

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...

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	
VI / CTL Totals	748	590	217	713	232	25	12	Doc completed Pct 78.88%
VI Total (X)	671							Optimization Pct 31.02%
CTL Total (Z)	77							
VI Shell Total (/)	9							
CTRL Shell Total (\)	2							Optimize legend: S = Subroutine, I = Inline, X = reviewed, nothing done. (In some cases, after sufficient debug and use, additional optimizations could be considered.)

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BASE

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
LINEAR FILTER	X	X		X	SI			LinearFilter_Calculate.vi		
	X	X	X		X			LinearFilter_CutoffFrequency.vi		
	X	X	X	X	I		X	LinearFilter_Execute.vi		Labview style helper
	X	X		X	X			LinearFilter_HighPass.vi		
	X	X	X	X	X			LinearFilter_HighPassBW1.vi		
	X	X	X	X	X			LinearFilter_HighPassBW2.vi		
	X	X	X	X	X			LinearFilter_LowPassBW1.vi		
	X	X	X	X	X			LinearFilter_LowPassBW2.vi		
	X	X		X	X			LinearFilter_MovingAverage.vi		
	X	X		X	I			LinearFilter_New.vi		
	X	X		X	SI			LinearFilter_Reset.vi		
	X	X	X	X	SI			LinearFilter_ResetToValue.vi		
	X	X		X	X			LinearFilter_SinglePoleIIR.vi		
	X	X	X	X	X			LinearFilter_TimeConst.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
MEDIAN FILTER	X	X		X	X			MedianFilter_Calculate.vi		
	X	X	X	X			X	MedianFilter_Execute.vi		Labview style helper
	X	X		X	SI			MedianFilter_New.vi		
	X	X		X	SI			MedianFilter_Reset.vi		
	X	X	X	X	SI			MedianFilter_ResetToValue.vi		

SLEW RATE FILTER	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X				SlewRateLimiter_Calculate.vi		
	X	X	X	X				SlewRateLimiter_Close.vi		
	X	X	X	X			X	SlewRateLimiter_Execute.vi		Labview style helper
	X	X	X	X	SI			SlewRateLimiter_GetRate.vi		
	X	X		X				SlewRateLimiter_New.vi		
	X	X		X				SlewRateLimiter_NewInitialZero.vi		
	X	X		X				SlewRateLimiter_Reset.vi		
	X	X		X	SI			SlewRateLimiter_SetRate.vi		

TIMER	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X	X	X				Timer_Close.vi		releases semaphore
	X	X		X			X	Timer_Get.vi		
	X	X	X	X				Timer_GetAndReset.vi		
	X	X	X	No				Timer_GetInternal.vi		Internal (private) only
	X	X		X			X	Timer_HasPeriodPassed.vi		
	X	X	X	X			X	Timer_HasPeriodPassedOnce.vi		
	X	X		X			X	Timer_New.vi		
	X	X		X			X	Timer_Reset.vi		
	X	X	X	No				Timer_ResetInternal		Internal (private) only
	X	X		X			X	Timer_Start.vi		
	X	X		X			X	Timer_Stop.vi		
	X	X	X	No				Timer_StopInternal.vi		Internal (private) only

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CONTROLLER

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ARM FF	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X				ArmFF_Calculate.vi		
	X	X		X				ArmFF_CalculateVelocityOnly.vi		
			X					ArmFF_Execute.vi		LabVIEW style single call
			X					ArmFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	X	X		X				ArmFF_MaxAchieveAccel.vi		
	X	X		X				ArmFF_MaxAchieveVelocity.vi		
	X	X		X				ArmFF_MinAchieveAccel.vi		
	X	X		X				ArmFF_MinAchieveVelocity.vi		
	X	X		X				ArmFF_New.vi		
	X	X		X				ArmFF_New_ZeroGravity.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
CONTROLLER UTIL	X	X		X				ControllerUtil_GetModulusError.vi		This was short lived in WPILIB, but still useful here.

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
ELEV FF	X	X		X				ElevFF_Calculate.vi		
	X	X		X				ElevFF_CalculateVelocityOnly.vi		
			X					ElevFF_Execute.vi		LabVIEW style single call
			X					ElevFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	X	X		X				ElevFF_MaxAchieveAccel.vi		
	X	X		X				ElevFF_MaxAchieveVelocity.vi		
	X	X		X				ElevFF_MinAchieveAccel.vi		
	X	X		X				ElevFF_MinAchieveVelocity.vi		
	X	X		X				ElevFF_New.vi		
	X	X		X				ElevFF_New_ZeroAccel.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
HOL_DRV_CTRL	X	X		X				HolDrvCtrl_AtReference.vi		Added 1/26/21
	X	X		X				HolDrvCtrl_Calculate.vi		Added 1/26/21
	X	X		X				HolDrvCtrl_Calculate_Trajectory.vi		Added 1/26/21
			X					HolDrvCtrl_Execute.vi		Future
			X					HolDrvCtrl_Execute_Trajectory.vi		Future
	X	X		X				HolDrvCtrl_New.vi		Added 1/26/21
	X	X		X				HolDrvCtrl_SetEnabled.vi		Added 1/26/21
	X	X		X				HolDrvCtrl_SetTolerance.vi		Added 1/26/21

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
PID CONTROLLER	X	X	X	X				PIDController_AdvCalculate_FF_Sp_Pv.vi		Advanced PID
	X	X	X	X				PIDController_AdvCalculate_FF_Sp_Pv_Per.vi		Advanced PID
	X	X	X	X			X	PIDController_AdvExecute.vi		Labview style helper. Advanced PID
	X	X		X				PIDController_AtSetpoint.vi		
	X	X		X				PIDController_Calculate_PV.vi		
	X	X		X				PIDController_Calculate_SP_PV.vi		
	X	X		X				PIDController_DisableContinuousInput.vi		
	X	X		X				PIDController_EnableContinuousInput.vi		
	X	X	X	X			X	PIDController_Execute.vi		Labview style helper
								PIDController_GetContinuousError.vi		OBSOLETE – Removed
	X	X		X				PIDController_GetPeriod.vi		

FRC LabVIEW Trajectory Library – VI Implementation List

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

X	X		X				PIDController_GetPID.vi		
X	X		X				PIDController_GetPositionError.vi		
X	X		X				PIDController_GetSetpoint.vi		
X	X		X				PIDController_GetVelocityError.vi		
X	X		X				PIDController_IsContinuousInputEnabled.vi		
X	X		X				PIDController_New.vi		
X	X		X				PIDController_NewPeriod.vi		
X		X	X	SI			PIDController_Pack_AdvLimits.vi		
X		X	X	SI			PIDController_Pack_AdvTuning.vi		
X		X	X	SI			PIDController_Pack_ErrorTolerance.vi		
X		X	X	SI			PIDController_Pack_InputLimits.vi		
X		X	X	SI			PIDController_Pack_Tuning.vi		
X	X		X				PIDController_Reset.vi		
X	X		X				PIDController_SetD.vi		
X	X	X	X				PIDController_SetDerivativeFilter.vi		Advanced PID
X	X	X	No				PIDController_SetFeedForward.vi		Advanced PID, Obsolete – DELETE
X	X	X	No				PIDController_SetFFGain.vi		Advanced PID, Obsolete – DELETE
X	X		X				PIDController_SetI.vi		
							PIDController_SetInputRange.vi		OBSOLETE – Removed
X	X		X				PIDController_SetIntegratorRange.vi		
X	X	X	X				PIDController_SetOutputLimits.vi		Advanced PID
X	X		X				PIDController_SetP.vi		
X	X	X	X				PIDController_SetPeriod.vi		
X	X		X				PIDController_SetPID.vi		
X	X	X	X				PIDController_SetPIDF.vi		Advanced PID
X	X		X				PIDController_SetSetpoint.vi		
X	X		X				PIDController_SetTolerance.vi		
X	X		X				PIDController_SetTolerancePandV.vi		

PROFIED PID CONTROLLER	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X				ProfiledPIDController_AtGoal.vi		
	X	X		X				ProfiledPIDController_AtSetpoint.vi		
	X	X		X				ProfiledPIDController_Calculate_Meas.vi		
	X	X		X				ProfiledPIDController_Calculate_Meas_Goal.vi		
	X	X		X				ProfiledPIDController_Calculate_Meas_StateGoal.vi		
	X	X		X				ProfiledPIDController_Calculate_Meas_StateGoal_TrapCnsrt.vi		
	X	X		X				ProfiledPIDController_DisableContInput.vi		
	X	X		X				ProfiledPIDController_EnableContInput.vi		
	X	X		X				ProfiledPIDController_GetGoal.vi		
	X	X		X				ProfiledPIDController_GetPeriod.vi		
	X	X	X	X				ProfiledPIDController_GetPID.vi		WPILIB has separate getters.
	X	X		X				ProfiledPIDController_GetPositionError.vi		
	X	X		X				ProfiledPIDController_GetSetpoint.vi		
	X	X		X				ProfiledPIDController_GetVelocityError.vi		
	X	X		X				ProfiledPIDController_New.vi		
	X	X		X				ProfiledPIDController_NewPeriod.vi		
	X	X		X				ProfiledPIDController_Reset.vi		
	X	X		X				ProfiledPIDController_Reset_PosOnly.vi		
	X	X		X				ProfiledPIDController_Reset_PosVel.vi		
	X	X		X				ProfiledPIDController_SetConstraints.vi		
	X	X		X				ProfiledPIDController_SetGoal.vi		
	X	X		X				ProfiledPIDController_SetGoal_PosOnly.vi		
	X	X		X				ProfiledPIDController_SetIntegratorRange.vi		
	X	X		X				ProfiledPIDController_SetPID.vi		
	X	X		X				ProfiledPIDController_SetTolerance_PosOnly.vi		
	X	X		X				ProfiledPIDController_SetTolerance_PosVel.vi		

		Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
RAMSETE		X	X		X	SI			Ramsete_New.vi	new	
		X	X		X	SI			Ramsete_New_B_Z.vi	new(b, zeta)	
		X	X		X	X			Ramsete_Calculate.vi	calculate	
		X	X		X	X			Ramsete_Calculate_Trajectory.vi	calculate_trajectory	
		X	X		X	SI			Ramsete_AtReference.vi	AtReference	
		X	X		X	SI			Ramsete_SetEnabled.vi	SetEnabled	
		X	X		X	SI			Ramsete_SetTolerance.vi	SetTolerance	
		X	X		X	X			Ramsete_SINC.vi	sinc	internal
		X	X	X	X	X			Ramsete_Diff_DO_Eng.vi		
		X	X	X	X	X			Ramsete_Diff_DO_SI.vi		
SIMPLE MOTOR FEEDFORWARD		Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
		X	X		X	SI			SimpleMotorFF_New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)	
										public SimpleMotorFeedforward(double ks, double kv)	
		X	X		X	SI			SimpleMotorFF_Calculate.vi	public double calculate(double velocity, double acceleration)	
		X	X		X	SI			SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)	
				X					SimpleMotorFF_Execute.vi		LabVIEW style single call
				X					SimpleMotorFF_ExecuteVelocityOnly.vi		LabVIEW style single call
		X	X		X	X			SimpleMotorFF_MaxAchieveVel.vi	public double maxAchievableVelocity(double maxVoltage, double acceleration)	
		X	X		X	X			SimpleMotorFF_MinAchieveVel.vi	public double minAchievableVelocity(double maxVoltage, double acceleration)	
		X	X		X	X			SimpleMotorFF_MaxAchieveAccel.vi	public double maxAchievableAcceleration(double maxVoltage, double velocity)	
		X	X		X	X			SimpleMotorFF_MinAchieveAccel.vi	public double minAchievableAcceleration(double maxVoltage, double velocity)	

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GEOMETRY

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

FRC LabVIEW Trajectory Library – VI Implementation List

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

X	X		X	X			Pose_Log.vi	twist2d log( pose2d end )	
X	X		X	SI			Pose_Equals.VI	boolean equals( other obj )	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
ROTATION									rotation2d new()	can use cluster constant
	X	X		X	SI			Rotation_CreateAngle.vi	rotation2d new( double value )	
	X	X		X	SI			Rotation_CreateXY.vi	rotation2d new( double x, double y )	
	X	X		X	SI			Rotation_CreateAngleDegrees.vi	rotation2d fromDegrees( double degrees )	convert to radians then create
	X	X		X	SI			Rotation_Plus.vi	rotation2d plus( rotation2d other )	
	X	X		X	SI			Rotation_Minus.vi	rotation2d minus( rotation2d other )	
	X	X		X	SI			Rotation_UnaryMinus.vi	rotation2d unaryminus( )	
	X	X		X	SI			Rotation_Times.vi	rotation2d times( double scalar )	
	X	X		X	SI			Rotation_RotateBy.vi	rotation2d rotateby( rotation2d other )	
	X	X	X	X	SI			Rotation_GetAngleCosSin.vi		New 1/26/21
	X	X		X	SI			Rotation_GetRadians.VI	double getRadians()	use cluster unpack
	X	X		X	SI				double getDegrees()	use cluster unpack, then convert to degree
	X	X		X	SI			Rotation_GetCos.VI	double getCos()	use cluster unpack
	X	X		X	SI			Rotation_GetSin.VI	double getSin()	use cluster unpack
	X	X		X	SI			Rotation_GetTan.VI	double getTan()	can calculate
	X	X		X	SI			Rotation_Equals.vi	boolean equals( rotation2d other )	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
TRANSFORM	X	X		X	SI			Transform_Create_PosePose.vi	transform2d new( pose2d, pose2d )	
	X	X		X	SI			Transform_Create_TransRot.vi	transform2d new( translation2d, rotation2d )	
									transform2d new( )	can use cluster constant
	X	X		X	SI			Transform_Times.vi	transform2d times( double scalar )	
	X	X		X	SI			Transform_GetTranslation.VI	translation2d getTranslation()	use cluster unpack
	X	X		X	SI			Transform_GetRotation.VI	rotation2d getRotation()	use cluster unpack
	X	X	X	X	SI			Transform_GetXY.vi		
	X	X	X	X	SI			Transform_GetXYAngle.vi		
	X	X		X	SI			Transform_Inverse.vi	transform inverse()	new
	X	X		X	SI			Transform_Equals.VI	boolean equals( other transform2d )	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
TRANSLATION									translation2d new()	can use cluster constant
	X	X		X	SI			Translation_Create.vi	translation2d new( double x, double y )	
	X	X		X	SI			Translation_Create_DistAng.vi		
	X	X		X	SI			Translation_GetDistance.vi	double getDistance( translation2d other )	
	X	X		X	SI			Translation_GetX.VI	double getX()	can use cluster unpack
	X	X		X	SI			Translation_GetY.VI	double getY()	can use cluster unpack
	X	X	X	X	SI			Translation_GetXY.VI		
	X	X		X	SI			Translation_GetNorm.VI	double getNorm()	can use cluster unpack
	X	X		X	SI			Translation_RotateBy.vi	translation2d rotateBy( rotation2d other )	
	X	X		X	SI			Translation_Plus.vi	translation2d plus( translation2d other )	

X	X		X	SI			Translation_Minus.vi	translation2d minus( translation2d other )	
X	X		X	SI			Translation_UnaryMinus.vi	translation2d unaryminus( )	
X	X		X	SI			Translation_Times.vi	translation2d times( double scalar )	
								translation2d div( double scalar )	can multiply by 1/scalar
X	X		X	SI			Translation_Equals.vi	boolean equals( translation other )	

TWIST	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X	SI			Twist_Create.vi	twist new( x, y, theta )	
	X	X		X	SI			Twist_Equals.VI	boolean equals( obj other )	
	X	X	X	X	SI			Twist_GetAll.VI		

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KINEMATICS

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

DIFFERENTIAL DRIVE KINEMATICS	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X	I	X		DiffKinematics_New.vi	diffDriveKine new( double trackWidth )	
	X	X		X	X	X		DiffKinematics_toChassisSpeed.vi	chassisSpeeds toChassisSpeeds( diffDrWheelSpeeds )	
	X	X		X	SI	X		DiffKinematics_toWheelSpeed.vi	diffDriveWheelSpeed toWheelSpeeds( chassisSpeeds )	

DIFFERENTIAL DRIVE ODOMETRY	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
									diffDrOdom new( rotation gyro, pose initial )	
									diffDrOdom new( rotation gyro )	
									void resetPosition( pose2d, rotation2d )	incorporated into “update”
									pose2d getPoseMeters()	
	X	X		X	X			DiffOdometry_Update.vi	pose2d update( rotation2d gyro, double leftdist, double right dist )	Incorporates enhanced reset



	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
DIFFERENTIAL DRIVE WHEEL SPEEDS									diffDrWheelSpeeds new()	
									diffDrWheelSpeeds new( double leftVel, double rightVel )	
	X	X		X	X			DiffWheel_ Normalize.vi	void normalize( double maxVel )	
MECANUM DRIVE KINEMATICS	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X	I			MecaKinematics_ New.vi		
	X	X		X	X			MecaKinematics_ SetInverseKinematics.vi		
	X	X		X	X			MecaKinematics_ ToChassisSpeeds.vi		
	X	X		X	X			MecaKinematics_ ToWheelSpeeds.vi		
	X	X		X	X			MecaKinematics_ ToWheelSpeedsZeroCenter.vi		
MECANUM DRIVE MOTOR VOLTAGE	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
nothing done										
MECANUM DRIVE ODOMETRY	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X				MecaOdometry_ New.vi		
	X	X		X				MecaOdometry_ NewDefaultPose.vi		
	X	X		X				MecaOdometry_ GetPose.vi		
	X	X		X				MecaOdometry_ Reset.VI		
	X	X		X				MecaOdometry_ Update.vi		
	X	X		X				MecaOdometry_ UpdateWithTime.vi		
MECANUM DRIVE WHEEL SPEEDS	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X	U			MecaWheel_ New.Vi	public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond)	
	X	X		X	X			MecaWheel_ Normalize.vi	public void normalize(double attainableMaxSpeedMetersPerSecond)	



SWERVE DRIVE KINEMATICS	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
									public SwerveDriveKinematics(Translation2d... wheelsMeters)	variable parameters (replace with array and “4” calls)
	X	X	X	X				SwerveKinematics_NewX.VI		uses array as input
	X	X	X	X				SwerveKinematics_New4.VI		For 4 module drives
	X	X		X				SwerveKinematics_ToSwerveModuleStates.VI	public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds, Translation2d centerOfRotationMeters)	
	X	X		X				SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI	public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)	
									public ChassisSpeeds toChassisSpeeds(SwerveModuleState... wheelStates)	variable parameters (replace with array and “4” calls)
	X	X	X	X				SwerveKinematics_ToChassisSpeedsX.VI		uses array as input
	X	X	X	X				SwerveKinematics_ToChassisSpeeds4.VI		For 4 module drives
	X	X	X	X				SwerveKinematics_NormalizeWheelSpeeds.vi	public static void normalizeWheelSpeeds(SwerveModuleState[] moduleStates, double attainableMaxSpeedMetersPerSecond)	

SWERVE DRIVE ODOMETRY	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X				SwerveOdometry_New.VI	public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle, Pose2d initialPose)	
	X	X		X				SwerveOdometry_NewZeroCenter.VI	public SwerveDriveOdometry(SwerveDriveKinematics kinematics, Rotation2d gyroAngle)	
	X	X		X				SwerveOdometry_ResetPosition.VI	public void resetPosition(Pose2d pose, Rotation2d gyroAngle)	
	X	X		X				SwerveOdometry_GetPosition.VI	public Pose2d getPoseMeters()	
									public Pose2d updateWithTime(double currentTimeSeconds, Rotation2d gyroAngle, SwerveModuleState... moduleStates)	variable parameters (replace with array and “4” calls)
	X	X	X	X				SwerveOdometry_UpdateWithTimeX.VI		uses array as input
	X	X	X	X				SwerveOdometry_UpdateWithTime4.VI		For 4 module drives
									public Pose2d update(Rotation2d gyroAngle, SwerveModuleState... moduleStates)	variable parameters (replace with array and “4” calls)
	X	X	X	X				SwerveOdometry_UpdateX.VI		uses array as input
	X	X	X	X				SwerveOdometry_Update4.VI		For 4 module drives

SWERVE DRIVE MODULE STATE	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X	SI			SwerveModuleState_New.vi	public SwerveModuleState(double speedMetersPerSecond, Rotation2d angle)	
	X	X		X	SI			SwerveModuleState_CompareTo.vi	public int compareTo(SwerveModuleState o)	
	X	X		X	SI			SwerveModuleState_Optimize.vi	public SwerveModuleState optimize( SwerveModuleState desired, Rotation2d angle )	

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SPLINE

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
CUBIC HERMITE SPLINE	X	X		X				CubicHermiteSpline_New.vi	public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)	
									protected SimpleMatrix getCoefficients()	not needed, use cluster unpack
	X	X		X				CubicHermiteSpline_makeHermiteBasis.vi	private SimpleMatrix makeHermiteBasis()	
	X	X		X				CubicHermiteSpline_getControlVectorFromArrays.vi	private SimpleMatrix getControlVectorFromArrays( double[] initialVector, double[] finalVector)	
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
POSE WITH CURVATURE	X	X		X	SI			PoseWithCurve_New.vi	public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter)	
									public PoseWithCurvature()	can use cluster constant
									public Pose2d poseMeters	not needed, use cluster unpack
									public double curvatureRadPerMeter..	not needed, use cluster unpack
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
QUINTIC HERMITE SPLINE	X	X		X				QuinticHermiteSpline_New.vi	public QuinticHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector)	
									protected SimpleMatrix getCoefficients()	not needed, use cluster unpack
	X	X		X				QuinticHermiteSpline_makeHermiteBasis.vi	private SimpleMatrix makeHermiteBasis()	
	X	X		X				QuinticHermiteSpline_getControlVectorFromArrays.vi	private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector)	
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
SPLINE (Abstract class)									Spline(int degree)	
	X	X		X				Spline_getPoint.vi	public PoseWithCurvature getPoint(double t)	
									public static class ControlVector	
									public ControlVector(double[] x, double[] y)	implemented as data structure
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes

FRC LabVIEW Trajectory Library – VI Implementation List

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

SPLINE HELPER

X	X		X		X		SplineHelp_GetCubicCtrlVectorsFromWayPts.vi	public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints( Pose2d start, Translation2d[] interiorWaypoints, Pose2d end )	
X	X	X	X				SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi		
X	X		X				SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi	public static List<Spline.ControlVector> getQuinticControlVectorsFromWaypoints( List<Pose2d> waypoints )	
X	X	X	X				SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi		
X	X		X		X		SplineHelp_getCubicSplinesFromControlVectors.vi	public static CubicHermiteSpline[] getCubicSplinesFromControlVectors( Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end)	
X	X	X	No				SplineHelp_GetCubicSpline_Calc1.vi		internal
X	X	X	No				SplineHelp_GetCubicSpline_Calc2.vi		internal
X	X	X	No				SplineHelp_GetCubicSpline_Calc3.vi		internal
X	X		X				SplineHelp_getQuinticSplinesFromControlVectors.vi	public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors( Spline.ControlVector[] controlVectors)	
X	X		No				SplineHelp_ThomasAlgorithm.vi	private static void thomasAlgorithm(double[] a, double[] b, double[] c, double[] d, double[] solutionVector)	internal
X	X		X	SI			SplineHelp_GetCubicCtrlVector.vi	private static Spline.ControlVector getCubicControlVector(double scalar, Pose2d point)	
X	X		X	SI			SplineHelp_GetQuinticCtrlVector.vi	private static Spline.ControlVector getQuinticControlVector(double scalar, Pose2d point)	

SPLINE PARAMETERIZER

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
X	X		X		X		SplineParam_Spline.vi	public static List<PoseWithCurvature> parameterize(Spline spline)	
X	X		X				SplineParam_Spline_T0_T1.vi	public static List<PoseWithCurvature> parameterize(Spline spline, double t0, double t1)	
X	X	X	No				SplineParam_StackGet.vi		internal
X	X	X	No				SplineParam_StackPop.vi		internal
X	X	X	No				SplineParam_StackPush.vi		internal

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TRAJECTORY

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TRAJECTORY

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
X	X		X	SI			Trajectory_New.vi	public Trajectory(final List<State> states)	
X	X		X	SI			Trajectory_New_Empty.vi		
								public Pose2d getInitialPose()	can use cluster unpack, array index
								public double getTotalTimeSeconds()	not needed, use unpack
								public List<State> getStates()	not needed, use unpack
X	X		X				Trajectory_Sample.vi	public State sample(double timeSeconds)	
X	X	X	X				Trajectory_SampleReverse.vi		Sample in reverse order. Negate sample.
X	X		X				Trajectory_TransformBy.vi	public Trajectory transformBy(Transform2d transform)	
X	X		X				Trajectory_RelativeTo.vi	public Trajectory relativeTo(Pose2d pose)	
X	X		X				Trajectory_equals.vi	boolean equals( other obj )	FUTURE
X	X		No	SI			Trajectory_lerp_double.vi	private static double lerp(double startValue, double endValue, double t)	internal
X	X		No	SI			Trajectory_lerp_Pose.vi	private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t)	internal

TRAJECTORY_STATE	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
									public State()	
	X	X		X	SI			TrajectoryState_New.vi	public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double curvatureRadPerMeter)	
	X	X		X				TrajectoryState_Interpolate.vi	State interpolate(State endValue, double i)	
	X	X		X				TrajectoryState_Equals.vi	boolean equals( other obj )	FUTURE

TRAJECTORY_CONFIG	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X	SI			TrajectoryConfig_Create.vi	public TrajectoryConfig(double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq)	
									public TrajectoryConfig addConstraint(TrajectoryConstraint constraint)	Implemented differently, can't duplicate.
									public TrajectoryConfig addConstraints(List<? extends TrajectoryConstraint> constraints)	Implemented differently, can't duplicate.
	X	X		X	SI			TrajectoryConfig_setKinematicsDiffDrive.vi	public TrajectoryConfig setKinematics(DifferentialDriveKinematics kinematics)	
	X	X		X	SI			TrajectoryConfig_setKinematicsMecanumDrive.vi	public TrajectoryConfig setKinematics(MecanumDriveKinematics kinematics)	
	X	X		X	SI			TrajectoryConfig_setKinematicsSwerveDrive.vi	public TrajectoryConfig setKinematics(SwerveDriveKinematics kinematics)	
									public double getStartVelocity()	can use cluster unpack
									public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond)	
									public double getEndVelocity()	can use cluster unpack
									public TrajectoryConfig setEndVelocity(double endVelocityMetersPerSecond)	
									public double getMaxVelocity()	can use cluster unpack
									public double getMaxAcceleration()	can use cluster unpack
									public List<TrajectoryConstraint> getConstraints()	Implemented differently, can't duplicate.
									public boolean isReversed()	can use cluster unpack
	X	X		X	SI			TrajectoryConfig_setReversed.vi	public TrajectoryConfig setReversed(boolean reversed)	
	X	X	X	X	SI			TrajectoryConfig_setCentripetalAccel.vi		
	X	X	X	X	SI			TrajectoryConfig_setVoltageDiffDrive.vi		
									NOTE ADD OTHER "SET" ROUTINES FOR OTHER CONSTRAINTS HERE, SINCE NEW CONSTRAINTS ARE SPECIFIC AND NOT GENERIC.	

TRAJECTORY_GENERATE	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X				TrajectoryGenerate_Make_Cubic_CtrlVect.vi	public static Trajectory generateTrajectory( Spline.ControlVector initial, List<Translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config )	uses cubic splines
	X	X		X				TrajectoryGenerate_Make_Cubic.vi	public static Trajectory generateTrajectory( Pose2d start, List<Translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config )	uses cubic splines

X	X		X				TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory( ControlVectorList controlVectors, TrajectoryConfig config)	uses quintic splines
X	X		X				TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(List<Pose2d> waypoints, TrajectoryConfig config)	uses quintic splines
X	X		X				TrajectoryGenerate_splinePointsFromSplines.vi	public static List<PoseWithCurvature> splinePointsFromSplines(Spline[] splines)	

TRAJECTORY GENERATE (Control Vector)	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
									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

TRAJECTORY PARAMETERIZE	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X				TrajectoryParam_timeParam.vi	public static Trajectory timeParameterizeTrajectory( List<PoseWithCurvature> points. List<TrajectoryConstraint> constraints, double startVelocityMetersPerSecond, double endVelocityMetersPerSecond, double maxVelocityMetersPerSecond, double maxAccelerationMetersPerSecondSq, boolean reversed ) private static void enforceAccelerationLimits(boolean reverse, List<TrajectoryConstraint> constraints, ConstrainedState state)	
	X	X		No				TrajectoryParam_enforceAccel.vi		This routines needs to be changed when new constraints are added.
	X	X	X	No				TrajectoryParam_calcStuffFwd.vi		
	X	X	X	No				TrajectoryParam_calcStuffRev.vi		
	X	X	X	No				TrajectoryParam_enforceVelocity.vi		This routines needs to be changed when new constraints are added.

TRAJECTORY PARAMETERIZE CONSTRAINED STATE	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X				ConstrainedState_New.vi	ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq)	
									ConstrainedState()	
	X	X	X	X				ConstrainedState_SetMaxAccel.vi		
	X	X	X	X				ConstrainedState_SetMinAccel.vi		
	X	X	X	X				ConstrainedState_SetVelAccel.vi		
	X	X	X	X				ConstrainedState_SetVelocity.vi		

Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
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TRAJECTORY UTIL	X	X		X				TrajectoryUtil_fromPathWeaverJSON.vi	public static Trajectory fromPathweaverJson(Path path)	
	X	X		X				TrajectoryUtil_toPathWeaverJSON.vi	public static void toPathweaverJson(Trajectory trajectory, Path path)	
									public static Trajectory deserializeTrajectory(String json)	
									public static String serializeTrajectory(Trajectory trajectory)	

TRAPEZOID PROFILE	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X				TrapProfConstraint_New.vi		
	X	X		X				TrapProfile_Calculate.vi		
	X	X		No				TrapProfile_Direct.vi		Private, remove from menu
	X	X	X	X				TrapProfile_Execute.vi		
	X	X		X				TrapProfile_IsFinished.vi		
	X	X		X				TrapProfile_New.vi		
	X	X		X				TrapProfile_New_DefInitial.vi		
	X	X		No				TrapProfile_ShouldFlipAcceleration.vi		Private, remove from menu
	X	X		X				TrapProfile_TimeLeftUntil.vi		
	X	X		X				TrapProfile_TotalTime.vi		
	X	X		X				TrapProfState_Equals.vi		
	X	X		X				TrapProfState_New.vi		

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TRAJECTORY CONSTRAINT

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CENTRIPETAL ACCELERATION CONSTRAINT	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X				CentripetalAccelConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X				CentripetalAccelConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI			CentripetalAccelConstraint_New.vi	public CentripetalAccelerationConstraint(double maxCentripetalAccelerationMetersPerSecondSq)	Can use cluster pack for now

DIFF DRIVE KINEMATIC CONSTRAINT	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
	X	X		X				DiffDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X				DiffDriveKinematicsConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI			DiffDriveKinematicsConstraint_New.vi	public DifferentialDriveKinematicsConstraint(final DifferentialDriveKinematics kinematics, double maxSpeedMetersPerSecond)	



	<i>Implemented</i>	<i>Documented</i>	<i>Not WPILIB</i>	<i>Menu Item</i>	<i>Execution Optimized</i>	<i>Test Routine</i>	<i>Sample Program</i>	VI Name	Function Prototype	Notes
DIFF DRIVE VOLTAGE CONSTRAINT	X	X		X				DiffDriveVoltageConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X				DiffDriveVoltageConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	Code updated to match 2/2020 library update.
	X	X		X	SI			DiffDriveVoltageConstraint_New.vi	public DifferentialDriveVoltageConstraint(SimpleMotorFeedforward feedforward, DifferentialDriveKinematics kinematics, double maxVoltage)	Can use cluster pack for now

	<i>Implemented</i>	<i>Documented</i>	<i>Not WPILIB</i>	<i>Menu Item</i>	<i>Execution Optimized</i>	<i>Test Routine</i>	<i>Sample Program</i>	VI Name	Function Prototype	Notes
JERK CONSTRAINT	/		X					JerkConstraint_getMaxVelocity.vi	Routine exists, it is just a shell	FUTURE
	/		X					JerkConstraint_getMinMaxAccel.vi	Routine exists, it is just a shell	FUTURE
	/		X		SI			JerkConstraint_New.vi	Routine exists, it is just a shell	FUTURE

	<i>Implemented</i>	<i>Documented</i>	<i>Not WPILIB</i>	<i>Menu Item</i>	<i>Execution Optimized</i>	<i>Test Routine</i>	<i>Sample Program</i>	VI Name	Function Prototype	Notes
MECANUM DRIVE KINEMATICS CONSTRAINT	X	X		X	SI			MecaDriveKinematicsConstraint_New.vi		
	X	X		X				MecaDriveKinematicsConstraint_getMaxVelocity.vi		
	X	X		X				MecaDriveKinematicsConstraint_getMinMaxAccel.vi		

	<i>Implemented</i>	<i>Documented</i>	<i>Not WPILIB</i>	<i>Menu Item</i>	<i>Execution Optimized</i>	<i>Test Routine</i>	<i>Sample Program</i>	VI Name	Function Prototype	Notes
SWERVE DRIVE KINEMATICS CONSTRAINT	X	X		X				SwerveDriveKinematicsConstraint_getMaxVelocity.vi	public double getMaxVelocityMetersPerSecond(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X				SwerveDriveKinematicsConstraint_getMinMaxAccel.vi	public MinMax getMinMaxAccelerationMetersPerSecondSq(Pose2d poseMeters, double curvatureRadPerMeter, double velocityMetersPerSecond)	
	X	X		X	SI			SwerveDriveKinematicsConstraint_New.vi	Newpublic SwerveDriveKinematicsConstraint(final SwerveDriveKinematics kinematics, double maxSpeedMetersPerSecond)	Can use cluster pack for now

TRAJECTORY CONSTRAINT

Interface class - nothing done (not needed)



	<i>Implemented</i>	<i>Documented</i>	<i>Not WPILIB</i>	<i>Menu Item</i>	<i>Execution Optimized</i>	<i>Test Routine</i>	<i>Sample Program</i>	VI Name	Function Prototype	Notes
TRAJECTORY CONSTRAINT (Min Max)	X	X		X	SI			Constraint_MinMax_New.vi	Constraint_MinMax_New	
	X	X		X	SI			Constraint_MinMax_NewMinMax.VI	Constraint_MinMax_New	

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UTILITY

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

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

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CONVERSIONS

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JAVA / C++ WPILIB EQUIVALENT

	<i>Implemented</i>	<i>Documented</i>	<i>Not WPILIB</i>	<i>Menu Item</i>	<i>Execution Optimized</i>	<i>Test Routine</i>	<i>Sample Program</i>	VI Name	Function Prototype	Notes
CONV	X	X	X	X	SI			Conv_AngleDegrees_Heading.vi		
	X	X	X	X	SI			Conv_AngleRadians_Heading.vi		
	X	X	X	X	SI			Conv_Centimeters_Meters.vi		

FRC LabVIEW Trajectory Library – VI Implementation List

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

X	X	X	X	SI			Conv_Deg_Radians.vi		
X	X	X	X	SI			Conv_Feet_Meters.vi		
X	X	X	X	SI			Conv_GyroDegrees_Heading.vi		
X	X	X	X	SI			Conv_Heading_AngleRadians.vi		
X	X	X	X	SI			Conv_Inches_Meters.vi		
X	X	X	X	SI			Conv_Kilograms_Pounds.vi		
X	X	X	X	SI			Conv_Meters_Feet.vi		
X	X	X	X	SI			Conv_Meters_Inches.vi		
X	X	X	X	SI			Conv_POSE_SI_Eng.vi		
X	X	X	X	SI			Conv_Pounds_Kilograms.vi		
X	X	X	X	SI			Conv_Radians_Deg.vi		
X	X	X	X	SI			Conv_Yards_Meters.vi		

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

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PATHFINDER UTIL

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

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

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STATE SPACE MODEL

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DC MOTOR	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X				DCMotor_GetAndymark9015.vi					
	X	X		X				DCMotor_GetAndymarkRs775_125.vi					
	X	X		X				DCMotor_GetBag.vi					
	X	X		X				DCMotor_GetBanebotsRs550.vi					
	X	X		X				DCMotor_GetBanebotsRs775.vi					

FRC LabVIEW Trajectory Library – VI Implementation List

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

X	X		X				DCMotor_GetCIM.vi					
X	X		X				DCMotor_GetCurrent.vi					
X	X		X				DCMotor_GetFalcon500.vi					
X	X		X				DCMotor_GetMiniCIM.vi					
X	X		X				DCMotor_GetNEO.vi					
X	X		X				DCMotor_GetNEO550.vi					
X	X		X				DCMotor_GetVex775Pro.vi					
X	X						DCMotor_GetRomiBuiltIn.vi					
X	X		X				DCMotor_New.vi					

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

STATE SPACE ESTIMATION

DIFFERENTIAL DRIVE POSE ESTIMATOR	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X				DiffDrivePoseEst_AddVisionMeasurement.vi		Just a shell, not functional!			
	X	X		X				DiffDrivePoseEst_FillStateVector.vi					
	X	X		X				DiffDrivePoseEst_GetEstimatedPosition.vi					
	X			X				DiffDrivePoseEst_Kalman_F_Callback.vi					
	X			X				DiffDrivePoseEst_Kalman_H_Callback.vi					
	X	X		X				DiffDrivePoseEst_New.vi					
	X	X		X				DiffDrivePoseEst_ResetPosition.vi					
	X	X		X				DiffDrivePoseEst_SetVisionMeasurementStdDevs.vi					
	X	X		X				DiffDrivePoseEst_Update.vi					
	X	X		X				DiffDrivePoseEst_UpdateWithTime.vi					
	X	X						DiffDrivePoseEst_VisionCorrect_Callback.vi					
	X			X				DiffDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi					

EXTENDED KALMAN FILTER	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X				ExtendedKalmanFilter_Correct.vi		Just a shell, not functional!			
	X	X		X				ExtendedKalmanFilter_Correct_OnlyUY.vi					
	X	X		X				ExtendedKalmanFilter_GetP.vi					
	X	X		X				ExtendedKalmanFilter_GetP_Single.vi					
	X	X		X				ExtendedKalmanFilter_GetXHat.vi					

FRC LabVIEW Trajectory Library – VI Implementation List

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

X	X		X				ExtendedKalmanFilter_GetXHat_Single.vi					
X	X		X				ExtendedKalmanFilter_New.vi					
X	X		X				ExtendedKalmanFilter_Predict.vi					
X	X		X				ExtendedKalmanFilter_Reset.vi					
X	X		X				ExtendedKalmanFilter_SetP.vi					
X	X		X				ExtendedKalmanFilter_SetXHat.vi					
X	X		X				ExtendedKalmanFilter_SetXHat_Single.vi					

KALMAN FILTER	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X		X		KalmanFilter_Correct.vi					
	X	X		X		X		KalmanFilter_New.vi					
	X	X		X		X		KalmanFilter_Predict.vi					
	X	X		X				KalmanFilter_Reset.vi					
	X	X		X				KalmanFilter_GetK					
	X	X		X				KalmanFilter_GetK_Single.vi					
	X	X		X				KalmanFilter_SetXHat					
	X	X		X		X		KalmanFilter_SetXHat_Single					
	X	X		X				KalmanFilter_GetXHat					
	X	X		X		X		KalmanFilter_GetXHaT_Single					

KALMAN FILTER LATENCY COMPENSATOR	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X			X				KalmanFilterLatencyComp_AddObserverState.vi		Work in progress.			
	X			X				KalmanFilterLatencyComp_ApplyPastGlobalMeas_FuncGroup.vi					
	X			X				KalmanFilterLatencyComp_ApplyPastGlobalMeasurement_UKF.vi		Work in progress.			
	X			X				KalmanFilterLatencyComp_FindClosestMeasurement.vi		Work in progress.			
	X			X				KalmanFilterLatencyComp_Observer_New.vi					
	X			X				KalmanFilterLatencyComp_Reset.vi		Work in progress.			
	X			X				KalmanFilterLatencyComp_New.vi		Work in progress.			

SWERVE DRIVE POSE ESTIMATOR	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
								SwerveDrivePoseEst_AddVisionMeasurement_StdDev.vi		Haven't started yet			
	X			X				SwerveDrivePoseEst_AddVisionMeasurement.vi		Haven't started yet			
	X			X				SwerveDrivePoseEst_VisionCorrect_Callback.vi					
	X			X				SwerveDrivePoseEst_VisionCorrect_Kalman_H_Callback.vi					
	X			X				SwerveDrivePoseEst_Kalman_F_Callback.vi					
	X			X				SwerveDrivePoseEst_Kalman_H_Callback.vi					
	X			X				SwerveDrivePoseEst_GetEstimatedPosition.vi		Haven't started yet			
	X			X				SwerveDrivePoseEst_New.vi		Haven't started yet			
	X			X				SwerveDrivePoseEst_ResetPosition.vi		Haven't started yet			
	X			X				SwerveDrivePoseEst_SetVisionMeasurementStdDevs.vi		Haven't started yet			

X			X				SwerveDrivePoseEst_Update.vi		Haven't started yet			
X			X				SwerveDrivePoseEst_UpdateWithTime.vi		Haven't started yet			
									Haven't started yet			

UNSCENTED KALMAN FILTER	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X			X				UnscentedKalmanFilter_Correct.vi		Work in progress.			
	X			X				UnscentedKalmanFilter_Correct_FuncGroup.vi					
	X			X				UnscentedKalmanFilter_Correct_OnlyUY.vi					
	X			X				UnscentedKalmanFilter_Correct_OnlyUYR.vi					
	X	X		X				UnscentedKalmanFilter_GetP.vi					
	X	X		X				UnscentedKalmanFilter_GetP_Single.vi					
	X	X		X				UnscentedKalmanFilter_GetXHat.vi					
	X	X		X				UnscentedKalmanFilter_GetXHat_Single.vi					
	X			X				UnscentedKalmanFilter_New.vi					
	X			X				UnscentedKalmanFilter_New_Default.vi					
	X			X				UnscentedKalmanFilter_New_FuncGroup.vi					
	X	X		X				UnscentedKalmanFilter_Predict.vi					
	X	X		X				UnscentedKalmanFilter_Reset.vi					
	X	X		X				UnscentedKalmanFilter_SetP.vi					
	X	X		X				UnscentedKalmanFilter_SetXHat.vi					
	X	X		X				UnscentedKalmanFilter_SetXHat_Single.vi					
	X			X				UnscentedKalmanFilter_Transform.vi					

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STATE SPACE CONTROL

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CONTROL AFFINE PLANT INVERSION FEEDFORWARD	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking

LINEAR PLANT INVERSION FEEDFORWARD	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X				LinearPIntInvFF_Calculate.vi					
	X	X		X				LinearPIntInvFF_Calculate_NextR.vi					
	X	X		X				LinearPIntInvFF_GetUff.vi					
	X	X		X				LinearPIntInvFF_New.vi					
	X	X		X				LinearPIntInvFF_New_Plant.vi					
	X	X		X				LinearPIntInvFF_Reset_Initial.vi					
	X	X		X				LinearPIntInvFF_Reset_Zero.vi					
	X	X		X				LinearPIntInvFF_GetUff_Single.vi					
	X	X		X				LinearPIntInvFF_GetR.vi					
	X	X		X				LinearPIntInvFF_GetR_Single.vi					

## FRC LabVIEW Trajectory Library – VI Implementation List

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

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Linear System	Implemented	Documented	Not WPLIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X				LinearSystem_CalculateX.vi					
	X	X		X				LinearSystem_CalculateY.vi					
	X	X		X				LinearSystem_GetA.vi					
	X	X		X				LinearSystem_GetAElement.vi					
	X	X		X				LinearSystem_GetB.vi					
	X	X		X				LinearSystem_GetBElement.vi					
	X	X		X				LinearSystem_GetC.vi					
	X	X		X				LinearSystem_GetCElement.vi					
	X	X		X				LinearSystem_GetD.vi					
	X	X		X				LinearSystem_GetDElement.vi					
	X	X		X				LinearSystem_New.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM LOOP	X	X		X				LinearSystemLoop_ClampInput.vi					
	X	X		X				LinearSystemLoop_Correct.vi					
								LinearSystemLoop_GetClampFunction.vi					
	X	X		X				LinearSystemLoop_GetController.vi					
	X	X		X				LinearSystemLoop_GetError_Single.vi					
	X	X		X				LinearSystemLoop_GetError.vi					
	X	X		X				LinearSystemLoop_GetFeedForward.vi					
	X	X		X				LinearSystemLoop_GetNextR_Single.vi					

X	X		X				LinearSystemLoop_GetNextR.vi					
X	X		X				LinearSystemLoop_GetObserver.vi					
X	X		X				LinearSystemLoop_GetU_Row.vi					
X	X		X				LinearSystemLoop_GetU.vi					
X	X		X				LinearSystemLoop_GetXHat_Single.vi					
X	X		X				LinearSystemLoop_GetXHat.vi					
							LinearSystemLoop_New_BBB					
							LinearSystemLoop_New_LinearSystem_ClampFunc					
X	X		X				LinearSystemLoop_New_LinearSystem_ClampVal.vi					
X	X		X				LinearSystemLoop_New.vi					
X	X		X				LinearSystemLoop_Predict.vi					
X	X		X				LinearSystemLoop_Reset.vi					
							LinearSystemLoop_SetClampFunction.vi					
							LinearSystemLoop_SetNextR_Some.vi					
X	X		X				LinearSystemLoop_SetNextR.vi					
							LinearSystemLoop_SetXHat_Single.vi					
							LinearSystemLoop_SetXHat.vi					

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STATE SPACE UTILITIES

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CALLBACK HELPER	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X		X	X				CallbackHelp_MatrixMinus.vi					
	X		X	X				CallbackHelp_MatrixMult.vi					
	X		X	X				CallbackHelp_MatrixMult_CoerceSizeB.vi					
	X		X	X				CallbackHelp_MatrixPlus.vi					

DISCRETIZATION	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X		X		Discretization_DiscretizeA.vi					
	X	X		X		X		Discretization_DiscretizeAB.vi					
	X	X		X		X		Discretization_DiscretizeABTaylor.vi					
								Discretization_DiscretizeAQ.vi					
	X	X		X		X		Discretization_DiscretizeAQTaylor.vi					
	X	X		X				Discretization_DiscretizeR.vi					

STATE SPACE UTIL	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X		X		StateSpaceUtil_MakeCostMatrix.vi					
	X	X		X		X		StateSpaceUtil_MakeCovarianceMatrix.vi					
	X	X		X				StateSpaceUtil_MakeWhiteNoiseVector.vi					
	/	X						StateSpaceUtil_IsStabalizable.vi					
	X	X		X				StateSpaceUtil_PoseToVector.vi					



X	X		X				StateSpaceUtil_ClampInputMaxMagnitude.vi		Routine exists, it is just a shell			
X	X		X				StateSpaceUtil_NomalizeInputVector.vi					
X	X		X				StateSpaceUtil_PoseTo4dVector.vi					
X	X		X				StateSpaceUtil_PoseTo3dVector.vi					

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SIMULATION

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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
BATTERY SIM	X	X		X				BatterySim_CalculateDefaultBatteryLoadedVoltage.vi					
	X	X		X				BatterySim_CalculateLoadedVoltage.vi					
DIFFERENTIAL DRIVE TRAIN SIM	X							DiffDriveTrainSim_ClampInput.vi					
	X			X				DiffDriveTrainSim_CreateKitbotSim.vi					
	X			X				DiffDriveTrainSim_CreateKitbotSim_EstMass.vi					
	X			X				DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi					
	X			X				DiffDriveTrainSim_GetCurrentDrawAmps.vi					
	X			X				DiffDriveTrainSim_GetCurrentGearing.vi					
	X			X				DiffDriveTrainSim_GetDynamics.vi					
	X			X				DiffDriveTrainSim_GetHeading.vi					
	X			X				DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi					
	X			X				DiffDriveTrainSim_GetLeftPositionMeters.vi					
	X			X				DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi					
	X			X				DiffDriveTrainSim_GetOutput_Single.vi					
	X			X				DiffDriveTrainSim_GetPose.vi					
	X			X				DiffDriveTrainSim_GetRightCurrentDrawAmps.vi					
	X			X				DiffDriveTrainSim_GetRightPositionMeters.vi					
	X			X				DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi					
	X			X				DiffDriveTrainSim_GetState.vi					
	X			X				DiffDriveTrainSim_GetState_Single.vi					
	X			X				DiffDriveTrainSim_KitBotWheelSize.vi					
	X			X				DiffDriveTrainSim_New.vi					
	X			X				DiffDriveTrainSim_New_Mass_MOI.vi					
	X			X				DiffDriveTrainSim_SetCurrentGearing.vi					
	X			X				DiffDriveTrainSim_SetInputs.vi					
	X			X				DiffDriveTrainSim_SetPose.vi					
	X			X				DiffDriveTrainSim_SetState.vi					
	X			X				DiffDriveTrainSim_ToughBoxMiniGearRatio.vi					
	X			X				DiffDriveTrainSim_ToughBoxMiniMotor.vi					
	X			X				DiffDriveTrainSim_Update.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
ELEVATOR SIM	X			X				ElevatorSim_New.vi					
	X			X				ElevatorSim_GetCurrentDraw.vi					
	X			X				ElevatorSim_GetPositionMeters.vi					
	X			X				ElevatorSim_GetVelocityMetersPerSecond.vi					
	X			X				ElevatorSim_SetInputVoltage.vi					
	X			X				ElevatorSim_UpdateX.vi					
	X			X				ElevatorSim_WouldHitLowerLimit.vi					
	X			X				ElevatorSim_WouldHitUpperLimit.vi					
	X		X	X				ElevatorSim_Update.vi		Needed because this doesn't extend.			
	X			X				ElevatorSim_HasHitLowerLimit.vi					
	X			X				ElevatorSim_HasHitUpperLimit.vi					
	X		X					ElevatorSim_RKF45_Func.vi					
								ElevatorSim_New_NoNoise.vi					
								ElevatorSim_New_LinSys.vi					
								ElevatorSim_New_LinSys_NoNoise.vi					
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
FLYWHEEL SIM	X			X				FlyWheelSim_GetAngularVelocityRadPerSec.vi					
	X			X				FlyWheelSim_New_MOI.vi					
	X			X				FlyWheelSim_SetInput.vi					
	X			X				FlyWheelSim_Update.vi					
	X			X				FlyWheelSim_GetCurrentDrawAmps					
	X			X				FlyWheelSim_GetAngularVelocityRPM.vi					
								FlyWheelSim_New_LinSys_NoNoise		Future			
								FlyWheelSim_New_LinSys		Future			
								FlyWheelSim_New_LinSys_MOI_NoNoise		Future			
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM SIM	X			X				LinearSystemSim_GetOutput.vi					
	X			X				LinearSystemSim_GetOutput_Single.vi					
	X			X				LinearSystemSim_New					
	X			X				LinearSystemSim_SetInput_Single.vi					
	X			X				LinearSystemSim_Update.vi					
	X			No				LinearSystemSim_UpdateX.vi					
	X		X	No				LinearSystemSim_UpdateY.vi					
								LinearSystemSim_New_NoNoise.vi					
	X			X				LinearSystemSim_SetInput.vi					
	X			X				LinearSystemSim_SetInput_Array.vi		Doesn't use clamp ?			
	X			X				LinearSystemSim_Setstate.vi					
								LinearSystemSim_GetCurrentDrawAmps.vi		DONT IMPLEMENT...			
	X							LinearSystemSim_ClampInput.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
SINGLE JOINT ARM SIM	X	X		X				SngJntArmSim_EsitmateMOI.vi					
	X	X		X				SngJntArmSim_GetAngleRads.vi					
	X	X		X				SngJntArmSim_GetCurrentDraw.vi					
	X	X		X				SngJntArmSim_GetVelocityRadsPerSec.vi					
	X	X		X				SngJntArmSim_HasHitLowerLimit.vi					
	X	X		X				SngJntArmSim_HasHitUpperLimit.vi					
	X	X		X				SngJntArmSim_New.vi					
	X	X						SngJntArmSim_Rkf45_Func.vi					
	X	X		X				SngJntArmSim_SetInputVoltage.vi					
	X			X				SngJntArmSim_Update.vi					
	X	X		X				SngJntArmSim_UpdateX.vi					
	X	X		X				SngJntArmSim_WouldHitLowerLimit.vi					
	X	X		X				SngJntArmSim_WouldHitUpperLimit.vi					

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MATRIX UTILITIES

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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
MAT BUILDER	X			X				MatBuilder_Fill.vi					
	X			X				MatBuilder_Create.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX	X	X		X				Matrix_AssignBlock.vi					
	X	X		X				Matrix_Block.vi					
	X	X		X				Matrix_Create.vi					
	X	X		X				Matrix_Diag.vi					
	X	X		X				Matrix_ElementSum.vi					
	X	X		X				Matrix_Exp.vi					
	X	X		X				Matrix_ExtractColumnVector.vi					
	X	X		X				Matrix_ExtractFrom.vi					
	X			X				Matrix_ExtractMatrix.vi					
	X	X		X				Matrix_ExtractRowVector.vi					
	X	X		X				Matrix_Fill.vi					
	X	X		X				Matrix_Ident.vi					
	X	X		X				Matrix_IsEqual.vi					
	X	X		X				Matrix_LitDecompose.vi					
	X	X		X				Matrix_Pow.vi					
	X	X		X				Matrix_SetColumn.vi					
	X	X		X				Matrix_SetRow.vi	THERE ARE LOTS OF OTHER MATRIX FUNCTIONS THAT SHOULD BE INCLUDED HERE FOR ISOLATION.				

## FRC LabVIEW Trajectory Library – VI Implementation List

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX HELPER	X		X	X				MatrixHelper_Zero.vi					
	X		X	X				MatrixHelper_CooerceSize.vi					
	X		X	X				MatrixHelper_MultCooerceBSize.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
VECTOR BUILDER	X	X		X				VecBuilder_1x1Fill.vi					
	X	X		X				VecBuilder_2x1Fill.vi					
	X	X		X				VecBuilder_3x1Fill.vi					
	X	X		X				VecBuilder_4x1Fill.vi					
	X	X		X				VecBuilder_5x1Fill.vi					
	X	X		X				VecBuilder_6x1Fill.vi					
	X	X		X				VecBuilder_7x1Fill.vi					
	X	X		X				VecBuilder_8x1Fill.vi					
								VecBuilder_9x1Fill.vi					
								VecBuilder_10x1Fill.vi					
	X	X	X	X				VecBuilder_ArrayBy1Fill.vi					

## MATH

ANGLE STATISTICS	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X		X		AngleStats_AngleAdd.vi					
	X	X	X	X				AngleStats_AngleAdd_CallbackHelp.vi					
	X	X		X		X		AngleStats_AngleMean.vi					
	X	X	X	X				AngleStats_AngleMean_CallbackHelp.vi					
	X	X		X		X		AngleStats_AngleResidual.vi					
	X	X	X	X				AngleStats_AngleResidual_CallbackHelp.vi					

MATH UTILITY	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
X	X		X				MathUtil	AngleModulus.vi					

X	X		X				MathUtil_Clamp.vi					
X	X		X				MathUtil_ApplyDeadband.vi					
X	X		X				MathUtil_Clamp_Int.vi					
X	X		X				MathUtil_InputModulus.vi					

MERWE SCALED SIGMA POINTS	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X				MerweScSigPts_ComputeWeights.vi					
	X	X		X				MerweScSigPts_GetNumSigmas.vi					
	X	X		X				MerweScSigPts_GetWc.vi					
	X	X		X				MerweScSigPts_GetWc_Single.vi					
	X	X		X				MerweScSigPts_GetWm.vi					
	X	X		X				MerweScSigPts_GetWm_Single.vi					
	X	X		X				MerweScSigPts_New.vi					
	X	X		X				MerweScSigPts_New_Default.vi					
	X	X		X				MerweScSigPts_SigmaPoints.vi					

NUMERICAL INTEGRATION	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X			No				NumIntegrate_Func_Ax_Bu_K.vi					
	X			No				NumIntegrate_Func_Bs.vi					
	X			No				NumIntegrate_Func_Ch.vi					
	X			No				NumIntegrate_Func_Ct.vi					
	/			X				NumIntegrate_Rk4_Dbl.vi		NOT DONE			
	/			X				NumIntegrate_Rk4_K_Dbl.vi		NOT DONE			
	X			X				NumIntegrate_Rk4_Mat_X.vi					
	X			X				NumIntegrate_Rk4_Mat_X_U.vi					
	X			X				NumIntegrate_Rkf45.vi					
	X			No				NumIntegrate_Rkf45Impl.vi					
	X			X				NumIntegrate_Trap_Dbl.vi					
	X			X				NumIntegrate_Trap_Mat.vi					

NUMERICAL JACOBIAN	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X	X		X				NumJacobian_X.vi		There are others that may need implemented.			
	X			X				NumJacobian_U.vi					

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
RICCATI	/			X				Riccati_Check_Detectable.vi		Routine exists, it is just a shell			
	/			X				Riccati_Check_Stabilizable.vi		Not really done !!!			
	X	X		X		X		Riccati_DARE.vi					
	X			X		X		Riccati_DARE_Iterate.vi					
	X	X		X				Riccati_DARE_N.vi					
	X			X				Riccati_Input_Check.vi					

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TYPE DEFINITIONS

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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
TypeDef	Z		X	X	N/A			ARM_FF.CTL		
	/		X	X	N/A			BIcon-Matrix_FUNC_TYPE.CTL		
	Z		X	X	N/A			CALLBACK_FUNC_TYPE.CTL		
	Z	X	X	X	N/A			CHASSIS_SPEEDS.CTL		
	Z	X	X	X	N/A			CONSTRAINED_STATE.CTL		
	Z		X	X	N/A			DCMOTOR.CTL		
	Z	X	X	X	N/A			DIFF_DRIVE_KINEMATICS.CTL		
	Z		X	X	N/A			DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctf		
	Z		X	X	N/A			DiFF_DRIVE_POSE_EST.ctf		
	Z		X	X	N/A			DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctf		
	Z		X	X	N/A			DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctf		
	Z		X	X	N/A			DIFF_DRIVE_TRAIN_SIM.ctf		
	Z		X	X	N/A			ELEVATOR_SIM.CTL		
	Z		X	X	N/A			ELEV_FF.CTL		
	Z		X	X	N/A			EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL		
	Z		X	X	N/A			ExTENDED_KALMAN_FILTER.CTL		
	Z		X	X	N/A			FLYWHEEL_SIM.ctf		
	Z		X	X	N/A			HOLONOMIC_DRV_CTRL.CTL		New 1/26/21
	Z		X	X	N/A			KALMAN_FILTER.ctf		
	Z		X	X	N/A			KALMAN_FILTER_LATENCY_COMP.CTL		
	Z	X	X	X	N/A			LINEAR_FILTER.CTL		
	Z		X	X	N/A			LINEAR_PLANT_INV_FF.ctf		
	Z		X	X	N/A			LINEAR_QUADRATIC_REGULATOR.ctf		
	Z		X	X	N/A			LINEAR_SYSTEM_LOOP.ctf		
	Z		X	X	N/A			LINEAR_SYSTEM_SIM.ctf		
	Z		X	X	N/A			LINEAR_SYSTEM.ctf		
	Z	X	X	X	N/A			MECA_DRIVE_KINEMATICS.CTL		
	Z	X	X	X	N/A			MECA_DRIVE_ODOMETRY.CTL		
	Z	X	X	X	N/A			MECA_WHEEL_SPEEDS.CTL		
	Z		X	X	N/A			MEDIAN_FILTER.CTL		
	Z		X	X	N/A			MERWE_SCALED_SIGMA_PTS.ctf		
	Z		X	X	N/A			OBSERVER_SNAPSHOT.CTL		
	Z		X	X	N/A			OBSERVER_SNAP_LIST_ITEM.CTL		
	Z	X	X	X	N/A			PARAM_STACK_ITEM.CTL		
	Z	X	X	X	N/A			PARAM_STACK.CTL		
	Z		X	X	N/A			PID_ADV_LIMITS.CTL		
	Z		X	X	N/A			PID_ADV_TUNING.CTL		

FRC LabVIEW Trajectory Library – VI Implementation List

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

Z		X	X	N/A		PID_CONTROLLER.CTL		
Z		X	X	N/A		PID_ERROR_TOLERANCE.CTL		
Z		X	X	N/A		PID_INPUT_LIMITS.CTL		
Z		X	X	N/A		PID_TUNING.CTL		
Z	X	X	X	N/A		POSE2D.CTL		
Z	X	X	X	N/A		POSEwCURVATURE.CTL		
Z		X	X	N/A		PROFIED_PID_CONTROLLER.CTL		
Z	X	X	X	N/A		RAMSETE.CTL		
Z	X	X	X	N/A		ROTATION2D.CTL		
Z		X	X	N/A		SINGLE_JOINT_ARM_SIM.CTL		
Z	X	X	X	N/A		SIMPLE_MOTOR_FF.CTL		
Z		X	X	N/A		SLEW_RATE_LIMITER.CTL		
Z	X	X	X	N/A		SPLINE_CTRL_VECTOR.CTL		
Z	X	X	X	N/A		SPLINE.CTL		
Z	X	X	X	N/A		SWERVE_DRIVE_KINEMATICS.CTL		
Z	X	X	X	N/A		SWERVE_DRIVE_MODULE_STATE.CTL		
Z	X	X	X	N/A		SWERVE_DRIVE_ODOMETRY.CTL		
Z			X	N/A		SWERVE_DRIVE_POSE_EST.CTL		
Z		X	X	N/A		TIMER.CTL		
Z	X	X	X	N/A		TRAJ_CONFIG.CTL		
Z	X	X	X	N/A		TRAJ_CONSTRAINT_CENTRIPETAL_ACCEL.CTL		
Z	X	X	X	N/A		TRAJ_CONSTRAINT_DIFF_DRIVE_KINEMATICS.CTL		
Z	X	X	X	N/A		TRAJ_CONSTRAINT_DIFF_DRIVE_VOLTAGE.CTL		
I		X		N/A		TRAJ_CONSTRAINT_JERK.CTL		Routine exists, it is just a shell
Z	X	X	X	N/A		TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL		
Z	X	X	X	N/A		TRAJ_CONSTRAINT_MINMAX.CTL		
Z	X	X	X	N/A		TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL		
Z	X	X	X	N/A		TRAJ_STATE.CTL		
Z	X	X	X	N/A		TRAJECTORY.CTL		
Z	X	X	X	N/A		TRANSFORM2D.CTL		
Z	X	X	X	N/A		TRANSLATION2D.CTL		
Z		X	X	N/A		TRAPEZOID_PROFILE_CONSTRAINT.CTL		
Z		X	X	N/A		TRAPEZOID_PROFILE_STATE.CTL		
Z		X	X	N/A		TRAPEZOID_PROFILE.CTL		
Z	X	X	X	N/A		TWIST2D.CTL		
Z		X	X	N/A		UNSCENTED_KALMAN_FILTER.ctf		
Z		X	X	N/A		UNSCENTED_KALMAN_NEW_FUNC_GROUP.CTL		
Z		X	X	N/A		UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL		
Z	X	X	X	N/A		UTIL_PATHFINDER_CONFIG.CTL		
Z	X	X	X	NA		UTIL_WAYPOINT.ctf		
Z		X	X	NA		UTIL_WEIGHTED_WAYPOINT.ctf		New V1.5
N/A		N/A		N/A		WAYPOINTS.CTL		Delete – obsolete
Z		X	X	NA		WEIGHTED_WAYPOINT.CTL		New V1.5
N/A		N/A		N/A		X_Y_HEADINGS.CTL		Delete – obsolete