routine	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi	Function Prototype boolean equals(other obj)		Code Review	Test Program	Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X	X Not WPILIB	X X X	S S Execution Optimize	Test Routine	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i)		Code Review	Test Program	Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X	X Not WPILIB	X X X	S S Execution Optimize	Test Routine	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i)		Code Review	Test Program	Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X	Not WPILIB	X X X	S S Execution Optimize	Test Routine	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSg. Pose2d poseMeters, double		Code Review	Test Program	Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X	Not WPILIB	X X X	S S Execution Optimize	Test Routine	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSg. Pose2d poseMeters, double		Code Review	Test Program	Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X	Not WPILIB	X X X	S S Execution Optimize	Test Routine	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double		Code Review	Test Program	Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X	Not WPILIB	X X X	S S Execution Optimize	Test Routine	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSg. Pose2d poseMeters, double		Code Review	Test Program	Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X	X Not WPILIB	X X X	S S Execution Optimize	Test Routine	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSg. Pose2d poseMeters, double		Code Review	Test Program	Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X	X Not WPILIB	X X X	S S Execution Optimize	Test Routine	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSg. Pose2d poseMeters, double		Code Review	Test Program	Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X	X Not WPILIB	X X X	S S Execution Optimize	Test Routine	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSg. Pose2d poseMeters, double		Code Review	Test Program	g Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X	B Not WPILIB	X X X	S S Execution Optimize	Test	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSg. Pose2d poseMeters, double		iew Code Review	am Test Program	king Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X	ILIB X Not WPILIB	X X X	S S Execution Optimize	utine Test	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi TrajectoryState_New.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSg. Pose2d poseMeters, double		Peview Code Review	ogram Test Program	hecking Error Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X	WPILIB X Not WPILIB	Item X X Wen	S S Execution Optimize	utine Test	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi TrajectoryState_New.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSg. Pose2d poseMeters, double		e Review	. Program	r Checking
	TRAJECTORY_STATE	X X X X X X X X X X	X X X X	WPILIB	Item X X Wen	ecution Optimized Solution Optimize	utine Test	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi TrajectoryState_New.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter) public State()	Notes	de Review	est Program Test Program	irror Checking
	TRAJECTORY_STATE	Implemented 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 Not WPILIB	X X X	S S Execution Optimize	utine Test	VI Name TrajectoryState_Equals.vi TrajectoryState_GetAll.vi TrajectoryState_GetPose.vi TrajectoryState_Interpolate.vi	Function Prototype boolean equals(other obj) State interpolate(State endValue, double i) public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSg. Pose2d poseMeters, double		Code Review	Test Program	Error Checking

Revision 2025.0 1/7/2025 – Update april tag definitions, added new field.

new	field.							
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	Ÿ		
X	X	X	X		TrajectoryConfig_GetConstraints.vi	public List <trajectoryconstraint> getConstraints()</trajectoryconstraint>	Implemented differently, can't duplicate.	
Χ	X		X		TrajectoryConfig GetEndVelocity.vi	public double getEndVelocity()	can use cluster unpack	
X	X		X		TrajectoryConfig GetKinematicsDiffDrive.vi		·	
Χ	X		Χ		TrajectoryConfig GetKinematicsMecanumfDrive.vi			
X	X		X		TrajectoryConfig GetKinematicsSwerveDrive.vi			
Χ	X	Χ	Χ		TrajectoryConfig GetMaxVelAccel.vi			
Χ	X		Χ		TrajectoryConfig GetStartVelocity.vi	public double getStartVelocity()	can use cluster unpack	
X	X		X		TrajectoryConfig GetVoltageDiffDrive.vi		·	
Χ	X		X		TrajectoryConfig IsReversed.vi	public boolean isReversed()	can use cluster unpack	
Χ	X	Χ	Χ	SI	TrajectoryConfig_setCentripetalAccel.vi			
Χ	X		X		TrajectoryConfig_SetEndVelocity.vi	public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond)		
Χ	X		X	SI	TrajectoryConfig_setKinematicsDiffDrive.vi	public TrajectoryConfig setKinematics(DifferentialDriveKinematics kinematics)		
Χ	X		X	SI	TrajectoryConfig_setKinematicsMecanumfDrive.vi	public TrajectoryConfig setKinematics(MecanumDriveKinematics kinematics)		
Χ	X		X	SI	TrajectoryConfig_setKinematicsSwerveDrive.vi	<pre>public TrajectoryConfig setKinematics(SwerveDriveKinematics kinematics)</pre>		
Χ	X		X	SI	TrajectoryConfig_setReversed.vi	public TrajectoryConfig setReversed(boolean reversed)		
X	X		X		TrajectoryConfig_SetStartVelocity.vi	public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond)		
Χ	X	Χ	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 VI Name TRAJECTORY GENERATE X TrajectoryGenerate Make Cubic CtrlVect.vi public static Trajectory generateTrajectory(Spline.ControlVector uses cubic splines initial, List<Translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<Translation2d> interiorWaypoints, Pose2d end, XX TrajectoryGenerate Make Cubic.vi Χ uses cubic splines TrajectoryConfig config)
Helper to bring these all together. X X X X TrajectoryGenerate Make Generic.vi Use this one!!! public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) TrajectoryGenerate_Make_Quintic_CtrlVect.vi uses quintic splines TrajectoryGenerate Make Quintic Weighted.vi $X \mid X \mid X \mid X$ New 2762 public static Trajectory generateTrajectory(List<Pose2d> waypoints, TrajectoryConfig config) TrajectoryGenerate_Make_Quintic.vi uses quintic splines X $X \mid X$ TrajectoryGenerate splinePointsFromSplines.vi public static List<PoseWithCurvature> . splinePointsFromSplines(Spline[] splines) VI Name Function Prototype Notes TRAJECTORY GENERATE (Control Vector) public ControlVectorList(int initialCapacity) may not need, just data public ControlVectorList() may not need, just data

public ControlVectorList(Collection<? extends

Spline.ControlVector> collection)

may not need, just data

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. Menu Item Function Prototype TRAJECTORY PARAMETERIZE X X X No TrajectoryParam calcStuffFwd.vi X X X No TrajectoryParam calcStuffRev.vi private static void enforceAccelerationLimits(boolean reverse, his routines needs to be changed X TrajectoryParam_enforceAccel.vi List<TrajectoryConstraint> constraints, ConstrainedState state) nen new constraints are added. This routines needs to be changed when new constraints are added. $X \mid X$ X No TrajectoryParam enforceVelocity.vi XX public static Trajectory X TrajectoryParam timeParam.vi timeParameterizeTrajectory(List<PoseWithCurvature> points. List<TrajectoryConstraint> constraints, double startVelocityMetersPerSecond, double endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq, boolean reversed) Test Routine Not WPILIB Menu Item VI Name Function Prototype Notes ConstrainedState New.vi TRAJECTORY PARAMETERIZE CONSTRAINED STATE X ConstrainedState(PoseWithCurvature pose, double Χ distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq) X X X X ConstrainedState SetMaxAccel.vi X X X X ConstrainedState SetMinAccel.vi $X \mid X \mid X \mid X$ ConstrainedState_SetVelAccel.vi ConstrainedState SetVelocity.vi X X X X ConstrainedState() Function Prototype Notes TRAJECTORY UTIL X X TrajectoryUtil_fromPathWeaverJSON.vi public static Trajectory fromPathweaverJson(Path path) X X X X X TrajectoryUtil_MakeWeightedWayPoint_ENG.vi TrajectoryUtil MakeWeightedWayPoint.vi $X \mid X \mid X \mid X \mid X$ TrajectoryUtil_toPathWeaverJSON.vi public static void toPathweaverJson(Trajectory trajectory, Path X public static Trajectory deserializeTrajectory(String json) public static String serializeTrajectory(Trajectory trajectory) Function Prototype Notes TRAPEZOID PROFILE X TrapProfConstraint New.vi TrapProfile Calculate.vi Χ XX No TrapProfile Direct.vi Private, remove from menu $X \mid X \mid X \mid X$ TrapProfile Execute.vi X X X X SI TrapProfile Execute AtGoal.vi Χ TrapProfile IsFinished.vi XX Χ TrapProfile New DefInitial.vi XX Χ TrapProfile New.vi TrapProfile_ShouldFlipAcceleration.vi $X \mid X$ No Private, remove from menu XX Χ TrapProfile_TimeLeftUntil.vi X TrapProfile TotalTime.vi X XX TrapProfState Equals.vi XX Χ TrapProfState New.vi

Revision 2025.0 1/7/2025 – Update april tag definitions, added new field.

'======== TRAJECTORY CONSTRAINT '========= Menu Item 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 X SI CentripetalAccelConstraint_New.vi Can use cluster pack for now maxCentripetalAccelerationMetersPerSecondSq) Test Routine Vot WPILIB Function Prototype Notes public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) DIFF DRIVE KINEMATIC CONSTRAINT X DiffDriveKinematicsConstraint getMaxVelocity.vi DiffDriveKinematicsConstraint getMinMaxAccel.vi public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) public DifferentialDriveKinematicsConstraint(final DiffDriveKinematicsConstraint New.vi SI Χ DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond) Fest Routine 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) X XX SI DiffDriveVoltageConstraint New.vi DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage) Function Prototype Notes ELLIPTICAL REGION CONSTRAINT X EllipRegionConstraint_getMaxVelocity.vi X EllipRegionConstraint_getMinMaxAccel.vi XX Χ EllipRegionConstraint_IsPoseInRegion.vi EllipRegionConstraint New.vi

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. Function Prototype Notes JERK CONSTRAINT / JerkConstraint_getMaxVelocity.vi Routine exists, it is just a shell **FUTURE** JerkConstraint getMinMaxAccel.vi Routine exists, it is just a shell SI JerkConstraint New.vi Routine exists, it is just a shell **FUTURE** Function Prototype Notes MAX VELOCITY CONSTRAINT MaxVelocityConstraint_getMaxVelocity.vi $X \mid X$ X SI X SI X SI MaxVelocityConstraint_getMinMaxAccel.vi MaxVelocityConstraint_New.vi Function Prototype Notes MECANUM DRIVE KINEMATICS CONSTRAINT X X Χ MecaDriveKinematicsConstraint_getMaxVelocity.vi MecaDriveKinematicsConstraint_getMinMaxAccel.vi XX X SI MecaDriveKinematicsConstraint New.vi Function Prototype RECTANGULAR REGION CONSTRAINT X XX RectRegionConstraint getRectRegion.vi XX RectRegionConstraint_getMinMaxAccel.vi XX Χ RectRegionConstraint IsPoseInRegion.vi RectRegionConstraint_New.vi VI Name Function Prototype Notes SWERVE DRIVE KINEMATICS CONSTRAINT SwerveDriveKinematicsConstraint_getMaxVelocity.vi public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)
public MinMax XX SwerveDriveKinematicsConstraint_getMinMaxAccel.vi Χ getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond) Newpublic SwerveDriveKinematicsConstraint(final SwerveDriveKinematicsConstraint New.vi X SI Can use cluster pack for now SwerveDriveKinematics kinematics, double maxSpeedMetersPerSecond) Test Routine Vot WPILIB Menu Item Function Prototype Notes

WPILib LabVIEW Math Library – VI Implementation List Revision 2025.0 1/7/2025 – Update april tag definitions, added new field.

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TRAJECTORY CONSTRAINT	X

cu i	ICW IICU.												
Γ	X	X	Χ	Χ		TrajConstraint_GetMaxVelocity.vi							
	X	Χ	Χ	Χ		TrajConstraint_GetMinMaxAccel.vi							
	X	Χ	Χ	Χ		TrajConstraint_GetType.vi							

TRAJECTORY CONSTRAINT (Min Max) X X

Function Prototype X SI X SI Constraint_MinMax_New Constraint_MinMax_New.vi XX Constraint_MinMax_NewMinMax.VI Constraint_MinMax_New

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UTILITY

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

JAVA / C++ WPILIB EQUIVALENT

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
UTIL		\overline{X}	X	X	SI			Util ApproxEqual.vi		
	X	X	X	X				Util_Array_PoseWCurv_to_XY.vi		
	Χ	Χ	Χ	X	SI			Util CalcDist.vi		
	Х	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	Χ	No	I			Util GetTime U32.vi		
	X	Χ	Χ	No	1			Util_GetTime_U64.vi		
	X	Χ	Χ	No	N/A			Util_LibraryGlobals.vi		Global Variables – no block diag.
	Χ	Χ	Χ	X				Util_Trajectory_Absolute_To_Relative.vi		
	Χ	Χ	Χ	X				Util_Trajectory_ReadFile.vi		
	Χ	Χ	Χ	X				Util_Trajectory_to_XY.vi		
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_Config.vi		internal
L	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_OneState.vi		internal
L	X	Χ	Χ	X				Util_Trajectory_WriteFile_PathFinder.vi		
L	X	Χ	Χ	No				Util_Trajectory_WriteFile_PathFinderConfig.vi		internal
	Χ	Χ	Χ	X				Util_Trajectory_WriteFile_Pathweaver.vi		
	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_States.vi		internal
_	Χ	Χ	Χ	No				Util_Trajectory_WriteFile_WayPoints.vi		internal
_	Χ	Χ	Χ	X				Util_Trajectory_WriteFile.vi		
	Χ	X	X	X				Util_TrajectoryState_Meters_To_Inches.vi		
	Χ	Χ	X	X				Util_TrajState_to_DiffDrive_WheelPos.vi		
	Χ	Χ	X	X				Util_DispWaypoint_Eng_To_SI.vi		
	Χ	Χ	X	X				Util_DispWaypoint_To_CubicInput.vi		
-	X	X	X	X				Util_DispWaypoint_To_QuinticInput.vi		
L	X	X	X	X				Util_DispWeightedWaypiont_Eng_To_WeightedWaypoint		
	X	Χ	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	Sample Program	Function Prototype	Notes
CONV X X X X SI	Conv_AngleDegrees_Heading.vi		
X X X X SI	Conv_AngleRadians_Heading.vi		

WPILib LabVIEW Math Library – VI Implementation List Revision 2025.0 1/7/2025 – Update april tag definitions, added n

ded new	field.				
X	X	X	Χ	SI	Conv_Centimeters_Meters.vi
X	X	X	Χ	SI	Conv_Deg_Radians.vi
X	X	X	Χ	SI	Conv_Deg_Rotations.vi
X	X	X	Χ	SI	Conv_Feet_Meters.vi
X	X	X	Χ	SI	Conv_GyroDegrees_Heading.vi
X	X	X	Χ	SI	Conv_Heading_AngleRadians.vi
X	X	X	Χ	SI	Conv_Inches_Meters.vi
X	X	X	Χ	SI	Conv_Kilograms_Pounds.vi
X	X	X	Χ	SI	Conv_Meters_Feet.vi
X	X	X	Χ	SI	Conv_Meters_Inches.vi
X	X	X	Χ	SI	Conv_Pose2d_SI_Eng.vi
X	X	X	Χ	SI	Conv_Pounds_Kilograms.vi
X	X	X	Χ	SI	Conv_Radians_Deg.vi
X	X	X	Χ	SI	Conv_Radians_Rotations.vi
X	X	X	Χ	SI	Conv_Rotations_Deg.vi
X	X	X	Χ	SI	Conv_Rotations_Radians.vi
X	X	X	Χ	SI	Conv_Yards_Meters.vi

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

'====== PATHFINDER UTIL '=======

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	VI Name	Function Prototype	Notes
PATHFINDERUTIL	X	X	X	X				PathfinderUtil_Continuous_Heading_Difference.vi		
	Χ	X	Χ	Χ				PathfinderUtil_OptimizeTrajectoryStates.vi		
	Χ	X	Χ	Χ				PathfinderUtil_ToTrajectory.vi		
	Χ	Χ	Χ	Χ				PathfinderUtil_ToTrajectoryStates.vi		

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STATE SPACE MODEL '======

> Function Prototype Notes DCMotor_GetAndymark9015.vi DCMotor_GetAndymarkAM2235A.vi DC MOTOR X X X SI X SI

WPILib LabVIEW Math Library – VI Implementation List Revision 2025.0 1/7/2025 – Update april tag definitions, added n

ded new	field.						
X	X	Χ	SI		DCMotor_GetAndymarkAM3493.vi		
X	X	X	SI		DCMotor_GetAndymarkRs775_125.vi		
X	X	Χ	SI		DCMotor_GetBag.vi		
X	X	Χ	SI		DCMotor_GetBanebotsRs550.vi		
X	X	Χ	SI		DCMotor_GetBanebotsRs775.vi		
X	X	Χ	SI		DCMotor_GetCIM.vi		
X	X	Χ	SI		DCMotor_GetCurrent.vi		
X	X	Χ	SI		DCMotor_GetFalcon500.vi		
X	X	Χ	SI		DCMotor_GetMiniCIM.vi		
X	X	Χ	SI		DCMotor_GetNEO.vi		
X	X	Χ	SI		DCMotor_GetNEO550.vi		
X	X	Χ	SI		DCMotor_GetRomiBuiltIn.vi		
X	X	Χ	SI		DCMotor_GetSpeed.vi		
X	X	Χ	SI		DCMotor_GetTorque.vi		
X	X	Χ	SI		DCMotor_GetVex775Pro.vi		
X	X	Χ	SI		DCMotor_New.vi		
X	X	Χ	SI		DCMotor_PickMotor.vi		
X	X	Χ	SI		DCMotor_WithReduction.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimi	Test Routine	Ample Program	unction Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM ID	X	X		Χ			LinearSystemId_CreateDCMotorSystem.vi	•				
	X	X		Χ			LinearSystemId_CreateDriveTrainVelocitySystem.vi		Update to use create matrix			
	Χ	Χ		Χ			LinearSystemId_CreateElevatorSystem.vi		Update to use create matrix			
	X	X		Χ			LinearSystemId_CreateFlywheelSystem.vi		Update to use create matrix			
	X	X		Χ			LinearSystemId_CreateSingleJointedArmSystem.vi		Update to use create matrix			
	X	X	Χ	Χ	SI		LinearSystemId_DCMotor_Pack_Model_Params.vi					
	X	X	Χ	Χ	SI		LinearSystemId_DiffDrv_ID_Pack_Model_Params.vi					
	X	X	Χ	Χ	SI		LinearSystemId_DiffDrv_Pack_Model_Params.vi					
	X	X	Χ	Χ	SI		LinearSystemId_Elevator_Pack_Model_Params.vi					
	Χ	X	Χ	Χ	SI		LinearSystemId_FlyWheel_Pack_Model_Params.vi					
	X	X		Χ			LinearSystemId_IdentifyDriveTrainSystem.vi		Update to use create matrix			
	X	X		Χ			LinearSystemId_IdentifyPositionSystem.vi		Update to use create matrix			
	X	X		Χ			LinearSystemId_IdentifyVelocitySystem.vi		Update to use create matrix			
	X	X	X	Χ	SI		LinearSystemId_SngJntArm_Pack_Model_Params.vi					
	l	I	1	i		1						

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STATE SPACE ESTIMATION

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mplemented Documented Vot WPILIB	Wenu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE POSE ESTIMATOR X X	\overline{X}		Ò	DiffDrivePoseEst_AddVisionMeasurement.vi	71			·	
X X	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					
XX	X			DiffDrivePoseEst_Update.vi					
XX	X			DiffDrivePoseEst_UpdateWithTime.vi					
XX	X			DiffDrivePoseEst_VisionCorrect_Callback.vi					
X X	X			DiffDrivePoseEst VisionCorrect Kalman H Callback vi					

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Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. Function Prototype Notes 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 XX 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 $X \mid X \mid X \mid X \mid SI$ DiffDrivePoseEst2 ResetPosition.vi X SI X SI DiffDrivePoseEst2 SetVisionMeasurementStdDevs.vi DiffDrivePoseEst2_Update.vi XX X DiffDrivePoseEst2 UpdateWithTime.vi Function Prototype EXTENDED KALMAN FILTER X X ExtendedKalmanFilter Correct OnlyUY.vi X ExtendedKalmanFilter Correct.vi ust a shell, not functional! ExtendedKalmanFilter_GetP_Single.vi XX Χ ExtendedKalmanFilter_GetP.vi XX X ExtendedKalmanFilter GetXHat Single.vi $X \mid X$ Χ ExtendedKalmanFilter GetXHat.vi ExtendedKalmanFilter New.vi Χ XX X ExtendedKalmanFilter Predict.vi Χ ExtendedKalmanFilter Reset.vi XX Χ ExtendedKalmanFilter SetP.vi XX Χ ExtendedKalmanFilter SetXHat Single.vi ExtendedKalmanFilter_SetXHat.vi Function Prototype VI Name Notes KALMAN FILTER X X KalmanFilter Correct.vi KalmanFilter_GetK KalmanFilter_GetK_Single.vi XX Χ KalmanFilter_GetXHat $X \mid X$ Χ KalmanFilter GetXHaT_Single XX Χ X X X KalmanFilter New.vi KalmanFilter_Predict.vi XX Χ KalmanFilter Reset.vi XX Χ KalmanFilter SetXHat KalmanFilter SetXHat Single X X Χ X Function Prototype Notes KALMAN FILTER LATENCY COMPENSATOR X X KalmanFilterLatencyComp AddObserverState.vi

Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi $X \mid X$ Χ KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi X KalmanFilterLatencyComp_FindClosestMeasurement.vi $X \mid X$ KalmanFilterLatencyComp New.vi Χ KalmanFllterLatencyComp_Observer_New.vi XX XX X KalmanFilterLatencyComp Reset.vi Function Prototype Notes **MECANUM DRIVE POSE ESTIMATOR** MecaDrivePoseEst AddVisionMeasurement StdDev.vi MecaDrivePoseEst AddVisionMeasurement.vi MecaDrivePoseEst GetEstimatedPosition.vi X XX No MecaDrivePoseEst Kalman F Callback.vi XX No MecaDrivePoseEst Kalman H Callback.vi MecaDrivePoseEst New.vi $X \mid X$ X MecaDrivePoseEst ResetPosition.vi XX Χ X MecaDrivePoseEst_SetVisionMeasurementStdDevs.vi XX Χ MecaDrivePoseEst Update.vi XX Χ MecaDrivePoseEst UpdateWithTime.vi MecaDrivePoseEst VisionCorrect Callback.vi $X \mid X$ No XX No MecaDrivePoseEst VisionCorrect Kalman H Callback.vi Function Prototype VI Name Notes MECANUM DRIVE POSE ESTIMATOR 2 X X MecaDrivePoseEst2 AddVisionMeasurement.vi X X X NO SI MecaDrivePoseEst2 BufferDuration.vi MecaDrivePoseEst2 Execute.vi $X \mid X \mid X \mid X$ XX MecaDrivePoseEst2 GetEstimatedPosition.vi X SI X X X No SI MecaDrivePoseEst2 InterpRecord ExtractFromVar.vi XX MecaDrivePoseEst2 InterpRecord Interp.vi No XX MecaDrivePoseEst2 InterpRecord New.vi No SI MecaDrivePoseEst2_New.vi XX X MecaDrivePoseEst2 Pack Config.vi X X X X SI SI MecaDrivePoseEst2 ResetPosition.vi XX X SI MecaDrivePoseEst2_SetVisionMeasurementStdDevs.vi XX X MecaDrivePoseEst2 Update.vi MecaDrivePoseEst2 UpdateWithTime.vi $X \mid X$ VI Name Function Prototype Notes SWERVE DRIVE POSE ESTIMATOR SwerveDrivePoseEst AddVisionMeasurement StdDev.vi X X SwerveDrivePoseEst AddVisionMeasurement.vi Χ SwerveDrivePoseEst GetEstimatedPosition.vi $X \mid X$ Χ X X X X X SwerveDrivePoseEst Kalman F Callback.vi SwerveDrivePoseEst_Kalman_H_Callback.vi XX Χ SwerveDrivePoseEst New.vi XX Χ SwerveDrivePoseEst ResetPosition.vi SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi $X \mid X$ X X SwerveDrivePoseEst Update.vi X X SwerveDrivePoseEst_UpdateWithTime.vi XX Χ SwerveDrivePoseEst VisionCorrect Callback.vi XX Χ SwerveDrivePoseEst VisionCorrect Kalman H Callback.vi

Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. 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 SI X X X No SI SwerveDrivePoseEst2 InterpRecord ExtractFromVar.vi SwerveDrivePoseEst2 InterpRecord Interp.vi No XX 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 X SI X SI XX SwerveDrivePoseEst2 SetVisionMeasurementStdDevs.vi $X \mid X$ X SwerveDrivePoseEst2_Update.vi SwerveDrivePoseEst2_UpdateWithTime.vi $X \mid X$ X VI Name Function Prototype Notes UNSCENTED KALMAN FILTER X X UnscentedKalmanFilter Correct FuncGroup.vi XX Х UnscentedKalmanFilter Correct OnlyUY.vi XX Χ UnscentedKalmanFilter Correct OnlyUYR.vi UnscentedKalmanFilter_Correct.vi XX X UnscentedKalmanFilter_GetP_Single.vi XX X X UnscentedKalmanFilter GetP.vi Χ UnscentedKalmanFilter GetXHat Single.vi XX Х UnscentedKalmanFilter GetXHat.vi XX X UnscentedKalmanFilter New Default.vi UnscentedKalmanFilter_New_FuncGroup.vi $X \mid X$ Χ X UnscentedKalmanFilter New.vi UnscentedKalmanFilter_Predict.vi XX Χ UnscentedKalmanFilter Reset.vi XX Χ UnscentedKalmanFilter SetP.vi UnscentedKalmanFilter_SetXHat_Single.vi $X \mid X$ Χ UnscentedKalmanFilter_SetXHat.vi $X \mid X$ Χ UnscentedKalmanFilter Transform.vi '----STATE SPACE CONTROL '======== VI Name Function Prototype Notes CONTROL AFFINE PLANT INVERSION FEEDFORWARD Menu Item Function Prototype Notes

WPILib LabVIEW Math Library - VI Implementation List Revision 2025.0 1/7/2025 – Update april tag definitions, added new field.

DIFFERENTIAL DRIVE ACCELERATION LIMITER X X DiffDrvAccelLimit Calculate.vi $X \mid X \mid$ Χ DiffDrvAccelLimit New.vi VI Name Function Prototype Notes IMPLICIT MODEL FOLLOWER X ImplModelFollow Calculate.vi Χ X X ImplModelFollow GetU.vi XX Χ ImplModelFollow GetU Single.vi XX Χ Χ ImplModelFollow_New.vi ImplModelFollow_New_Plant.vi $X \mid X$ Χ X ImplModelFollow Reset.vi X 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 X LinearPIntInvFF GetUff Single.vi LinearPIntInvFF_GetUff.vi Χ XX Χ LinearPIntInvFF New Plant.vi LinearPIntInvFF New.vi $X \mid X$ Χ LinearPIntInvFF Reset Initial.vi XX Χ LinearPIntInvFF Reset Zero.vi Function Prototype Notes LINEAR QUADRATIC REGULATOR X X LinearQuadraticRegulator_Calculate_NextR.vi XX Χ LinearQuadraticRegulator Calculate.vi LinearQuadraticRegulator_GetK_Single.vi NOT ORIGINAL. XX Χ X X X X X LinearQuadraticRegulator GetK.vi X LinearQuadraticRegulator_GetR_Single.vi XX X LinearQuadraticRegulator GetR.vi XX Χ LinearQuadraticRegulator GetU Single.vi LinearQuadraticRegulator_GetU.vi $X \mid X$ X LinearQuadraticRegulator LatencyCompensate.vi Routine exists, but it only has nterger raise matrix to power. XX Χ LinearQuadraticRegulator_New_ELMS.vi X LinearQuadraticRegulator New N.vi LinearQuadraticRegulator New Raw.vi XX X Χ LinearQuadraticRegulator_New_SystemELMS.vi XX Χ LinearQuadraticRegulator New.vi LinearQuadraticRegulator Reset.vi Χ $X \mid X$ Function Prototype Notes VI Name

LINEAR SYSTEM X X

XX

X

LinearSystem_CalculateX.vi LinearSystem_CalculateY.vi WPILib LabVIEW Math Library - VI Implementation List Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. LinearSystem GetA.vi XX X SI LinearSystem_GetAElement.vi LinearSystem GetB.vi XX X SI XX X SI LinearSystem GetBElement.vi <u>X</u> SI LinearSystem GetC.vi XX X SI LinearSystem GetCElement.vi $X \mid X$ X SI LinearSystem GetD.vi LinearSystem GetDElement.vi $X \mid X$ X SI X SI LinearSystem New.vi XX Not WPILIB Item Function Prototype Notes LINEAR SYSTEM LOOP X X Χ LinearSystemLoop ClampInput.vi LinearSystemLoop_Correct.vi $X \mid X$ X LinearSystemLoop_DCMotor_Execute.vi $X \mid X \mid X \mid X$ X X X X SI LinearSystemLoop DCMotor Pack Ctrl.vi X X X X LinearSystemLoop DiffDrv Execute.vi X X X X SI LinearSystemLoop DiffDrv Pack Ctrl.vi X | X | X | X LinearSystemLoop_Elevator_Execute.vi LinearSystemLoop_Elevator_Pack_Ctrl.vi X X X X SI LinearSystemLoop Execute.vi $X \mid X \mid X \mid X$ X X X X LinearSystemLoop FlyWheel Execute.vi X X X X SI LinearSystemLoop_FlyWheel_Pack_Ctrl.vi LinearSystemLoop_GetClampFunction.vi XX X LinearSystemLoop_GetController.vi XX LinearSystemLoop_GetError_Single.vi Χ Χ LinearSystemLoop GetError.vi XX Χ LinearSystemLoop_GetFeedForward.vi XX X LinearSystemLoop GetNextR Single.vi LinearSystemLoop GetNextR.vi $X \mid X$ Χ XX LinearSystemLoop_GetObserver.vi Χ X LinearSystemLoop GetU Row.vi LinearSystemLoop_GetU.vi XX Χ LinearSystemLoop GetXHat Single.vi XX Χ LinearSystemLoop GetXHat.vi LinearSystemLoop_New_BBB LinearSystemLoop_New_LinearSystem_ClampFunc LinearSystemLoop New LinearSystem ClampVal.vi X XX LinearSystemLoop_New.vi X X X X SI LinearSystemLoop Pack Ctrl Params.vi LinearSystemLoop Predict.vi $X \mid X$ X XX LinearSystemLoop_Reset.vi LinearSystemLoop_SetClampFunction.vi LinearSystemLoop_SetNextR_Some.vi LinearSystemLoop_SetNextR.vi XX Χ LinearSystemLoop SetXHat Single.vi LinearSystemLoop_SetXHat.vi LinearSystemLoop_SngJntArm_Execute.vi $X \mid X \mid X \mid X$ X X X X SI LinearSystemLoop SngJntArm Pack Ctrl.VI opt Not WPILIB ltem VI Name Function Prototype Notes LTV DIFFERENTIAL DRIVE CONTROLLER X X X SI LTVDiffDriveCtrl AtReference.vi LTVDiffDriveCtrl_Calculate_TrajState.vi $X \mid X \mid$ X XX Χ LTVDiffDriveCtrl Calculate.vi

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

X X X X

X

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LTVDiffDriveCtrl Execute TrajState.vi

LTVDiffDriveCtrl Execute.vi

LTVDiffDriveCtrl New.vi

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Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. LTVDiffDriveCtrl Pack Ctrl Params.vi X X X X SI X X X X SI LTVDiffDriveCtrl_Pack_Model_Params.vi X X X X SI X X X X SI LTVDiffDriveCtrl Pack Tolerance.vi LTVDiffDriveCtrl SetTolerance.vi Function Prototype VI Name Notes LTV UNICYCLE CONTROLLER X X X SI X LTVUnicycleCtrl_AtReference.vi LTVUnicycleCtrl_Calculate_TrajState.vi $X \mid X$ X X XX LTVUnicycleCtrl_Calculate.vi Χ X LTVUnicycleCtrl Execute.vi LTVUnicycleCtrl_Execute_TrajState.vi XX X X LTVUnicycleCtrl_New.vi LTVUnicycleCtrl_Pack_Model_Params.vi X X X X SI X X X X SI LTVUnicycleCtrl Pack Tolerance.vi X SI X LTVUnicycleCtrl_SetEnabled.vi XX X SI X LTVUnicycleCtrl_SetTolerance.vi '======== STATE SPACE UTILITIES '======== Function Prototype Notes CALLBACK HELPER X X X X CallbackHelp MatrixMinus.vi CallbackHelp_MatrixMult_CoerceSizeB.vi $X \mid X \mid X \mid X$ CallbackHelp MatrixMult.vi X X X X CallbackHelp MatrixPlus.vi $X \mid X \mid X \mid X$ Function Prototype Notes DISCRETIZATION X X X X Discretization DiscretizeA.vi Χ Discretization DiscretizeAB.vi $X \mid X$ X X X Discretization_DiscretizeABTaylor.vi Χ Χ Χ Χ Discretization DiscretizeAQ.vi X XX Discretization_DiscretizeAQTaylor.vi X XX Χ Discretization DiscretizeR.vi Function Prototype Notes STATE SPACE UTIL X X No StateSpaceUtil_Check_Stabalizable.vi Internal routine StateSpaceUtil_ClampInputMaxMagnitude.vi Routine exists, it is just a shell XX Χ StateSpaceUtil IsDetectable.vi XX Χ StateSpaceUtil IsStabalizable.vi StateSpaceUtil MakeCostMatrix.vi XX X Χ StateSpaceUtil_MakeCovarianceMatrix.vi $X \mid X$ X X

WPILib LabVIEW Math Library - VI Implementation List Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. StateSpaceUtil MakeWhiteNoiseVector.vi $X \mid X$ Χ StateSpaceUtil NomalizeInputVector.vi X StateSpaceUtil PoseTo3dVector.vi XX StateSpaceUtil PoseTo4dVector.vi X XX StateSpaceUtil PoseToVector.vi SIMULATION '======== Function Prototype Notes BATTERY SIM X X BatterySim CalculateDefaultBatteryLoadedVoltage.vi X SI BatterySim_CalculateLoadedVoltage.vi X SI $X \mid X$ X X X X SI BatterySim Execute.vi VI Name Function Prototype Notes DC MOTOR SIM $\begin{array}{c|c} X & X \\ \hline X & X \\ \hline \end{array}$ X DCMotorSim Execute.vi DCMotorSim_getAngularPositionRad.vi XX Χ DCMotorSim_getAngularPositionRotations.vi DCMotorSim getAngularVelocityRadPerSec.vi $X \mid X$ Χ DCMotorSim_getAngularVelocityRPM.vi XX Χ X DCMotorSim GetCurrentDrawAmps.vi DCMotorSim_New_MOI.vi XX X DCMotorSim New Plant.vi X X X X SI DCMotorSim Pack Simulation Params.vi DCMotorSim_SetInputVoltage.vi $X \mid X$ Χ DCMotorSim_Update.vi VI Name Function Prototype Notes DIFFERENTIAL DRIVE TRAIN SIM X X DiffDriveTrainSim_ClampInput.vi XX Χ DiffDriveTrainSim CreateKitbotSim EstMass.vi DiffDriveTrainSim CreateKitbotSim EstMassMOI.vi XX Χ DiffDriveTrainSim_CreateKitbotSim.vi $X \mid X$ X XX X DiffDriveTrainSim Execute.vi DiffDriveTrainSim GetCurrentDrawAmps.vi XX X DiffDriveTrainSim GetCurrentGearing.vi XX Χ DiffDriveTrainSim GetDynamics.vi XX Χ DiffDriveTrainSim_GetHeading.vi DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi XX Χ X DiffDriveTrainSim GetLeftPositionMeters.vi XX DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi Χ XX X DiffDriveTrainSim GetOutput Single.vi DiffDriveTrainSim GetPose.vi XX Χ DiffDriveTrainSim_GetRightCurrentDrawAmps.vi $X \mid X$ Χ

DiffDriveTrainSim_GetRightPositionMeters.vi

DiffDriveTrainSim GetState Single.vi

DiffDriveTrainSim New Mass MOI.vi

DiffDriveTrainSim GetState.vi DiffDriveTrainSim_KitBotWheelSize.vi

DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi

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 $X \mid X$

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2025.0 1/7/2025 – Update april tag definitions, ac							_		
	XX	X		DiffDriveTrainSim_New.vi					
	X X	X		DiffDriveTrainSim_Pack_Model_Params.vi					
	X X	X		DiffDriveTrainSim_Pack_Simulation_Params.vi					
		Χ		DiffDriveTrainSim_SetCurrentGearing.vi					
	XX	X		DiffDriveTrainSim_SetInputs.vi					
		Χ		DiffDriveTrainSim_SetPose.vi					
		Х		DiffDriveTrainSim_SetState.vi					
	XX	X		DiffDriveTrainSim_ToughBoxMiniGearRatio.vi					
	XX	Х		DiffDriveTrainSim ToughBoxMiniMotor.vi					
		Х		DiffDriveTrainSim_Update.vi					
	lemented umented WPILIB	nu Item cution Optimized	t Routine	nple Program			le Review	t Program	or Checkina
	<i>t</i> 6 4	Menu Execu	Test	S VI Name	Function Prototype	Notes	Code	est est	.2
EL EVATOR		<u>≥</u> Ш			Function Prototype	Notes		<u> </u>	Ш
ELEVATOR		X		ElevatorSim_Execute.vi					
		X		ElevatorSim_GetCurrentDraw.vi					
	X X	X		ElevatorSim_GetPositionMeters.vi					
	XX	Х		ElevatorSim_GetVelocityMetersPerSecond.vi					
		Χ		ElevatorSim_HasHitLowerLimit.vi					
	XX	X		ElevatorSim_HasHitUpperLimit.vi					
				ElevatorSim_New_LinSys_NoNoise.vi					
				ElevatorSim_New_LinSys.vi					
				ElevatorSim_New_NoNoise.vi					
		Х		ElevatorSim_New.vi					
	XXX			ElevatorSim Pack Simulation Params.vi					
	XXXX	No		ElevatorSim_RKF45_Func.vi					
		X		ElevatorSim_SetInputVoltage.vi					
	XX	X		ElevatorSim_SetState.vi			+		
	^ ^	^			1	1			
		V	+			Mooded because this decent			
	X X X	X		ElevatorSim_Update.vi		Needed because this doesn't			
		X		ElevatorSim_Update.vi		Needed because this doesn't extend.			
	XX	X		ElevatorSim_Update.vi ElevatorSim_UpdateX.vi					
	X X X X	X		ElevatorSim_Update.vi					
FLYWHEEL	X	X X Wenu Item X X X X X X X X X X X X X X X X X X X		ElevatorSim_Update.vi ElevatorSim_UpdateX.vi ElevatorSim_WouldHitLowerLimit.vi ElevatorSim_WouldHitUpperLimit.vi	Function Prototype		Code Review	Test Program	Error Checkina
FLYWHEEL LINEAR SYSTEM	X	X X X X X X X X X X X X X X X X X X X	Test	ElevatorSim_Update.vi ElevatorSim_WouldHitLowerLimit.vi ElevatorSim_WouldHitUpperLimit.vi ElevatorSim_WouldHitUpperLimit.vi ElevatorSim_WouldHitUpperLimit.vi VI Name FlyWheelSim_Execute.vi FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetCurrentDrawAmps FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise FlyWheelSim_New_LinSys_MOI_NoNoise FlyWheelSim_New_LinSys_NoNoise FlyWheelSim_New_MOI.vi FlyWheelSim_Pack_Simulation_Params.vi FlyWheelSim_SetInput.vi FlyWheelSim_SetState.vi FlyWheelSim_Update.vi	Function Prototype Function Prototype	Notes Future Future		Test Program	Error Checking
	Implemented X X Implemented Documented X X X X Not WPILIB X X Not WPILIB	Menu Item X X X X	Routine	ElevatorSim_UpdateX.vi ElevatorSim_WouldHitLowerLimit.vi ElevatorSim_WouldHitUpperLimit.vi ElevatorSim_WouldHitUpperLimit.vi ElevatorSim_WouldHitUpperLimit.vi VI Name FlyWheelSim_Execute.vi FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetAngularVelocityRadPerSec.vi FlyWheelSim_GetCurrentDrawAmps FlyWheelSim_New_LinSys FlyWheelSim_New_LinSys_MOI_NoNoise FlyWheelSim_New_LinSys_MOI_NoNoise FlyWheelSim_New_LinSys_NoNoise FlyWheelSim_New_MOI.vi FlyWheelSim_Pack_Simulation_Params.vi FlyWheelSim_SetInput.vi FlyWheelSim_SetState.vi FlyWheelSim_Update.vi		Notes Future Future Future Future	Review	Program	Error Checking

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iaca new	noid.							
X	X		X		LinearSystemSim_GetOutput.vi			
X	X		X		LinearSystemSim_New			
					LinearSystemSim_New_NoNoise.vi			
X	X		X		LinearSystemSim_SetInput_Array.vi	Doesn't use clamp?		
X	X		X		LinearSystemSim_SetInput_Single.vi			
X	X		X		LinearSystemSim_SetInput.vi			
X	X		X		LinearSystemSim_Setstate.vi			
X	X		X		LinearSystemSim_Update.vi			
X	X		No		LinearSystemSim_UpdateX.vi			
X	X	X	No		LinearSystemSim_UpdateY.vi			

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
SINGLE JOINT ARM SIM	Χ	Χ		Χ			SngJntArmSim_EsitmateMOI.vi					
	X	X	Χ	Χ			SngJntArmSim_Execute.vi					
	X	Χ		Χ			SngJntArmSim_GetAngleRads.vi					
	X	Χ		Χ			SngJntArmSim_GetCurrentDraw.vi					
	X	X		Χ			SngJntArmSim_GetVelocityRadsPerSec.vi					
	X	X		X			SngJntArmSim_HasHitLowerLimit.vi					
	X	X		X			SngJntArmSim_HasHitUpperLimit.vi					
	Χ	X		X			SngJntArmSim_New.vi					
	Χ	X	Χ	Χ	SI		SngJntArmSim_Pack_Simulation_Params.vi					
	Χ	X		No			SngJntArmSim_Rkf45_Func.vi					
	Χ	X		Χ			SngJntArmSim_SetInputVoltage.vi					
	Χ	X		X			SngJntArmSim_SetState.vi					
	Χ	X		X			SngJntArmSim_Update.vi					
	Χ	X		Χ			SngJntArmSim_UpdateX.vi					
	Χ	Χ		Χ			SngJntArmSim_WouldHitLowerLimit.vi					
	Χ	X		Χ			SngJntArmSim_WouldHitUpperLimit.vi					

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

> MAT BUILDER X X Documented VI Name Function Prototype Notes MatBuilder_Create.vi MatBuilder_Fill.vi XX

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX	Χ	X		Χ	SI		Matrix_AssignBlock.vi					
	Χ	X		Χ	SI		Matrix_Block.vi					
							Matrix_ChangeBoundsUnchecked.vi					
	Χ	X		Χ	SI		Matrix_Create.vi					
							Matrix_Det.vi					
	Χ	X		Χ	SI		Matrix_Diag.vi					
							Matrix_Div_Scalar.vi		labview has function			
							Matrix_ElementPower.vi					
	Χ	X		Χ	SI		Matrix_ElementSum.vi					
							Matrix_ElementTimes.vi					
							Matrix_Equals.vi					
	Χ	X		Χ	1		Matrix_Exp.vi					

Revision 2025.0	1/7/2025 - Update april ta	g definitions, added new	/ field.				
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V V OI Matrix FritanatOnly man Vantanati				
X X X SI Matrix_ExtractColumnVector.vi				
X X X SI Matrix_ExtractFrom.vi				
Matrix_ExtractMatrix.vi				
X X X S/ Matrix_ExtractRowVector.vi				
X X X S/ Matrix_Fill.vi				
Matrix_Get.vi	labview has function			
X X X I Matrix Ident.vi	WPILIB calls this EYE			
Matrix Inv.vi				
X X X S/ Matrix_IsEqual.vi				
Matrix IsIdentical.vi				
X X X I Matrix_LLTDecompose.vi				
Matrix Max.vi				
Matrix_MaxAbs.vi				
Matrix_Mean.vi				
Matrix_MinInternal.vi				
Matrix_Minus_Matrix.vi				
Matrix_Minus_Scalar.vi				
X X X I Matrix_NormF.vi				
Matrix_NormIndP1.vi				
Matrix_Plus_Matrix.vi				
Matrix Plus Scalar.vi				
X X X I Matrix_Pow.vi	THIS NEEDS WORK!!!!			
X X SI Matrix_SetColumn.vi				
X X SI Matrix_SetRow.vi THERE ARE LOTS OF OTHER MATRIX FUNCTION	ONS THAT			
SHOULD BE INCLUDED HERE FOR ISOLATION.				
Matrix_Solve.vi				
Matrix_Times_Matrix.vi				
Matrix_Times_Scalar.vi				
Matrix_Trines_ocalar.vi				
X X X SI Matrix_Transpose.vi				
X X X X Matrix_WithinTolerance.vi				
emented umented WPILIB u Item cution Optimizec Routine iple Program		e Review	. Program	r Checking
SIMPLE MATRIX X X X S/ S/ SimpleMatrix_ExtractMatrix.vi	Notes NOTE Matrix also has an ExtractMatrix with different calling parameters YUK.	Code Review	Test Program	Error Checking
SIMPLE MATRIX X X SI SimpleMatrix_ExtractMatrix.vi	NOTE Matrix also has an ExtractMatrix with different calling		Program	or Checking Error Checking
SIMPLE MATRIX X X SI SimpleMatrix_ExtractMatrix.vi	NOTE Matrix also has an ExtractMatrix with different calling	Code Review		
SIMPLE MATRIX X X X S/ S/ SimpleMatrix_ExtractMatrix.vi	NOTE Matrix also has an ExtractMatrix with different calling parameters YUK.		Program	
SIMPLE MATRIX X X X S/ S/ SimpleMatrix_ExtractMatrix.vi	NOTE Matrix also has an ExtractMatrix with different calling parameters YUK.		Program	
SIMPLE MATRIX X	NOTE Matrix also has an ExtractMatrix with different calling parameters YUK.		Program	
SIMPLE MATRIX X	NOTE Matrix also has an ExtractMatrix with different calling parameters YUK.		Program	
SIMPLE MATRIX X X X X SI SimpleMatrix_ExtractMatrix.vi SimpleMatrix_ExtractMatrix.vi SimpleMatrix_ExtractMatrix.vi Function Prototype WATRIX HELPER X X X X SI MatrixHelper_CooerceSize.vi X X X X X SI MatrixHelper_MultCooerceBSize.vi MatrixHelper_Zero.vi	NOTE Matrix also has an ExtractMatrix with different calling parameters YUK.		Program	
SIMPLE MATRIX X	NOTE Matrix also has an ExtractMatrix with different calling parameters YUK. Notes	Code Review	m Test Program	Checking Error Checking
Simple Matrix	NOTE Matrix also has an ExtractMatrix with different calling parameters YUK. Notes	Code Review	m Test Program	Checking Error Checking
Simple Matrix	NOTE Matrix also has an ExtractMatrix with different calling parameters YUK. Notes	Code Review	m Test Program	Checking Error Checking
SIMPLE MATRIX X X X S	NOTE Matrix also has an ExtractMatrix with different calling parameters YUK. Notes	Code Review	m Test Program	Checking Error Checking
Simple Matrix X	NOTE Matrix also has an ExtractMatrix with different calling parameters YUK. Notes	Code Review	m Test Program	Checking Error Checking
Simple Matrix	NOTE Matrix also has an ExtractMatrix with different calling parameters YUK. Notes	Code Review	m Test Program	Checking Error Checking

WPILib LabVIEW Math Library – VI Implementation List Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. VecBuilder 7x1Fill.vi XX X SI X SI XX VecBuilder_8x1Fill.vi VecBuilder 9x1Fill.vi VecBuilder 10x1Fill.vi X X X X SI VecBuilder_ArrayBy1Fill.vi Function Prototype VI Name Notes VECTOR X X X SI Vector Dot.vi Vector_Norm.vi $X \mid X$ Si '======== MATH '======== Function Prototype Notes AngleStats_AngleAdd_CallbackHelp.vi
AngleStats_AngleAdd.vi ANGLE STATISTICS X X X X X AngleStats_AngleMean_CallbackHelp.vi AngleStats_AngleMean.vi X X X X X XX XIIX AngleStats_AngleResidual_CallbackHelp.vi $X \mid X \mid X \mid X \mid X$ AngleStats AngleResidual.vi Function Prototype Notes MATH UTILITY X X X SI MathUtil_AngleModulus.vi XX X SI MathUtil_ApplyDeadband.vi MathUtil Clamp Int.vi XX X SI MathUtil_Clamp.vi XX X SI X SI X Si XX MathUtil_InputModulus.vi MathUtil_Interpolate.vi Function Prototype Notes MerweScSigPts_ComputeWeights.vi MERWE SCALED SIGMA POINTS $X \cup X$ XI MerweScSigPts_GetNumSigmas.vi MerweScSigPts_GetWc_Single.vi MerweScSigPts_GetWc.vi $X \mid X$ X SI XX X SI X SI X SI XX MerweScSigPts_GetWm_Single.vi X SI XX MerweScSigPts GetWm.vi MerweScSigPts_New_Default.vi $X \mid X$ X I XX XI MerweScSigPts_New.vi MerweScSigPts_SigmaPoints.vi

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Revision 2025.0 1/7/2025 – Update april tag definitions, added new field. Test Routine Menu Item 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 Χ NumIntegrate_Rk4_Dbl_X.vi XX X NumIntegrate_Rk4_Mat_X_U.vi NumIntegrate_Rk4_Mat_X.vi $X \mid X$ Χ No SI NumIntegrate_Rkdp_Func_A.vi XX No SI NumIntegrate Rkdp Func B1.vi XX No SI NumIntegrate Rkdp Func B1B2.vi XX No SI NumIntegrate_Rkdp_Func_B2.vi Numintegrate_Rkdp_Impl.vi $X \mid X$ No I New replacement for RKF45 NumIntegrate_RKDP_Mat_X_U.vi Χ NumIntegrate_Rkf45_Func_A.vi No SI XX No SI NumIntegrate_Rkf45_Func_B1.vi NumIntegrate_Rkf45_Func_B1B2.vi $X \mid X$ No SI NumIntegrate_Rkf45_Func_B2.vi No SI $X \mid X$ 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 $X \mid X \mid X \mid X \mid I \mid$ Function Prototype VI Name Notes RUNGE KUTTA TIME VARYING X XNo RungeKuttaTimeVarying_RK4_Mat_T_Y.vi VI Name Function Prototype Notes NUMERICAL JACOBIAN X X Χ NumJacobian U.vi NumJacobian_X.vi XX VI Name Function Prototype Notes RICCATI X X X Riccati Check Detectable.vi Routine exists, it is just a shell Riccati Check Stabilizable.vi Not really done !!! X $X \mid X$ Riccati DARE Choose.vi Intended to allow DARE method X X X X X Riccati DARE Iterate.vi

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Riccati_DARE_StructDoubling.vi
Riccati_DARE_N.vi
Riccati_DARE.vi
Riccati_Input_Check.vi X

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OMPUTER VISION UTILITIES		X		X				CompVisionUtil_CalculateDistanceToTarget.vi				
	X	X		X				CompVisionUtil_EstimateCameraToTarget.vi CompVisionUtil_EstimateFieldToCamera.vi				
	X	X		X				CompVisionUtil_EstimateFieldToRobot.vi				
	X	X		X				CompVisionUtil_EstimateFieldToRobot_Alt.vi				
		Χ		Χ				CompVisionUtil_ObjectToRobotPose.vi				
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APRIL TAG	X	X	X	X	SI SI			AprilTag_Equals.vi AprilTag_GetAll.vi				
	X	X	^	\hat{x}	SI			AprilTag_New.vi				
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	Implemented	Documented	Not WPILIB	Menu Item	Execution	Test Routine		VI Name	Function Prototype	Notes	Code Review	Test Program
APRIL TAG FIELD LAYOUT	X	Χ	Not WPILIB	Χ	ଦ Execution	Test Routine		AprilTagFieldLayout_GetField.vi	Function Prototype	Notes	Code Review	Test Program
APRIL TAG FIELD LAYOUT	X	X	Not WPILIB	X	ର ଓ Execution	Test Routine		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi	Function Prototype	Notes	Code Review	Test Program
APRIL TAG FIELD LAYOUT	X	Χ	Not WPILIB	X X X	IS IS Execution	Test Routine		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi	Function Prototype	Notes	Code Review	Test Program
APRIL TAG FIELD LAYOUT	X X X X	X X X X	Not WPILIB	X X X X	ID ID ID ID Execution	Test Routine		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi	Function Prototype	Notes	Code Review	Test Program
APRIL TAG FIELD LAYOUT	X X X X X	X X X X X	Not WPILIB	X X X X X	IS Execution	Test Routine		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi	Function Prototype	Notes	Code Review	Test Program
APRIL TAG FIELD LAYOUT	X X X X X X	X X X X X X	Not WPILIB	X X X X X X	IS IS Execution	Test Routine		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi AprilTagFieldLayout_New2023.vi	Function Prototype	Notes	Code Review	Test Program
APRIL TAG FIELD LAYOUT	X X X X X X X	X X X X X X	Not WPILIB	X X X X X X	IS IS Execution	Test Routine		AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi AprilTagFieldLayout_New2023.vi AprilTagFieldLayout_New2024.vi AprilTagFieldLayout_New2024.vi	Function Prototype	Notes	Code Review	Test Program
APRIL TAG FIELD LAYOUT	X	X X X X X X X X	Not WPILIB	X X X X X X X X	IS I			AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi AprilTagFieldLayout_New2023.vi AprilTagFieldLayout_New2024.vi AprilTagFieldLayout_New2025.vi AprilTagFieldLayout_New2025.vi	Function Prototype		Code Review	Test Program
APRIL TAG FIELD LAYOUT	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 no	12 15 16 17 17 18 18 18 18 18 18			AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi AprilTagFieldLayout_New2023.vi AprilTagFieldLayout_New2024.vi AprilTagFieldLayout_New2025.vi AprilTagFieldLayout_New2025.vi AprilTagFieldLayout_New2025.vi AprilTagFieldLayout_NewSelect.vi AprilTagFieldLayout_NewSelect.vi AprilTagFieldLayout_NewSelect OLD	Function Prototype	Notes polymorphic VI	Code Review	Test Program
APRIL TAG FIELD LAYOUT	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	IS I			AprilTagFieldLayout_GetField.vi AprilTagFieldLayout_GetOriginPosition.vi AprilTagFieldLayout_GetTagPose.vi AprilTagFieldLayout_GetTags.vi AprilTagFieldLayout_New.vi AprilTagFieldLayout_New2022.vi AprilTagFieldLayout_New2023.vi AprilTagFieldLayout_New2024.vi AprilTagFieldLayout_New2025.vi AprilTagFieldLayout_New2025.vi AprilTagFieldLayout_New2025.vi AprilTagFieldLayout_NewSelect.vi	Function Prototype		Code Review	Test Program

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ag definitions, added	d new f	field.			þ							
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
FIELD DISPLAY	X	X	Χ	X			X FieldDisp_Element_Disp.vi					
	X	X	Χ	Χ			X FieldDisp_Element_Prepare.vi					
	X		Χ	no			FieldDisp_Element_Rotate.vi					
	X		Χ	no			FieldDisp_Element_Rotate_Init.vi					
	X		Χ	no			FieldDisp_Field_Crop_and_Scale.vi					
	X	X	Χ	Χ			X FieldDisp_Field_Disp.vi					
	X	X	Χ	Χ			X FieldDisp_Field_Selector_Prepare.vi					
	X		Χ	no			FieldDisp_Get_Field_Info.vi					
	X		Χ	no			FieldDisp_Open_Field_Info_File.vi					
	Χ		Χ	no			FieldDisp_Read_Field_Pic.vi					
	X		Χ	no			FieldDisp_Read_Image_File.vi				·	
			1									

'======= COMMUNICATIONS '=======

> Function Prototype Notes NetworkUDP_Close.vi NetworkUDP_Send.vi

'========== T/OF DEFINITIONS										
TYPE DEFINITIONS										
' 	TypeDef		2 Z	X Not N	X Menu Item X Execution Optimized	4	VI Name Function Prototype Notes AprilTag.ctl	Code Review	Test Program	Error Checking
		Z			X N/.		AprilTagFieldLayout,ctl	_		
	-	Z Z			X N/.		AprilTagFieldLayoutOriginPosition_ENUM.ctl AprilTagFields ENUM.ctl	-		
	-				X N/.		April TagPoseEstimate.ctl	-		
				_	X N/		ARM FF.CTL			
	-				X N/		 BANG BANG.CTL			
		ı		X	X N/	4	BICon-Matrix_FUNC_TYPE.CTL NOT USED. Should this be deleted or abandoned???			
					X N/.		CALLBACK_FUNC_TYPE.CTL			
					X N/.		CHASSIS_SPEEDS.CTL			
					X N/.		CONTRAINED_STATE.CTL			
		Z	Z		X N/.		COORDINATE_AXIS.CTL			
	-	Z			X N/.		COORDINATE_SYSTEM.CTL			
		Z	Ζ	X	X N/.		DCMOTOR_SIM.CTL	-		
		7	Z	Z	X N/.		DCMOTOR_SIM_MODEL_PARAMS.CTL OBSOLETE - Removed DCMOTOR_SIM_SIMULATION_PARAMS.CTL	-		
	-				X N/.		DCMOTOR_SIM_SIMULATION_PARAMIS.CTL DCMOTOR TYPES ENUM.CTL	-		
	-				X N/.		DCMOTOR.CTL DCMOTOR.CTL	-		
	<u> </u>	Z			X N/.		DEBOUNCER TYPE ENUM.Ctl	1		
	-				X N/.		DEBOUNCER.CTL DEBOUNCER.CTL	†		
					X N/.		DIFF DRIVE ACCEL LIMIT.CTL	1		
					X N/.		DIFF DRIVE KINEMATICS.CTL	1		
	_						· -	_		

led new f	ield.					
Z	Ζ	X	Χ	N/A	DIFF DRIVE Kitbot WheelSize ENUM.ctl	
Z	Z	X		N/A	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	
		X	X	N/A		
Z	Z				DIFF_DRIVE_POSE_EST2_CONFIG.CTL	
Z	Ζ	X	No	N/A	DIFF_DRIVE_POSE_EST2_INTERP_RECORD.CTL	
Z	Ζ	Χ		N/A	DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl	
Z	Z	X	X	N/A	DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl	
Z		Ζ	X	N/A	DIFF DRIVE SIM MODEL PARAMS	
Z		Ζ	Χ	N/A	DIFF DRIVE SIM SIMULATION PARAMS.CTL	
Z	Ζ	X	X	N/A	DIFF DRIVE TRAIN SIM STATE ENUM.CTL	
Z	Z	X	X	N/A	DIFF DRIVE TRAIN SIM.ctl	
				NA NA		Mac LITH MAYDOINT VI
Z	Z	X	X		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		~		NA	DrumSequence State ENLIM vi	
Z		X			DrumSequence_State_ENUM.vi	
Z		Χ		NA	DrumSequence_Step_ENUM.vi	
Z	Ζ	X	Χ	N/A	ELEV_FF.CTL	
Z	Z	Χ	Χ	N/A	ELEVATOR_SIM.CTL	
Z	Ζ	Ζ	Χ	N/A	ELEVATOR_SIM_SIMULATION_PARAMS.CTL	
Z	Z	X	Χ	N/A	EXTENDED KALMAN CORRECT FUNC GROUP.CTL	
Z		Ζ		N/A	EXTENDED KALMAN FILTER.CTL	
Z		Z		N/A	FieldDisp ElementPicture.ctl	
Z		Z	^	N/A	FieldDisp_FieldElement.ctl	
				N/A		
Z	7	Z	V		FieldDisp_Field_Info.ctl	
Z	Ζ	X	Χ	N/A	FLYWHEEL_SIM.ctl	
Z	Z	Z		N/A	FLYWHEEL_SIM_SIMULATION_PARAMS.CTL	
Z	Z	Χ	Χ	N/A	FUNCTION_GENERATOR_MATRIX.ctl	
Z	Z	X	X	N/A	FUNCTION_GENERATOR.ctl	
Ζ	Z	X	X	N/A	HOLONOMIC DRV CTRL.CTL	New 1/26/21
Z	Ζ	Х	Χ	N/A	KALMAN FILTER LATENCY COMP FUNC GROUP.CTL	
Z	Z	X		N/A	KALMAN FILTER LATENCY COMP.CTL	
Z	Z	X	X	N/A	KALMAN FILTER.ctl	
Z	Z	X		N/A	LINEAR_FILTER.CTL	
Z	Ζ	Χ	Χ	N/A	LINEAR_PLANT_INV_FF.ctl	
Z	Ζ	Χ		N/A	LINEAR_QUADRATIC_REGULATOR.ctl	
Z	Z	Z	X	N/A	LINEAR_SYSTEM_ID_DCMOTOR_MODEL.CTL	
Z		Ζ	X	N/A	LINEAR SYSTEM ID ELEVATOR MODEL.CTL	
Z		Ζ		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	
				N/A	LINEAR SYSTEM LOOP CTRL PARAMS.CTL	
Z	Z	Z				
Z	Z	Z		N/A	LINEAR_SYSTEM_LOOP_DCMOTOR_CTRL_PARAMS.CL	
Z	Ζ	Ζ	Χ	N/A	LINEAR_SYSTEM_LOOP_DIFF_DRV_CTRL_PARAMS.CTL	
Z	Ζ	Ζ	X	N/A	LINEAR_SYSTEM_LOOP_ELEVATOR_CTRL_PARAMS.CTL	
Z	Ζ	Ζ		N/A	LINEAR_SYSTEM_LOOP_FLYWHEEL_CTRL_PARAMS.CTL	
Z	Ζ	Ζ	Χ	N/A	LINEAR_SYSTEM_LOOP_SNGJNTARM_CTRL_PARAMS.CTL	
Z	Ζ	Χ		N/A	LINEAR SYSTEM SIM.ctl	
Z	Ζ	X		N/A	LINEAR SYSTEM.ctl	
Z	Z	Z	X	N/A	LTV DIFF_DRIVE_CTRL_CONTROL_PARAMS.CTL	
Z	Z	Z		N/A	LTV DIFF DRIVE CTRL MODEL PARAMS.CTL	
Z	Z	X			LTV DIFF DRIVE CTRL STATE ENUM.ctl	
Z	Z	Z		N/A	LTV DIFF_DRIVE_CTRL_STATE_ENOM.cti	
		-				
Z	Z	X		N/A	LTV_DIFF_DRIVE_CTRL.ctl	
Z	Z	Z	X	N/A	LTV_UNICYCLE_CONTROLLER_MODEL_PARAMS.CTL	
Z	Ζ	Χ	Χ	N/A	LTV_UNICYCLE_CONTROLLER_STATE_ENUM.ctl	
Z	Ζ	Ζ		N/A	LTV_UNICYCLE_CONTROLLER_TOLERANCE.CTL	
Z	Ζ	Χ	X	N/A	LTV_UNICYCLE_CONTROLLER.CTL	
Z	Ζ	Χ	Χ	N/A	MECA_DRIVE_KINEMATICS.CTL	
Z	Ζ	X	Χ	N/A	MECA DRIVE ODOMETRY.CTL	
Z	Z	X	X	N/A	MECA DRIVE POSE EST.CTL	
Z	Z	X		N/A	MECA DRIVE POSE EST2.ctl	
	Z	X			MECA DRIVE POSE EST2 CONFIG.CTL	
Z						
Z		X	X	N/A	MECA_DRIVE_POSE_EST2_INTERP_RECORD.CTL	
Z	Ζ	Χ		N/A	MECA_WHEEL_POSITIONS.CTL	
Z	Ζ	Χ	Χ	N/A	MECA_WHEEL_SPEEDS.CTL	
Z	Ζ	Χ	Χ	N/A	MEDIAN_FILTER.CTL	
Z	Ζ	X		N/A	MERWE SCALED SIGMA PTS.ctl	
Z	Z	X		N/A	OBSERVER SNAP LIST ITEM.CTL	
Z	Z	X		N/A	OBSERVER SNAPSHOT.CTL	
	Z	X			PARAM STACK ITEM.CTL	
Z	/			11//7		The state of the s

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d new field.							
Z	Ζ	Χ	X	N/A		PARAM STACK.CTL	
Z	Ζ	Χ		N/A		PID ADV LIMITS.CTL	
Z	Z	X	X	N/A		PID ADV TUNING.CTL	
						PID CONTROLLER.CTL	
Z	Z	X	X	N/A			
Z	Ζ	Χ	X	N/A		PID_ERROR_TOLERANCE.CTL	
Z	Ζ	Χ		N/A		PID_INPUT_LIMITS.CTL	
Z	Z	X	X	N/A		PID_TUNING.CTL PID_TUNING.CTL	
Z	Z	X	X	N/A		POSE2D.CTL	
Z	Ζ	X	X	N/A		POSE3D.CTL	
Z	Z	X	X	N/A		POSEWCURVATURE.CTL	
Z	Z	X	X	N/A		PROFILED PID CONTROLLER.CTL	
Z	Ζ	Χ		N/A		QUATERNION.CTL CONTRACTOR CONTRAC	
Z	Ζ	Χ		N/A		RAMSETE_EXE_TUNING.CTL	
Z	Z	X	Χ	N/A		RAMSETE.CTL	
Z	Z	X	X	N/A		ROTATION2D.CTL	
Z	Ζ	Χ	X	N/A		ROTATION3D.CTL	
Z	Ζ	Ζ	X	N/A		SIMPLE MOTOR FF KA TUNE PARAMS.CTL	
Z	Z	X		N/A		SIMPLE MOTOR FF.CTL	
	Z		X	N/A		SINGLE JOINT ARM SIM.CTL	
Z		X					
Z	Z	X	X	N/A		SINGLE_JOINT_ARM_SIM_SIMULATION_PARAMS.CTL	
Z	Ζ	Χ	X	N/A		SLEW_RATE_LIMITER.CTL	
Z	Ζ	Χ	X	N/A		SPLINE_CTRL_VECTOR.CTL	
Z	Ζ	Χ	Χ	N/A		SPLINE.CTL	
Z	Ζ	X	Χ	N/A		SWERVE DRIVE KINEMATICS.CTL	
Z	Ζ	Χ		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	Ζ	X	X	N/A		SWERVE_DRIVE_Pose_EST.CTL	
Z		Χ	X	N/A		SWERVE_DRIVE_POSE_EST2.ctl	
Z	Ζ	Χ	Χ	N/A		SWERVE_DRIVE_POSE_EST2_CONFIG.CTL	
Z		X	No	N/A		SWERVE DRIVE POSE EST2 INTERP RECORD.CTL	
Z	Z	X	X	N/A		TIME INTERPOLATABLE BOOLEAN.CTL	
Z	Ζ	X	X	N/A		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	Z	Z	X	N/A		TIME_INTERPOLATABLE_VARIANT.CTL	
Z	Ζ	Χ	Χ	N/A		TIMER.CTL	
Z	Ζ	Χ		N/A		TRAJ_CONFIG.CTL	
Z	Z	X	X	N/A		TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL	
Z	Z	X	Χ	N/A		TRAJ CONSTRAINT DIIF DRIVE KINEMATICS.CTL	
Z	Ζ	X	Χ	N/A		TRAJ CONSTRAINT DIIF DRIVE VOLTAGE.CTL	
Z	Z	X	X	N/A		TRAJ CONSTRAINT ELLIP REGION.CTL	
_		X	- / (N/A		TRAJ CONSTRAINT JERK.CTL	Routine exists, it is just a shell
7	7					TRAJ CONSTRAINT MAX VELOCITY.CTL	Roddine exists, it is just a sileli
Z	Z	X		N/A			
Z	Z	X	X	N/A	-	TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL	
Z	Ζ	Χ	X	N/A		TRAJ_CONSTRAINT_MINMAX.CTL	
Z	Ζ	Χ		N/A		TRAJ_CONSTRAINT_RECT_REGION.CTL	
Z	Ζ	Χ	Χ	N/A		TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	
Z	Ζ	Χ	Χ	N/A		TRAJ STATE.CTL	
Z	Z	X		N/A		TRAJECTORY_SPLINE_TYPE_ENUM.CTL	
Z	Z	X		N/A		TRAJECTORY.CTL	
	Z					TRANSFORM2D.CTL	+
Z		X	X	N/A	-		
Z	Z	X	X	N/A	+	TRANSFORM3D.CTL	
Z	Z	Χ	Χ	N/A		TRANSLATION2D.CTL	
Z	Ζ	Χ	X	N/A		TRANSLATION3D.CTL	
Z	Ζ	Χ	X	N/A		TRAPEZOID_PROFILE_CONSTRAINT.CTL	
Z	Ζ	Χ	Χ	N/A		TRAPEZOID PROFILE STATE.CTL	
Z	Z	X	X	N/A		TRAPEZOID PROFILE.CTL	
Z	Z	X	X	N/A	+	TWIST2D.CTL	+
			$\frac{\lambda}{X}$	N/A	+	TWIST3D.CTL	+
Z	Z	X			-		
Z	Z	X		N/A		UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL	
Z	Ζ	Χ		N/A		UNSCENTED_KALMAN_FILTER.ctl	
Z	Ζ	Χ		N/A		UNSCENTED_KALMAN_NEW_FUNC_GROUP.CTL	
Z	Ζ	Χ		N/A		UTIL PATHFINDER CONFIG.CTL	
N/A		N/A		N/A		WAYPOINTS.CTL	Delete – obsolete
Z	Ζ	X	X	NA		WEIGHTED WAYPOINT.CTL	New V1.5
N/A	_	N/A		N/A		X Y HEADINGS.CTL	Delete – obsolete
Z	Z		V	N/A		X Y PAIR.CTL	Doioto obsoluto
		^	_^_	IWA		A_1_1 All N. O. I.	

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