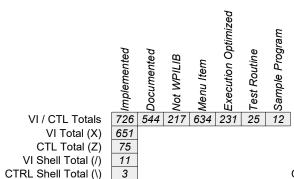
Revision 2.X 11/12/2021 - State Space Items - (This list is still missing one VI....) Added additional columns for test and sample.

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



| x | x | x | x | x

Doc completed Pct 74.93% Optimization Pct 31.82%

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

LinearFilter TimeConst.vi

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

> Sample Program
> IN ame Not WPILIB Function Prototype Notes LINEAR FILTER X X LinearFilter Calculate.vi X SI LinearFilter_CutoffFrequency.vi X LinearFilter Execute.vi Labview style helper X X X X X X X X LinearFilter HighPass.vi LinearFilter_HighPassBW1.vi X X X X LinearFilter_HighPassBW2.vi X X X X LinearFilter LowPassBW1.vi X X X X X LinearFilter LowPassBW2.vi XX XX LinearFilter_MovingAverage.vi XX XI LinearFilter New.vi XX X SI LinearFilter Reset.vi X X X X SI LinearFilter ResetToValue.vi LinearFilter SinglePoleIIR.vi $X \mid X$ XX

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

X X X

ArmFF_MinAchieveVelocity.vi ArmFF_New.vi
ArmFF_New_ZeroGravity.vi

orary – VI Implementation	l ist									
		issing	one	VI) Add	ded ac	dditio	nal columns for test and sample.	_	
SLEW RATE FILTER	X X X X	X X X X X X X X X X X X X X X X X X X	X X X X	X X Wenu Item	☑ Execution Optimized	Test Routine	X	VI Name SlewRateLimiter_Calculate.vi SlewRateLimiter_Close.vi SlewRateLimiter_Execute.vi SlewRateLimiter_GetRate.vi SlewRateLimiter_New.vi SlewRateLimiter_NewlitalZero.vi SlewRateLimiter_Reset.vi	Function Prototype	Notes Labview style helper
	\hat{X}	\hat{x}		X	SI			SlewRateLimiter SetRate.vi		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program			
				Ž	Щ	7e		VI Name		Notes
TIMER			Χ	X				Timer_Close.vi		releases semaphore
-	X	X		X				Timer_Get.vi		
	X	X	Χ	X				Timer_GetAndReset.vi		
-	X	X	Χ	No				Timer_GetInternal.vi		Internal (private) only
	Χ	Χ		X				Timer_HasPeriodPassed.vi		
	Χ	Χ	Χ	X				Timer_HasPeriodPassedOnce.vi		
	Χ	Χ		Χ				Timer_New.vi		
	Χ	Χ		Χ				Timer_Reset.vi		
	Χ		Χ	No				Timer_ResetInternal		Internal (private) only
	Χ	X		X				Timer_Start.vi		
	Χ	X		X			X	Timer_Stop.vi		
	Χ	Χ	Χ	No				Timer_StopInternal.vi		Internal (private) only
_										

'======== CONTROLLER '========

> ARM FF X X X Test Routine Not WPILIB X Menu Item Function Prototype Notes ArmFF_Calculate.vi
> ArmFF_CalculateVelocityOnly.vi X ArmFF_Execute.vi
> ArmFF_ExecuteVelocityOnly.vi
> ArmFF_MaxAchieveAccel.vi LabVIEW style single call LabVIEW style single call X X X X X X X Χ ArmFF_MaxAchieveVelocity.vi Χ Χ ArmFF_MinAchieveAccel.vi X X X X X X

ry – VI Implementation	List							_	
Space Items – (This list is s	still m	issin	g one	VI) Add	ded add	ditional columns for test and sample.		
					nize		E		
	Ø	75			Execution Optimiz	(I)	Program		
	Implemented	Documented	-IB	E	0	Test Routine	Ŏ C		
	neı	ner	Not WPILIB	Menu Item	ţio	Sou	⊕ 		
)er	'n	3	nn) SCU	# H	ତ୍ର ପ୍ରଥି VI Name		
	ш	õ	Ş	Me	ιĭi	Jes	S VI Name	Function Prototype	Notes
CONTROLLER UTIL		X		X	7		ControllerUtil GetModulusError.vi		This was short lived in WPILIB, but
									still useful here.
_							·		
					eq.				
					πiz		E		
	75	~			ptii	45	gra		
	μeα	ţec	18	и	0	iine	Program		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Φ.		
	len	'n	\leq	שַ	cn	t R	ବୁର୍ଯ୍ୟ VI Name		
	dμ	8	Įot	Je.	š	es	S VI Name	Function Prototype	Notes
ELEV FF		X	_<_	X	Щ	_	ElevFF_Calculate.vi	T direction i rototype	140103
CLCV FF	X	X		\hat{x}			ElevFF CalculateVelocityOnly.vi		
	^	^	X	^			ElevFF Execute.vi		LabVIEW style single call
			X				ElevFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	Χ	Χ	^	Х			ElevFF MaxAchieveAccel.vi		Labvievi style siligle call
	X	X		X			ElevFF_MaxAchieveAccel.vi		
	X	X		X			ElevFF MinAchieveAccel.vi		
-	X	X		X			ElevFF MinAchieveAccei.vi		
-				X			ElevFF New.vi		
-	X	X		X			ElevFF New ZeroAccel.vi		
L	^	^		\			Elever_New_ZeroAccel.vi		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nampe Program	Function Prototype	Notes
HOL_DRV_CTRL		X		X			HolDrvCtrl AtReference.vi		Added 1/26/21
	Χ	X		X			HolDrvCtrl_Calculate.vi		Added 1/26/21
	Χ	X		X			HolDrvCtrl_Calculate_Trajectory.vi		Added 1/26/21
			Χ				HolDrvCtrl_Execute.vi		Future
			Χ				HolDrvCtrl_Execute_Trajectory.vi		Future
	Χ	X X		X			HolDrvCtrl_New.vi		Added 1/26/21
	Χ	Χ		X			HolDrvCtrl_SetEnabled.vi		Added 1/26/21
	Χ	X		X			HolDrvCtrl_SetTolerance.vi		Added 1/26/21
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Nample Program	Function Prototype	Notes
PID CONTROLLER		X	\overline{X}	X			PIDController_AdvCalculate_FF_Sp_Pv.vi	·-··· · · · · · · · · · · · · · · · · ·	Advanced PID
	X		X				PIDController AdvCalculate FF Sp Pv Per.vi		Advanced PID
	X	X	X	X			X PIDController_AdvExecute.vi		Labview style helper. Advanced PID
	Χ	X		X			PIDController_AtSetpoint.vi		
	Χ	Χ		Χ			PIDController_Calculate_PV.vi		
	Χ	Χ		X			PIDController_Calculate_SP_PV.vi		
	Χ	Χ		X			PIDController_DisableContinousInput.vi		
X X X PIDController_EnableContinousInput.vi X X X X PIDController_Execute.vi							PIDController_EnableContinousInput.vi		
							X PIDController_Execute.vi		Labview style helper
PIDController_GetContinuousError.vi									OBSOLETE – Removed
X X PIDController_GetPeriod.vi									
	Χ	X		X			PIDController_GetPID.vi		
	Χ	X		X			PIDController_GetPositionError.vi		
							-	•	•

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

SSU	missir	ıg one	VI) Added a	dditional columns for test and sample.	
)			X		PIDController_GetSetpoint.vi	
_	(X		X		PIDController_GetVelocityError.vi	
>			X		PIDController_IsContinuousInputEnabled.vi	
)			X		PIDController_New.vi	
	(X		X		PIDController_NewPeriod.vi	
	(X	X	SI	PIDController_Pack_AdvLimits.vi	
	(X	X	SI	PIDController_Pack_AdvTuning.vi	
	(X	X	SI	PIDController_Pack_ErrorTolerance.vi	
	(X	X	SI	PIDController_Pack_InputLimits.vi	
	(X	X	SI	PIDController_Pack_Tuning.vi	
)			X		PIDController_Reset.vi	
			X		PIDController_SetD.vi	
)	(X	X	X		PIDController_SetDerivativeFilter.vi	Advanced PID
)	(X	X	No		PIDController_SetFeedForward.vi	Advanced PID, Obsolete – DELETE
)	(X	X	No		PIDController_SetFFGain.vi	Advanced PID, Obsolete – DELETE
)	(X		X		PIDController_Setl.vi	
					PIDController_SetInputRange.vi	OBSOLETE – Removed
>	(X		X		PIDController_SetIntegratorRange.vi	
)	(X	X	X		PIDController_SetOutputLimits.vi	Advanced PID
)	(X		X		PIDController_SetP.vi	
)	(X	X	X		PIDController_SetPeriod.vi	
)	_		X		PIDController_SetPID.vi	
)	(X	X	X		PIDController_SetPIDF.vi	Advanced PID
)	(X		X		PIDController_SetSetpoint.vi	
)			X		PIDController_SetTolerance.vi	
)	(X		X		PIDController_SetTolerancePandV.vi	

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program amen In				Function Prototype		Notes
PROFILED PID CONTROLLER		X		X					_AtGoal.vi				
	Χ	Χ		X					_AtSetpoint.vi				
	Χ	Χ		X					_Calculate_Meas				
	Χ	X		X					_Calculate_Meas				
	X	X		X					_Calculate_Meas				
	Χ	Χ		X						_StateGoal_TrapCns	srt.vi		
	X	X		X					_DisableContInpu				
	X	X		X					_EnableContInpu	t.VI			
	X	X		X					_GetGoal.vi				
	X	X	V	X					_GetPeriod.vi				MOULD be a second of the second
	X	X	Χ	X					_GetPID.vi				WPILIB has separate getters.
	X	X		X					_GetPositionError GetSetpoint.vi	r.VI			
-	\hat{X}	\dot{X}		X					_GetVelocityErro	- vi			
	X	X		X				Controller		.VI			
	X	X		X					_NewPeriod.vi				
	X	X		X				Controller	_				
	\tilde{x}	\overline{x}		X					Reset PosOnly.	vi			
	X	\overline{X}		X					Reset PosVel.v				
	X	X		X					SetConstraints.v				
	X	X		X					SetGoal.vi				
	X	X		X					_SetGoal_PosOn	ly.vi			
	X	Χ		X									
	Χ	Χ		X					SetPID.vi				
	Χ	Χ		X			ProfiledP	Controller	_SetTolerance_P	osOnly.vi			
	Χ	Χ		X					SetTolerance_P				

	s list is still !	miss	mig Ul	ie vi.	, 🗥	ided add	tional columns for test and sample.	-	
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					Optimiz				
	ted	7	ξ α	ے د	, g	ine			
	Implemented	,	Not WPII IB	Menu Item	Execution	Test Routine			
	len		5 \$: 7	crt 2	t R			
	dm	ځ :	3 5	غ ۾	ž š	Test Rou	VI Name	Function Prototype	Notes
RAI	MSETE X				SI		Ramsete New.vi	new	110.00
	X		x		(SI		Ramsete New B Z.vi	new(b, zeta)	
	X			X	(X		Ramsete_Calculate.vi	calculate	
	X				(X		Ramsete_Calculate_Trajectory.vi	calculate_trajectory	
	X			X	(SI		Ramsete_AtReference.vi	AtReference	
	X		X .		(SI		Ramsete_SetEnabled.vi	SetEnabled	
	X			+	(SI		Ramsete_SetTolerance.vi	SetTolerance	intownal
	X				(X		Ramsete_SINC.vi Ramsete_Diff_DO_Eng.vi	sinc	internal
	X	/ 	х х х х	$\langle \rangle$	(X		Ramsete Diff DO SI.vi		
			· ^	^			Nainsete_Dill_DO_SI.VI		
					g				
					ize				
					Optimizea				
	þ	3	ۍ <u>۱</u>	^	Õ	e			
	ente.	, ,	3 5	; ;	: 6	uţi.			
	eme		3 8	. #	utic	Ro.			
	Implemented	į ?	Not WPII IB	Menu Item	Execution	Test Routine	VI Name		
					<u>: </u>	¥ ,	5 VI Name		Notes
SIMPLE MOTOR FEEDFOR	RWARD X	(X	(X	(SI		SimpleMotorFF_New.vi	public SimpleMotorFeedforward(double ks, double kv, double ka)	
								public SimpleMotorFeedforward(double ks, double kv)	
	X	<i>(</i>)	<	У	(SI		SimpleMotorFF Calculate.vi	public double calculate(double velocity, double acceleration)	
	X			X	(SI		SimpleMotorFF_CalculateVelocityOnly.vi	public double calculate(double velocity)	
			Х	_			SimpleMotorFF_Execute.vi		LabVIEW style single call
			Х				SimpleMotorFF_ExecuteVelocityOnly.vi		LabVIEW style single call
	X	: >	X	X	<i>X</i>		SimpleMotorFF_MaxAchieveVel.vi	public double maxAchievableVelocity(double maxVoltage, double	
		\bot		\perp				acceleration)	
	X	(X		X	<i>X</i>		SimpleMotorFF_MinAchieveVel.vi	public double minAchievableVelocity(double maxVoltage, double	
	X	/ ,	_	+	(X		SimpleMotorFF_MaxAchieveAccel.vi	acceleration) public double maxAchievableAcceleration(double maxVoltage,	
	^	1	×	^			SimplewotorF_iviaxAchieveAccel.vi	double velocity)	
	X	()	\prec		(X		SimpleMotorFF_MinAchieveAccel.vi	public double minAchievableAcceleration(double maxVoltage,	
		1	`	^`			emplemeter r _initia temever teeevi	double velocity)	
====									
TRY									
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	nplemer		ot M/Pii	o. vvr iL enii Itor	xecution	est Ro	NI Nama	Function Destatune	Natas
	Implemented		Not WPII IB	Menu Item	Execution	Test Routine	VI Name		Notes
	POSE							pose2d new()	Notes can use cluster constant
	POSE	()	X	X	(SI		Pose_New_TRRO.vi	pose2d new() pose2d new(translation2d, rotation2d)	
	POSE X		X X	X	(SI		Pose_New_TRRO.vi Pose_New.vi	pose2d new() pose2d new(translation2d, rotation2d) pose2d new(double x, double y, rotation2d)	
	POSE X X X		X X	X X	(SI (SI (SI		Pose_New_TRRO.vi Pose_New.vi Pose_Plus.vi	pose2d new() pose2d new(translation2d, rotation2d) pose2d new(double x, double y, rotation2d) pose2d plus(transform2d other)	
	POSE X X 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		Pose_New_TRRO.vi Pose_New.vi Pose_Plus.vi Pose_Minus.vi	pose2d new() pose2d new(translation2d, rotation2d) pose2d new(double x, double y, rotation2d) pose2d plus(transform2d other) transform2d minus(pose2d other)	can use cluster constant
	POSE X X X X X X		X	X X X	(SI (SI (SI (SI (SI		Pose_New_TRRO.vi Pose_New.vi Pose_Plus.vi Pose_Minus.vi Pose_getTranslation.vi	pose2d new() pose2d new(translation2d, rotation2d) pose2d new(double x, double y, rotation2d) pose2d plus(transform2d other) transform2d minus(pose2d other) translation2d getTranslation()	can use cluster constant
	POSE X X X X X X X		X X X X X	X X X X	(SI (SI (SI (SI (SI (SI		Pose_New_TRRO.vi Pose_New.vi Pose_Plus.vi Pose_Minus.vi Pose_getTranslation.vi Pose_getRotation.vi	pose2d new() pose2d new(translation2d, rotation2d) pose2d new(double x, double y, rotation2d) pose2d plus(transform2d other) transform2d minus(pose2d other) translation2d getTranslation()	can use cluster constant
	POSE X X X X X X X X X X X		X	X X X X	(SI (SI (SI (SI (SI (SI (SI		Pose_New_TRRO.vi Pose_New.vi Pose_Plus.vi Pose_Minus.vi Pose_getTranslation.vi Pose_getRotation.vi Pose_getXY.vi	pose2d new() pose2d new(translation2d, rotation2d) pose2d new(double x, double y, rotation2d) pose2d plus(transform2d other) transform2d minus(pose2d other) translation2d getTranslation()	can use cluster constant
	POSE X X X X X X X X X X X X		X	X	(SI (SI (SI (SI (SI (SI (SI (SI		Pose_New_TRRO.vi Pose_New.vi Pose_Plus.vi Pose_Minus.vi Pose_getTranslation.vi Pose_getRotation.vi Pose_getXY.vi Pose_getXYAngle.vi	pose2d new() pose2d new(translation2d, rotation2d) pose2d new(double x, double y, rotation2d) pose2d plus(transform2d other) transform2d minus(pose2d other) translation2d getTranslation() rotation2d getRotation()	can use cluster constant
	X X X X X X X X X X		X	X	(SI		Pose_New_TRRO.vi Pose_New.vi Pose_Plus.vi Pose_Minus.vi Pose_getTranslation.vi Pose_getRotation.vi Pose_getXY.vi Pose_getXYAngle.vi Pose_TransformBy.vi	pose2d new() pose2d new(translation2d, rotation2d) pose2d new(double x, double y, rotation2d) pose2d plus(transform2d other) transform2d minus(pose2d other) translation2d getTranslation() rotation2d getRotation() pose2d transformby(transform2d other)	can use cluster constant
	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		Pose_New_TRRO.vi Pose_New.vi Pose_Plus.vi Pose_Minus.vi Pose_getTranslation.vi Pose_getRotation.vi Pose_getXY.vi Pose_getXYAngle.vi Pose_TransformBy.vi Pose_RelativeTo.vi	pose2d new() pose2d new(translation2d, rotation2d) pose2d new(double x, double y, rotation2d) pose2d plus(transform2d other) transform2d minus(pose2d other) translation2d getTranslation() rotation2d getRotation() pose2d transformby(transform2d other) pose2d relativeto(pose2d other)	can use cluster constant
	X X X X X X X X X X		X	X	(SI		Pose_New_TRRO.vi Pose_New.vi Pose_Plus.vi Pose_Minus.vi Pose_getTranslation.vi Pose_getRotation.vi Pose_getXY.vi Pose_getXYAngle.vi Pose_TransformBy.vi	pose2d new() pose2d new(translation2d, rotation2d) pose2d new(double x, double y, rotation2d) pose2d plus(transform2d other) transform2d minus(pose2d other) translation2d getTranslation() rotation2d getRotation() pose2d transformby(transform2d other)	

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timplementation				\/I \	۸ ما ما م ما		and advisors for took and assemb	_	
tems – (This list is s	sun m	issing	one	VI)	Added	addill	onal columns for test and sample.		
					ŽĢ.				
					Optimiz	Program			
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	Implemented	Documented	Not WPILIB	Ë		5			
	æ	<u>3</u>	ď	Menu Item	Execution Test Routi	ن ک			
	e	S	3	2	5 4	Sample			
	ď	Ö	ŏ	eu	Exec	i E			
		Ã	Ž	Z	Ш́ř	Š	VI Name	Function Prototype	Notes
ROTATION								rotation2d new()	can use cluster constant
	Χ	Χ		X	SI		Rotation_CreateAngle.vi	rotation2d new(double value)	
	X				SI		Rotation CreateXY.vi	rotation2d new(double x, double y)	
		Χ							
	X	X			SI		Rotation_CreateAngleDegrees.vi	rotation2d fromDegrees(double degrees)	convert to radians then create
	Χ	X		X	SI		Rotation Plus.vi	rotation2d plus(rotation2d other)	
	X	X			SI		Rotation Minus.vi	rotation2d minus(rotation2d other)	
		~							
	Χ	Χ			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	~		SI		Rotation_GetAngleCosSin.vi	Totalioniza rotatos y (rotationiza otrior)	New 1/26/21
			^					1 11 15 II 0	
	Χ	Χ			SI		Rotation_GetRadians.VI	double getRadians()	use cluster unpack
	Χ	X		Χ	SI			double getDegrees()	use cluster unpack, then convert to
									degree
	Χ	X		Χ	SI		Rotation GetCos.VI	double getCos()	use cluster unpack
-	X								
		Χ			SI		Rotation_GetSin.VI	double getSin()	use cluster unpack
	X	Χ			SI		Rotation_GetTan.VI	double getTan()	can calculate
ļ	Χ	X		X	SI		Rotation Equals.vi	boolean equals(rotation2d other)	
l						<u> </u>			
					7				
TRANSFORM	X X Implemented	X X Documented	Not WPILIB	X X	S Execution Optimized	Sample	VI Name Transform_Create_PosePose.vi Transform_Create_TransRot.vi Transform_Times.vi	Function Prototype transform2d new(pose2d, pose2d) transform2d new(translation2d, rotation2d) transform2d new() transform2d times(double scalar)	Notes can use cluster constant
	Χ	X			SI		Transform_GetTranslation.VI	translation2d getTranslation()	use cluster unpack
	Χ	X		X	SI		Transform_GetRotation.VI	rotation2d getRotation()	use cluster unpack
	Χ	X	X	X	SI		Transform GetXY.vi		
	X	X	V	X	SI		Transform_GetXYAngle.vi		
			^				T (
	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
TDANCE ATICS!	_		<	2	ш -	- v)	vi ivallic		1
TRANSLATION								translation2d new()	can use cluster constant
	X	X	_		SI		Translation_Create.vi	translation2d new(double x, double y)	
ļ	Χ	X		X	SI		Translation_Create_DistAng.vi		
	X	X			SI		Translation GetDistance.vi	double getDistance(translation2d other)	
		^							
	Χ	Χ			SI		Translation_GetX.VI	double getX()	can use cluster unpack
	Χ	X	_		SI		Translation_GetY.VI	double getY()	can use cluster unpack
	Χ	X	X		SI		Translation GetXY.VI		
	X	X	-		SI		Translation GetNorm.VI	double getNorm()	can use cluster unpack
									can use cluster unpack
	X	X			SI		Translation_RotateBy.vi	translation2d rotateBy(rotation2d other)	
	X	X			SI		Translation_Plus.vi	translation2d plus(translation2d other)	
	Χ	X			SI		Translation Minus.vi	translation2d minus(translation2d other)	
	X	$\frac{\lambda}{X}$			SI		Translation_UnaryMinus.vi	translation2d unaryminus()	
	Χ	Χ		Χ	SI		Translation_Times.vi	translation2d times(double scalar)	
								translation2d div(double scalar)	can multiply by 1/scalar
	Χ	Χ		Χ	SI		Translation_Equals.vi	boolean equals(translation other)	.,,

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	Function Prototype	Notes
TWIST	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		

	lmp	Doc	Not		Exe	7es	ง VI Name	Function Prototype	Notes
TWIS	T X	X		X	SI		Twist_Create.vi	twist new(x, y, theta)	
		X		X	SI		Twist_Equals.VI	boolean equals(obj other)	
	X	X	X	X	SI		Twist_GetAll.VI		
'========= (/L)=LATIO									
KINEMATICS									
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					Optimizec				
					otin				
	ted	eq.	B	,		ine			
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	len	5	Ž	μ	cnt	t R			
	Implemented	Documented	Not WPILIB	Menu Item	Execution	Test Routine	VI Name	Function Prototype	Notes
CHASSIS SPEED		7					, virvanio	chassisspeeds new ()	can use cluster constant
		X		Х	SI		ChassisSpeeds_New.vi	chassisspeeds new (double xvel, double yvel, double angvel)	
		X		X	SI		ChassisSpeeds_FromFieldRelativeSpeeds.VI	chassisspeeds fromFieldRelativeSpeeds(double x, double y,	
							' - '	double angvel, rotation2d robotangle)	
					75				
					Optimized				
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	Implementea	Documented	Not WPILIB	Menu Item	Execution	Test Routine	NI NI	Formation Donatation a	Nister
DIFFERENTIAL DRIVE KINEMATIC		<u>۵</u>			Щ	X	VI Name DiffKinematics New.vi	Function Prototype diffDriveKine new(double trackWidth)	Notes
DIFFERENTIAL DRIVE KINEMATIC	3 <u>^</u>	X	,	X	X	X	DiffKinematics_toChassisSpeed.vi	chassisSpeeds toChassisSpeeds(diffDrWheelSpeeds)	
	X	$\frac{1}{X}$,	$\frac{\lambda}{X}$	SI	X	DiffKinematics toWheelSpeed.vi	diffDriveWheelSpeeds toWheelSpeeds (chassisSpeeds)	
				1 //	UI I	Λ	Dill till ciliation_tovvilocic pood.vi	umbrivevincerepeed terrineerepeeds (unasersepeeds)	
					pə				
					niz				
	σ	7			Optimized	ø)	VI Name		
	Implementea	Documentec	18	8		Test Routine			
	ие	ne,	į	lte.	tio	gor,	D C C C C C C C C C C C C C C C C C C C		
)ei	'n	Not WPILIB	Wenu Item	Execution	st F			
	Ĕ	_ 	8	Me	ĔX	7e	VI Name	Function Prototype	Notes
DIFFERENTIAL DRIVE ODOMETR	Y							diffDrOdom new(rotation gyro, pose initial)	
								diffDrOdom new(rotation gyro)	
								void resetPosition(pose2d, rotation2d)	incorporated into "update"
	V	V	,	V	V		DiffO describer 1 limited and	pose2d getPoseMeters()) lo
	X	X		X	X		DiffOdometry_Update.vi	pose2d update(rotation2d gyro, double leftdist, double right dist	Incorporates ennanced reset
					pə				
					niz				
	σ	7	;		Optimized	(D)	ຫ ວັດ		
	nte	teα	18	3	0	ıtin,			
	шeі	ne,	Į.	/te	ıtio.	300			
	Implementea	Documente	Not WPILIE	Menu Item	Execution	Test Routine			
		20	₹ 2	Me	Ë	7e	VI Name	Function Prototype	Notes
DIFFERENTIAL DRIVE WHEEL SPEED	S							diffDrWheelSpeeds new()	
				_				diffDrWheelSpeeds new(double leftVel, double rightVel)	
	X	X		X	X		DiffWheel_Normalize.vi	void normalize(double maxVel)	

		Оос	Not	Mer	Exe	Tesi	Name	Function Prototype	Notes
MECANUM DRIVE MOTOR VOLTAGE	dwj	-	_ <	<	Щ	_	Virvanic	Tunction Trototype	Notes
noth	ina di	one							
noun	nig a	0110							
MECANUM DRIVE ODOMETRY	X X Implemented	X X Documented	Not WPILIB	X X Menu Item	Execution Optimized	Test Routine	VI Name MecaOdometry_New.vi MecaOdometry_NewDefaultPose.vi	Function Prototype	Notes
	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	X Implemented	X Documented	Not WPILIB	X Menu Item	X	Test Routine	MecaWheel_New.Vi MecaWheel Normalize.vi	Function Prototype public MecanumDriveWheelSpeeds(double frontLeftMetersPerSecond, double frontRightMetersPerSecond, double rearLeftMetersPerSecond, double rearRightMetersPerSecond) public void normalize(double attainableMaxSpeedMetersPerSecond)	Notes
SWERVE DRIVE KINEMATICS	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine		Function Prototype public SwerveDriveKinematics(Translation2d wheelsMeters)	Notes variable parameters (replace with
	V	V	\ <u> </u>	\ <u> </u>			Comment in a marking May VVII		array and "4" calls)
-	X	X	X	X			SwerveKinematics_NewX.VI		uses array as input
	Χ	Χ	Χ	Χ			SwerveKinematics_New4.VI		For 4 module drives

Notes

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

public SwerveModuleState[]

Translation2d centerOfRotationMeters)

toSwerveModuleStates(ChassisSpeeds chassisSpeeds,

SwerveKinematics_ToSwerveModuleStates.VI

FRC LabVIEW Trajectory Library – VI Implementation							
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	X	X		X	SwerveKinematics_ToSwerveModuleStatesZeroCenter.VI	public SwerveModuleState[] toSwerveModuleStates(ChassisSpeeds chassisSpeeds)	
						public ChassisSpeeds toChassisSpeeds(SwerveModuleState wheelStates)	variable parameters (replace with array and "4" calls)
	Χ	X	Χ	X	SwerveKinematics ToChassisSpeedsX.VI		uses array as input
	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)	
	Implemented	Documented	Not WPILIB	Menu Item Execution Optimized Test Routine Sample Program	VI Name	Function Prototype	Notes
SWERVE DRIVE ODOMETRY	X	X		X	SwerveOdometry_New.VI	public SwerveDriveOdometry(SwerveDriveKinematics kinematics,	
-	X		-	X	SwerveOdometry NewZeroCenter.VI	Rotation2d gyroAngle, Pose2d initialPose) public SwerveDriveOdometry(SwerveDriveKinematics kinematics,	
	, ,	'`				Rotation2d gyroAngle)	
	X			X	SwerveOdometry_ResetPosition.VI	public void resetPosition(Pose2d pose, Rotation2d gyroAngle)	
	Χ			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	X X Implemented	X Documented	Not WPILIB	X X Menu Item S Sample Program	VI Name SwerveModuleState_New.vi SwerveModuleState_CompareTo.vi SwerveModuleState_Optimize.vi	Function Prototype public SwerveModuleState(double speedMetersPerSecond, Rotation2d angle) public int compareTo(SwerveModuleState o) public SwerveModuleState optimize(SwerveModuleState desired, Rotation2d angle)	Notes
SPLINE '=======							
CUBIC HERMITE SPLINE	X		Not WPILIB	X X Menu Item Execution Optimized Test Routine Sample Program	VI Name CubicHermiteSpline_New.vi . CubicHermiteSpline_makeHermiteBasis.vi	public CubicHermiteSpline(double[] xInitialControlVector, double[] xFinalControlVector, double[] yInitialControlVector, double[] yFinalControlVector) protected SimpleMatrix getCoefficients() private SimpleMatrix makeHermiteBasis()	Notes not needed, use cluster unpack
	X	X		X	CubicHermiteSpline_getControlVectorFromArrays.vi	private SimpleMatrix getControlVectorFromArrays(double[]	
		1				initialVector, double[] finalVector)	

e Space Items – (This list is s	still m	issin	g one	VI	.) <u>A</u> d	ded a	dditic	nal columns for test and sample.		
POSE WITH CURVATURE	X Implemented	X Documented	Not WPILIB	X Menu Item	ত Execution Optimize	Test Routine		VI Name PoseWithCurve_New.vi	public PoseWithCurvature(Pose2d poseMeters, double curvatureRadPerMeter)	Notes
									public PoseWithCurvature()	can use cluster constant
									public Pose2d poseMeters public double curvatureRadPerMeter	not needed, use cluster unpack not needed, use cluster unpack
QUINTIC HERMITE SPLINE	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Test Routine		VI Name QuinticHermiteSpline_New.vi	public QuinticHermiteSpline(double[] xInitialControlVector,	Notes
								· -	double[] xFinalControlVector, double[] yInitialControlVector,	
									double[] yFinalControlVector) protected SimpleMatrix getCoefficients()	not needed, use cluster unpac
	X	X		X				QuinticHermiteSpline_makeHermiteBasis.vi QuinticHermiteSpline_getControlVectorFromArrays.vi	private SimpleMatrix makeHermiteBasis() private SimpleMatrix getControlVectorFromArrays(double[] initialVector, double[] finalVector)	
SPLINE (Abstract class)	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype Spline(int degree)	Notes
OF LINE (Abstract class)	X	Χ		X				Spline getPoint.vi	public PoseWithCurvature getPoint(double t)	
								<u> </u>	public static class ControlVector	
			<u> </u>	<u> </u>	Optimized		ram		public ControlVector(double[] x, double[] y)	implemented as data structure
	'mplemented	Documented	Not WPILIB	Menu Item	Execution Op	Test Routine	Sample Progra	VI Name	Function Prototype	Notes
SPLINE HELPER		X		X		X		SplineHelp_GetCubicCtrlVectorsFromWayPts.vi	public static Spline.ControlVector[] getCubicControlVectorsFromWaypoints(Pose2d start, Translation2d[] interiorWaypoints, Pose2d end)	
	X		Χ					SplineHelp_GetCubicCtrlVectorsFromWeightedWayPts.vi SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi	public static List <spline.controlvector></spline.controlvector>	
	X	X	V	X				SplineHelp_GetQuinticCtrlVectorsFromWayPts.vi SplineHelp_GetQuinticCtrlVectorsFromWeightedWayPts.vi	getQuinticControlVectorsFromWaypoints(List <pose2d> waypoints)</pose2d>	
	X	X	X	X		X		SplineHelp_getCubicSplinesFromControlVectors.vi	public static CubicHermiteSpline[]	
									getCubicSplinesFromControlVectors(Spline.ControlVector start, Translation2d[] waypoints, Spline.ControlVector end)	
	X					-		SplineHelp_GetCubicSpline_Calc1.vi		internal
	X		X	No No				SplineHelp_GetCubicSpline_Calc2.vi SplineHelp_GetCubicSpline_Calc3.vi		internal
	X	X	X X	X				SplineHelp_GetCubicSpline_Calc3.vi SplineHelp_getQuinticSplinesFromControlVectors.vi	public static QuinticHermiteSpline[] getQuinticSplinesFromControlVectors(Spline.ControlVector[]	internal
									controlVectors)	

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	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)	3
SPLINE PARAMETERIZER	X X X X X X X X X X	X		X X No)	### SplineParam_Spline.vi SplineParam_Spline_T0_T1.vi	Function Prototype public static List <posewithcurvature> parameterize(Spline spline) public static List<posewithcurvature> parameterize(Spline spline) double t0, double t1)</posewithcurvature></posewithcurvature>	internal internal
	X	X		IVC	,			internal
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	lement	ument	WPILI	nu Iten	cution	t Routi		
	Implemented	Document	Not WPILI	Menu Iten	Execution	Test Routine Sample Prog awa IA	Function Prototype	Notes
TRAJECTOR	X	X		X	SI	Trajectory_New.vi	Function Prototype public Trajectory(final List <state> states)</state>	Notes
TRAJECTORY		X		X X Menu Iten	SI	Trajectory_New_vi Trajectory_New_Empty.vi	public Trajectory(final List <state> states)</state>	
TRAJECTORY	X	X		X	SI	Trajectory_New.vi	Function Prototype public Trajectory(final List <state> states) public Pose2d getInitialPose()</state>	Notes can use cluster unpack, array in
TRAJECTOR	X	X		X	SI	Trajectory_New.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds()</state>	can use cluster unpack, array i
TRAJECTORY	X	X		X	SI	Trajectory_New.vi Trajectory_New_Empty.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds() public List<state> getStates()</state></state>	can use cluster unpack, array i
TRAJECTORY	X	X		X	SI	Trajectory_New.vi Trajectory_New_Empty.vi Trajectory_Sample.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds()</state>	can use cluster unpack, array i not needed, use unpack not needed, use unpack
TRAJECTORY	X	X		X	SI	Trajectory_New.vi Trajectory_New_Empty.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds() public List<state> getStates() public State sample(double timeSeconds)</state></state>	can use cluster unpack, array i not needed, use unpack not needed, use unpack Sample in reverse order. Nega
TRAJECTORY	XXXX	X X X	X	X X X	SI SI	Trajectory_New.vi Trajectory_New_Empty.vi Trajectory_Sample.vi Trajectory_SampleReverse.vi Trajectory_TransformBy.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds() public List<state> getStates() public State sample(double timeSeconds) public Trajectory transformBy(Transform2d transform)</state></state>	can use cluster unpack, array in not needed, use unpack not needed, use unpack
TRAJECTORY	XXX	X X X	X	X	SI SI	Trajectory_New.vi Trajectory_New_Empty.vi Trajectory_Sample.vi Trajectory_SampleReverse.vi Trajectory_TransformBy.vi Trajectory_RelativeTo.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds() public List<state> getStates() public State sample(double timeSeconds) public Trajectory transformBy(Transform2d transform) public Trajectory relativeTo(Pose2d pose)</state></state>	can use cluster unpack, array not needed, use unpack not needed, use unpack Sample in reverse order. Negasample.
TRAJECTORY	X X X X X X	X X X X	X	X	SI	Trajectory_New_Vi Trajectory_New_Empty.vi Trajectory_Sample.vi Trajectory_SampleReverse.vi Trajectory_TransformBy.vi Trajectory_RelativeTo.vi Trajectory_equals.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds() public List<state> getStates() public State sample(double timeSeconds) public Trajectory transformBy(Transform2d transform) public Trajectory relativeTo(Pose2d pose) boolean equals(other obj)</state></state>	can use cluster unpack, array not needed, use unpack not needed, use unpack Sample in reverse order. Negasample.
TRAJECTORY	X X X X X X X X	X	X	X X X X X No	SI SI	Trajectory_New.vi Trajectory_New_Empty.vi Trajectory_Sample.vi Trajectory_SampleReverse.vi Trajectory_TransformBy.vi Trajectory_RelativeTo.vi Trajectory_equals.vi Trajectory_lerp_double.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds() public List<state> getStates() public State sample(double timeSeconds) public Trajectory transformBy(Transform2d transform) public Trajectory relativeTo(Pose2d pose) boolean equals(other obj) private static double lerp(double startValue, double endValue, double t)</state></state>	can use cluster unpack, array not needed, use unpack not needed, use unpack Sample in reverse order. Nega sample. FUTURE internal
TRAJECTORY	X X X X X X	X	X	X X X X X No	SI	Trajectory_New.vi Trajectory_New_Empty.vi Trajectory_Sample.vi Trajectory_SampleReverse.vi Trajectory_TransformBy.vi Trajectory_RelativeTo.vi Trajectory_equals.vi Trajectory_lerp_double.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds() public List<state> getStates() public State sample(double timeSeconds) public Trajectory transformBy(Transform2d transform) public Trajectory relativeTo(Pose2d pose) boolean equals(other obj) private static double lerp(double startValue, double endValue, double t)</state></state>	can use cluster unpack, array not needed, use unpack not needed, use unpack Sample in reverse order. Negasample.
	Implemented X X X X X X X X X X X X X X X X X X X	X X X X X X X	X	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	tion Optimized	Trajectory_New.vi Trajectory_New_Empty.vi Trajectory_Sample.vi Trajectory_SampleReverse.vi Trajectory_TransformBy.vi Trajectory_RelativeTo.vi Trajectory_equals.vi Trajectory_lerp_double.vi	public Pose2d getInitialPose() public double getTotalTimeSeconds() public List <state> getStates() public State sample(double timeSeconds) public Trajectory transformBy(Transform2d transform) public Trajectory relativeTo(Pose2d pose) boolean equals(other obj) private static double lerp(double startValue, double endValue, double t) private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t) Function Prototype</state>	can use cluster unpack, array not needed, use unpack not needed, use unpack Sample in reverse order. Nega sample.
TRAJECTORY_STATE	Implemented X X X X X X X X X X X X X X X X X X X	Documented X X X X X X X X X X X X X X X X X X X	Not WPILIB	X X X X X Noon Noon Noon Item	Execution Optimized Signature Signat	Trajectory_New_Empty.vi Trajectory_New_Empty.vi Trajectory_Sample.vi Trajectory_SampleReverse.vi Trajectory_TransformBy.vi Trajectory_RelativeTo.vi Trajectory_equals.vi Trajectory_lerp_double.vi Trajectory_lerp_Pose.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds() public List<state> getStates() public State sample(double timeSeconds) public Trajectory transformBy(Transform2d transform) public Trajectory relativeTo(Pose2d pose) boolean equals(other obj) private static double lerp(double startValue, double endValue, double t) private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t) Function Prototype public State()</state></state>	can use cluster unpack, array in not needed, use unpack not needed, use unpack. Sample in reverse order. Nega sample. FUTURE internal internal
	Implemented X X X X X X X X X X X X X X X X X X X	Documented X X X X X X X X X X X X X X X X X X X	Not WPILIB	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	Execution Optimized Signature Signat	Trajectory_New_Empty.vi Trajectory_New_Empty.vi Trajectory_Sample.vi Trajectory_SampleReverse.vi Trajectory_TransformBy.vi Trajectory_RelativeTo.vi Trajectory_equals.vi Trajectory_lerp_double.vi Trajectory_lerp_Pose.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds() public List<state> getStates() public State sample(double timeSeconds) public Trajectory transformBy(Transform2d transform) public Trajectory relativeTo(Pose2d pose) boolean equals(other obj) private static double lerp(double startValue, double endValue, double t) private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t) Function Prototype public State() public State(double timeSeconds, double velocityMetersPerSecond, double accelerationMetersPerSecondSq, Pose2d poseMeters, double</state></state>	can use cluster unpack, array not needed, use unpack not needed, use unpack Sample in reverse order. Nega sample. FUTURE internal internal
	Implemented X X X X X X X X X X X X X X 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 Noon Noon Noon Item	Execution Optimized SI	Trajectory_New_Empty.vi Trajectory_New_Empty.vi Trajectory_Sample.vi Trajectory_SampleReverse.vi Trajectory_TransformBy.vi Trajectory_RelativeTo.vi Trajectory_equals.vi Trajectory_lerp_double.vi Trajectory_lerp_Pose.vi	public Trajectory(final List <state> states) public Pose2d getInitialPose() public double getTotalTimeSeconds() public List<state> getStates() public State sample(double timeSeconds) public Trajectory transformBy(Transform2d transform) public Trajectory relativeTo(Pose2d pose) boolean equals(other obj) private static double lerp(double startValue, double endValue, double t) private static Pose2d lerp(Pose2d startValue, Pose2d endValue, double t) Function Prototype public State() public State(double timeSeconds, double velocityMetersPerSecond, double</state></state>	can use cluster unpack, array in not needed, use unpack not needed, use unpack. Sample in reverse order. Nega sample. FUTURE internal internal

TRAJECTORY

State Space Itama (This list is	atill ma					4~4 ~~	Iditional columns for toot and comple		
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	Implementec	Documented	Not WPILIB	Menu Item	Ä	Test Routine	VI Name	Function Prototype	Notes
TRAJECTORY CONFIG		X	_	\overline{X}	SI	T -	TrajectoryConfig_Create.vi	public TrajectoryConfig(double maxVelocityMetersPerSecond,	
TRACESTORT CONTIG	^	^		^	O,		Trajectory Gornig_Greate.vi	double maxAccelerationMetersPerSecondSq)	
								public TrajectoryConfig addConstraint(TrajectoryConstraint	Implemented differently, can't
									duplicate.
									Implemented differently, can't
								TrajectoryConstraint> constraints)	duplicate.
	X	Χ		X	SI		TrajectoryConfig_setKinematicsDiffDrive.vi	public TrajectoryConfig setKinematics(DifferentialDriveKinematics	
								kinematics)	
	X	X		X	SI		TrajectoryConfig_setKinematicsMecanumfDrive.vi	public TrajectoryConfig setKinematics(MecanumDriveKinematics	
							T 1 1 0 5 116 11 0 D 1	kinematics)	
	X	X		X	SI		TrajectoryConfig_setKinematicsSwerveDrive.vi	public TrajectoryConfig setKinematics(SwerveDriveKinematics	
								kinematics) public double getStartVelocity()	oon ugo alugtar uppast
						+			can use cluster unpack
								<pre>public TrajectoryConfig setStartVelocity(double startVelocityMetersPerSecond)</pre>	
									can use cluster unpack
						 		public TrajectoryConfig setEndVelocity(double	can use cluster unpack
								endVelocityMetersPerSecond)	
									can use cluster unpack
									can use cluster unpack
								public List <trajectoryconstraint> getConstraints()</trajectoryconstraint>	Implemented differently, can't
									duplicate.
									can use cluster unpack
	Х	X		X	SI		TrajectoryConfig_setReversed.vi	public TrajectoryConfig setReversed(boolean reversed)	dan dec claster unpack
	X	X	X	X	SI		TrajectoryConfig_setCentripetalAccel.vi	public trajectory-coning settle-versed/boolean reversed/	
	X	×	X	X	SI		TrajectoryConfig_setVoltageDiffDrive.vi		
					- 01		Trajectory Gornig_Set voltage Bill Brive.vi	NOTE ADD OTHER "SET" ROUTINES FOR OTHER	
								CONTRAINTS HERE, SINCE NEW CONTRAINTS ARE SPECIFIC AND NOT GENERIC.	
								SECULTO AND NOT GENERIC.	
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	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program Hongram		Notes
TRAJECTORY GENERATE		X Documented	Not WPILIB	X Menu Item	Execution Optimi	Test Routine	by b	public static Trajectory generateTrajectory(Spline.ControlVector	uses cubic splines
TRAJECTORY GENERATE			Not WPILIB		Execution Optimi	Test Routine		public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector</translation2d>	uses cubic splines
TRAJECTORY GENERATE	X	X	Not WPILIB	X	Execution Optimi	Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end. TrajectoryConfig config)</translation2d>	uses cubic splines
TRAJECTORY GENERATE			Not WPILIB		Execution Optimi	Test Routine		public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start,</translation2d>	uses cubic splines
TRAJECTORY GENERATE	X	X	Not WPILIB	X	Execution Optimi	Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end,</translation2d></translation2d>	uses cubic splines
TRAJECTORY GENERATE	X	X	Not WPILIB	X	Execution Optimi	Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config)</translation2d></translation2d>	uses cubic splines uses cubic splines
TRAJECTORY GENERATE	X	X	Not WPILIB	X	Execution Optimi	Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList</translation2d></translation2d>	uses cubic splines
TRAJECTORY GENERATE	X	X	Not WPILIB	X	Execution Optimi	Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config)</translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
TRAJECTORY GENERATE	X	X	Not WPILIB	X	Execution Optimi	Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines
TRAJECTORY GENERATE	x x x x	X X X	Not WPILIB	X X X	Execution Optimi	Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config)</pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
TRAJECTORY GENERATE	X	X	Not WPILIB	X	Execution Optimi	Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static TrajectoryConfig config) public static List<posewithcurvature></posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
TRAJECTORY GENERATE	x x x x	X X X	Not WPILIB	X X X	Execution Optimi	Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config)</pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
TRAJECTORY GENERATE	x x x x	X X X	Not WPILIB	X X X		Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static TrajectoryConfig config) public static List<posewithcurvature></posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
TRAJECTORY GENERATE	x x x x	X X X	Not WPILIB	X X X		Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi TrajectoryGenerate_splinePointsFromSplines.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static TrajectoryConfig config) public static List<posewithcurvature></posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
TRAJECTORY GENERATE	x x x x	X X X	Not WPILIB	X X X			TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi TrajectoryGenerate_splinePointsFromSplines.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static TrajectoryConfig config) public static List<posewithcurvature></posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
TRAJECTORY GENERATE	X X X X	X X X X		X X X X			TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi TrajectoryGenerate_splinePointsFromSplines.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static TrajectoryConfig config) public static List<posewithcurvature></posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
TRAJECTORY GENERATE	X X X X	X X X X		X X X X			TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi TrajectoryGenerate_splinePointsFromSplines.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static TrajectoryConfig config) public static List<posewithcurvature></posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
TRAJECTORY GENERATE	X X X X	X X X X		X X X			TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi TrajectoryGenerate_splinePointsFromSplines.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static TrajectoryConfig config) public static List<posewithcurvature></posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
TRAJECTORY GENERATE	X X X X	X X X X		X X X X			TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi TrajectoryGenerate_splinePointsFromSplines.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static TrajectoryConfig config) public static List<posewithcurvature></posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
TRAJECTORY GENERATE	x x x x	X X X	Not WPILIB Not WPILIB	X X X X	Execution Optimized Execution Optimi	Test Routine	TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static List<posewithcurvature> splinePointsFromSplines(Spline[] splines)</posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines
	Implemented X X X	X X X X		X X X X			TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi TrajectoryGenerate_splinePointsFromSplines.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static List<posewithcurvature> splinePointsFromSplines(Spline[] splines)</posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines uses quintic splines
TRAJECTORY GENERATE	Implemented X X X	X X X X		X X X X			TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi TrajectoryGenerate_splinePointsFromSplines.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static List<posewithcurvature> splinePointsFromSplines(Spline[] splines) Function Prototype public ControlVectorList(int initialCapacity) public ControlVectorList()</posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines uses quintic splines
	Implemented X X X	X X X X		X X X X			TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi TrajectoryGenerate_splinePointsFromSplines.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static List<posewithcurvature> splinePointsFromSplines(Spline[] splines) Function Prototype public ControlVectorList(int initialCapacity) public ControlVectorList(() public ControlVectorList(() sylvation () spline () sp</posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines uses quintic splines Notes may not need, just data
	Implemented X X X	X X X X		X X X X			TrajectoryGenerate_Make_Cubic_CtrlVect.vi TrajectoryGenerate_Make_Cubic.vi TrajectoryGenerate_Make_Quintic_CtrlVect.vi TrajectoryGenerate_Make_Quintic.vi TrajectoryGenerate_splinePointsFromSplines.vi	public static Trajectory generateTrajectory(Spline.ControlVector initial, List <translation2d> interiorWaypoints, Spline.ControlVector end, TrajectoryConfig config) public static Trajectory generateTrajectory(Pose2d start, List<translation2d> interiorWaypoints, Pose2d end, TrajectoryConfig config) public static Trajectory generateTrajectory(ControlVectorList controlVectors, TrajectoryConfig config) public static Trajectory generateTrajectory(List<pose2d> waypoints, TrajectoryConfig config) public static List<posewithcurvature> splinePointsFromSplines(Spline[] splines) Function Prototype public ControlVectorList(int initialCapacity) public ControlVectorList()</posewithcurvature></pose2d></translation2d></translation2d>	uses cubic splines uses cubic splines uses quintic splines uses quintic splines Notes may not need, just data may not need, just data

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.

revision 2.X 11/12/2021 — State Space Items — (Tills list is	Juli II	11331116	y Onc	V1)	_	addii	alonal columns for test and sample.		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimizec Test Routine	Sample Program	VI Name	Function Prototype	Notes
TRAJECTORY PARAMETERIZE	$\overline{}$	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,</trajectoryconstraint></posewithcurvature>	
	X	X	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	No			TrajectoryParam_enforceAccel.vi	private static void enforceAccelerationLimits(boolean reverse, List <trajectoryconstraint> constraints, ConstrainedState state)</trajectoryconstraint>	This routines needs to be changed when new constraints are added.
	X	X	X	No			TrajectoryParam_calcStuffFwd.vi TrajectoryParam_calcStuffRev.vi		
	X	X		No			TrajectoryParam_enforceVelocity.vi		This routines needs to be changed
									when new constraints are added.
TRAJECTORY PARAMETERIZE CONSTRAINED STATE	X Implemented	X Documented	Not WPILIB	X Menu Item	Execution Optimized	Sample Program	ConstrainedState_New.vi	Function Prototype ConstrainedState(PoseWithCurvature pose, double distanceMeters, double maxVelocityMetersPerSecond, double minAccelerationMetersPerSecondSq, double maxAccelerationMetersPerSecondSq) ConstrainedState()	Notes
	X	X		X			ConstrainedState_SetMaxAccel.vi		
	X		X	X			ConstrainedState_SetMinAccel.vi		
	X	X	X	X			ConstrainedState_SetVelAccel.vi ConstrainedState_SetVelocity.vi		
TRAJECTORY UTIL	X X Implemented	X X Documented	Not WPILIB	X X Menu Item	Execution Optimized Test Routine	Sample Program	VI Name TrajectoryUtil_fromPathWeaverJSON.vi TrajectoryUtil_toPathWeaverJSON.vi	Function Prototype public static Trajectory fromPathweaverJson(Path path) public static void toPathweaverJson(Trajectory trajectory, Path path) public static Trajectory deserializeTrajectory(String json) public static String serializeTrajectory(Trajectory trajectory)	Notes
TRAPEZOID PROFILE	X X X Implemented	X X X X X X X X X X X X X X X X X X X	X Not WPILIB	X X No X X No	Execution Optimized	Sample Program	VI Name TrapProfConstraint_New.vi TrapProfile_Calculate.vi TrapProfile_Direct.vi TrapProfile_Execute.vi TrapProfile_IsFinished.vi TrapProfile_New.vi TrapProfile_New_DefInitial.vi TrapProfile ShouldFlipAcceleration.vi	Function Prototype	Notes Private, remove from menu Private, remove from menu
		, ,,					1 1 · · · · · · · · · · · · · · · · · ·		1,

n 2.X 11/12/2021 – State Space Items – (This list is s			y one		Adde	addi		
-	X			X			TrapProfile_TimeLeftUntil.vi	
_	X	X		X			TrapProfile_TotalTime.vi	
	X	X		X			FrapProfState_Equals.vi	
L	Χ	X		X			FrapProfState_New.vi	
====== CTORY CONSTRAINT								
=====								
					Execution Optimized	_		
	_	_			otin	utine Progran		
	tec	tea	18	z	0	ine		
	Jer	neu	11	lte.	ijor	ο σ. Τ		
	len	ű	Ž	חנ	cn	א א מיל		
	Implementec	Documented	Not WPILIB	Menu Item	Ж	Test Routine Sample Prod	/I Name Function Prototype	Notes
CENTRIPETAL ACCELERATION CONSTRAINT	X	X	$\overline{}$	X	~		CentripetalAccelConstraint_getMaxVelocity.vi public double getMaxVelocity.vi	ityMetersPerSecond(Pose2d
							poseMeters, double curvatu velocityMetersPerSecond)	JrekadPerMeter, double
	Χ	X		X			CentripetalAccelConstraint_getMinMaxAccel.vi public MinMax	
							getMinMaxAccelerationMet double curvatureRadPerMe	tersPerSecondSq(Pose2d poseMeters, eter, double velocityMetersPerSecond)
	X	X		X	SI		CentripetalAccelConstraint New.vi public CentripetalAccelerati	ionConstraint(double Can use cluster pack for now
							maxCentripetalAcceleration	ıMetersPerSecondSq)
	'mplementea	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	/I Name Function Prototype	Notes
DIFF DRIVE KINEMATIC CONSTRAINT	X	X		X	7	- 0,		ityMetersPerSecond(Pose2d ureRadPerMeter, double
	X	X		X			DiffDriveKinematicsConstraint_getMinMaxAccel.vi public MinMax getMinMaxAccelerationMet	tersPerSecondSq(Pose2d poseMeters, eter, double velocityMetersPerSecond)
	X	X		X	SI		DiffDriveKinematicsConstraint_New.vi public DifferentialDriveKine DifferentialDriveKinematics maxSpeedMetersPerSecon	s kinematics, double
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program	/I Name Function Prototype	
	ш	õ	Not	Me	EX	Tes Sar	/I Name Function Prototype	Notes
DIFF DRIVE VOLTAGE CONSTRAINT	X	X		X		. 3,	DiffDriveVoltageConstraint_getMaxVelocity.vi public double getMaxVelocity.vi poseMeters, double curvatu velocityMetersPerSecond)	ityMetersPerSecond(Pose2d ureRadPerMeter, double
	X	X		X			DiffDriveVoltageConstraint_getMinMaxAccel.vi public MinMax getMinMaxAccelerationMet	tersPerSecondSq(Pose2d poseMeters, eter, double velocityMetersPerSecond)
		1	1	1			DiffDriveVoltageConstraint_New.vi public	

UTIL X X X X Util_Array_PoseWCurv_to_XY.vi FRC_LabVIEW_Trajectory_Library_Routines.xlsx

Function Prototype

VI Name

Notes

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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.

s <u>sun n</u>	HISSIN	y one	۷۱) Added a	dditional columns for test and sample.	
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	Χ		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	Χ		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	Χ		Util_Waypoint_To_CubicInput.vi	
X	X	X	Χ		Util_Waypoint_To_QuinticInput.vi	
X	X	X	No		Util_WeightedWayPoint_To_WeightedWayPoint.vi	Sorry about the confusing name

'========

CONVERSIONS '========

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

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimized	Test Routine	Sample Program	VI Name	Function Prototype	Notes
CONV	X	X	X	X	SI			Conv_AngleDegrees_Heading.vi		
	Χ	Χ	X	Χ	SI			Conv_AngleRadians_Heading.vi		
	Χ	X	X	Χ	SI			Conv_Centimeters_Meters.vi		
	Χ	X	X	X	SI			Conv_Deg_Radians.vi		
	Χ	X	X	X	SI			Conv_Feet_Meters.vi		
	Χ	X	X	X	SI			Conv_GyroDegrees_Heading.vi		
	X	X	X	Χ	SI			Conv_Heading_AngleRadians.vi		
	Χ	X	X	X	SI			Conv_Inches_Meters.vi		
	Χ	X	X	X	SI			Conv_Kilograms_Pounds.vi		
	Χ	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		
	Χ	X	X	X	SI			Conv_Pounds_Kilograms.vi		
	Χ	X	X	X	SI			Conv_Radians_Deg.vi		
	X	X	X	X	SI			Conv_Yards_Meters.vi		

	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimize	Test Routine	Name Program	Function Prototype	Notes
UNITS	X	X		Χ			Units_DegreesToRadians.vi		
	Χ	Χ		Χ			Units_FeetToMeters.vi		
	Χ	Χ		Χ			Units_InchesToMeters.vi		
	Χ	Χ		Χ			Units_MetersToFeet.vi		
	X	Χ		Χ			Units_MetersToInches.vi		
	Χ	Χ		Χ			Units_RadiansPerSecondToRotationsPerMinute.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.

 			,	ou duditional object to the contract of the co
$X \mid \lambda$	(X		Units_RadiansToDegrees.vi
$X \mid \lambda$	(X		Units RotationsPerMinuteToRadiansPerSecond.vi

'========

PATHFINDER UTIL '========

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

JAVA / C++ WPILIB EQUIVALENT

Function Prototype Notes PathfinderUtil_Continuous_Heading_Difference.vi PathfinderUtil_OptimizeTrajectoryStates.vi PathfinderUtil_ToTrajectory.vi PathfinderUtil_ToTrajectoryStates.vi

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

	Implemented	Documen	Not WPILIB	Execu	Test Routine	VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
DC MOTOR		X	X			DCMotor_GetAndymark9015.vi					
	X	X	X			DCMotor_GetAndymarkRs775_125.vi					
	Χ	X	X			DCMotor_GetBag.vi					
	Χ	X	X			DCMotor_GetBanebotsRs550.vi					
	Χ	X	X			DCMotor_GetBanebotsRs775.vi					
	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					
	Χ	X	X			DCMotor_New.vi					

	Implemented	Documented	Not WPILIB Menu Item	Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM ID	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			

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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XX

 $X \mid X$

 $X \mid X$

 $X \mid X$

 $X \mid X$

Χ

Χ

Χ

Χ

Χ

Χ

X

KalmanFilter GetK

KalmanFilter SetXHat

KalmanFilter_GetXHat
KalmanFilter GetXHaT Single

KalmanFilter GetK Single.vi

KalmanFilter SetXHat Single

STATE SPACE ESTIMATION

FRC_LabVIEW_Trajectory_Library_Routines.xlsx

'======= Sample Program
IA ample Program Not WPILIB Menu Item Function Prototype Notes Just a shell, not functional! DIFFERENTIAL DRIVE POSE ESTIMATOR X X DiffDrivePoseEst AddVisionMeasurement.vi DiffDrivePoseEst BiConsum VisionCorrect.vi Χ Χ DiffDrivePoseEst BiFunc F.vi Χ X DiffDrivePoseEst BiFunc H.vi XX X DiffDrivePoseEst FillStateVector.vi Χ X DiffDrivePoseEst GetEstimatedPosition.vi X XX Χ DiffDrivePoseEst New.vi XX Χ DiffDrivePoseEst_ResetPosition.vi XX Χ DiffDrivePoseEst SetVisionMeasurementStdDevs.vi XX Χ DiffDrivePoseEst Update.vi X XX DiffDrivePoseEst UpdateWithTime.vi Checking Not WPILIB Test Routine Menu Item Function Prototype Notes EXTENDED KALMAN FILTER X X ExtendedKalmanFilter Correct.vi Just a shell, not functional! ExtendedKalmanFilter_Correct_OnlyUY.vi X Χ X X Χ ExtendedKalmanFilter GetP.vi XX Χ ExtendedKalmanFilter GetP Single.vi XX Χ ExtendedKalmanFilter GetXHat.vi XX Χ ExtendedKalmanFilter_GetXHat_Single.vi $X \mid X$ Χ ExtendedKalmanFilter New.vi XX Χ ExtendedKalmanFilter Predict.vi XX Χ ExtendedKalmanFilter Reset.vi XX Χ ExtendedKalmanFilter SetP.vi XX Χ ExtendedKalmanFilter SetXHat.vi XX Χ ExtendedKalmanFilter SetXHat Single.vi Test Routine Not WPILIB Menu Item VI Name Function Prototype Notes KALMAN FILTER X KalmanFilter Correct.vi X X Χ Χ KalmanFilter New.vi X X $X \mid X$ Χ X KalmanFilter_Predict.vi $X \mid X$ Χ KalmanFilter Reset.vi

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Implemented	Documented	Not WPILIB	Menu Item Execution Ontimized	est F	Ĕ	Function Prototype	Notes	Code Review	Test Program	Error Checking
UNSCENTED KALMAN FILTER 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		Χ		UnscentedKalmanFilter_GetP.vi					
X	X		Χ		UnscentedKalmanFilter_GetP_Single.vi					
X	X		X		UnscentedKalmanFilter_GetXHat.vi					
X	X		X		UnscentedKalmanFilter_GetXHat_Single.vi					
X			X		UnscentedKalmanFilter_New.vi					
X			Χ		UnscentedKalmanFilter_New_Default.vi					
X			Χ		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		Χ		UnscentedKalmanFilter_SetXHat_Single.vi					
X			X		UnscentedKalmanFilter_Transform.vi					

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

LinearSystem_CalculateX.vi

LinearSystem CalculateY.vi

LINEAR SYSTEM X

Χ XX

X

FRC LabVIEW Trajectory Library – VI Implementation List Revision 2.X 11/12/2021 – State Space Items – (This list is still miss

st is still r	niss	sing one VI)	Added additi	onal columns for test and sample.		
X)	$X \mid X \mid X$	(LinearSystem_GetA.vi		
X)	$X \mid X \mid X$	(LinearSystem_GetAElement.vi		
X)	X 2	(LinearSystem_GetB.vi		
X)	$X \mid X \mid X$	(LinearSystem_GetBElement.vi		
X	;	x 2	(LinearSystem_GetC.vi		
X)	$X \mid X \mid X$	(LinearSystem_GetCElement.vi		
X	(ا	x	(LinearSystem_GetD.vi		
X)	X 2	(LinearSystem_GetDElement.vi		
X)	$X \mid X \mid X$	(LinearSystem_New.vi		

	Implemented	Documented Not WPILIB		Execution Optimized	Test Routine		Notes	Code Review	Test Program	Error Checking
LINEAR SYSTEM LOOP		X	X			LinearSystemLoop_ClampInput.vi				
	Χ	Χ	X			LinearSystemLoop_Correct.vi				
						LinearSystemLoop_GetClampFunction.vi				
	X	Χ	X			LinearSystemLoop_GetController.vi				
	X	Χ	X			LinearSystemLoop_GetError_Single.vi				
	Χ	X	X			LinearSystemLoop_GetError.vi				
	Χ	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				
	Χ	Χ	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				
	Χ	X	X			LinearSystemLoop_Reset.vi				
						LinearSystemLoop_SetClampFunction.vi				
			1			LinearSystemLoop_SetNextR_Some.vi				
	X	X	X			LinearSystemLoop_SetNextR.vi				
						LinearSystemLoop_SetXHat_Single.vi				
			1			LinearSystemLoop_SetXHat.vi				

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

> Sample Program
> Name Function Prototype Notes Bi-FUNCTION HELP X BiFuncHelp_MatrixMinus.vi BiFuncHelp_MatrixMult_vi BiFuncHelp_MatrixMult_CoerceSizeB.vi BiFuncHelp_MatrixPlus.vi X X X

FRC LabVIEW Trajectory Library – VI Implementation	n List	i									
Revision 2.X 11/12/2021 - State Space Items - (This list is	still m	nissin	g one	• VI	.) Add	led additional columns for test and sample.					
DISCRETIZATION	X X	X X Documented		X X Wenu Item		### Discretization DiscretizeA.vi X	Function Prototype	Notes	Code Review	Test Program	Error Checking
		_^		+^		DISCIELIZATION_DISCIELIZEIX.VI			+		
	Implemented	Documented	Not WPILIB	Menu Item	Execution Optimiz	Test Routine Sample Program Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
STATE SPACE UTIL	X			X		X StateSpaceUtil_MakeCostMatrix.vi	,,		T		
	X	X		X		X StateSpaceUtil_MakeCovarianceMatrix.vi					
	X	X		X		StateSpaceUtil_MakeWhiteNoiseVector.vi					
	/	Χ				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		StateSpaceUtil_PoseTo4dVector.vi					
	X	X		X		StateSpaceUtil_PoseTo3dVector.vi					
'====== SIMULATION '=========											

'=======

	Implemented	Documented	Not WPILIB	Menu	Execution Optimized Test Routine	な	Function Prototype	Notes	Code Review	Test Program	Error Checking
BATTERY SIM		X		X		BatterySim_CalculateDefaultBatteryLoadedVoltage.vi					
	X	Χ		X		BatterySim_CalculateLoadedVoltage.vi					
	Implemented	Documented	Not WPILIB	2 (Execution Optimized Test Routine	S VI Name	Function Prototype	Notes	Code Review	Test Program	Error Checking
DIFFERENTIAL DRIVE TRAIN SIN	I X					DiffDriveTrainSim_ClampInput.vi					
	X					DiffDriveTrainSim_CreateKitbotSim.vi					
	X					DiffDriveTrainSim_CreateKitbotSim_EstMass.vi					
	X					DiffDriveTrainSim_CreateKitbotSim_EstMassMOI.vi					
	X					DiffDriveTrainSim_GetCurrentDrawAmps.vi					
	X					DiffDriveTrainSim_GetCurrentGearing.vi					
	X					DiffDriveTrainSim_GetDynamics.vi DiffDriveTrainSim_GetHeading.vi					
	X					DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi					
	X					DiffDriveTrainSim_GetLeftCurrentDrawAmps.vi					
	X					DiffDriveTrainSim_GetLeftPositionMeters.vi					

		X X X X X X X X X X X X X X X X X X X				dditional columns for test and sample. DiffDriveTrainSim_GetLeftVelocityMetersPerSecond.vi DiffDriveTrainSim_GetOutput_Single.vi DiffDriveTrainSim_GetPose.vi DiffDriveTrainSim_GetRightCurrentDrawAmps.vi DiffDriveTrainSim_GetRightPositionMeters.vi DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi DiffDriveTrainSim_GetState.vi DiffDriveTrainSim_GetState_Single.vi DiffDriveTrainSim_KitBotWheelSize.vi DiffDriveTrainSim_KitBotWheelSize.vi DiffDriveTrainSim_New.vi				
		X X X X X X X X X X X X X X X X X X X				DiffDriveTrainSim_GetPose.vi DiffDriveTrainSim_GetRightCurrentDrawAmps.vi DiffDriveTrainSim_GetRightPositionMeters.vi DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi DiffDriveTrainSim_GetState.vi DiffDriveTrainSim_GetState_Single.vi DiffDriveTrainSim_KitBotWheelSize.vi				
		X				DiffDriveTrainSim_GetRightCurrentDrawAmps.vi DiffDriveTrainSim_GetRightPositionMeters.vi DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi DiffDriveTrainSim_GetState.vi DiffDriveTrainSim_GetState_Single.vi DiffDriveTrainSim_KitBotWheelSize.vi				
		X				DiffDriveTrainSim_GetRightPositionMeters.vi DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi DiffDriveTrainSim_GetState.vi DiffDriveTrainSim_GetState_Single.vi DiffDriveTrainSim_KitBotWheelSize.vi				
		X X X X X X X X X X X X X X X X X X X				DiffDriveTrainSim_GetRightVelocityMetersPerSecond.vi DiffDriveTrainSim_GetState.vi DiffDriveTrainSim_GetState_Single.vi DiffDriveTrainSim_KitBotWheelSize.vi				
		X X X X X X X X X X X X				DiffDriveTrainSim_GetState.vi DiffDriveTrainSim_GetState_Single.vi DiffDriveTrainSim_KitBotWheelSize.vi				
		X				DiffDriveTrainSim_GetState_Single.vi DiffDriveTrainSim_KitBotWheelSize.vi				\
		X				DiffDriveTrainSim_KitBotWheelSize.vi				
		X X X X X X X								
		X X X X X X				DiffDriveTrainSim New.vi				
		X X X X X X X X X X X X X X X X X X X								
		X X X X				DiffDriveTrainSim_New_Mass_MOI.vi				
		X X X				DiffDriveTrainSim_SetCurrentGearing.vi				
		X X X				DiffDriveTrainSim_SetInputs.vi				
		X X				DiffDriveTrainSim_SetPose.vi				
		Χ				DiffDriveTrainSim_SetState.vi				
						DiffDriveTrainSim_ToughBoxMiniGearRatio.vi				
		X				DiffDriveTrainSim_ToughBoxMiniMotor.vi				
						DiffDriveTrainSim_Update.vi				
	_									
		Implementec Documented	Not WPILIB	Menu Item Execution Op	Test Routine	Name NI Name			Code Reviev	st Progran
	_		δ	Me Ex	7e	^σ VI Name	Function Prototype	Notes	ပိ	Test
El	LEVATOR SIM			X		ElevatorSim_New.vi				
		Χ		X		ElevatorSim_GetCurrentDraw.vi				
		Χ		X		ElevatorSim_GetPositionMeters.vi				
		Χ		X		ElevatorSim_GetVelocityMetersPerSecond.vi				
		Χ		X		ElevatorSim_SetInputVoltage.vi			'	
		Χ		X		ElevatorSim_UpdateX.vi			'	
		Χ		X		ElevatorSim_WouldHitLowerLimit.vi				
		Χ		X		ElevatorSim_WouldHitUpperLimit.vi				
		X	X	X		ElevatorSim_Update.vi		Needed because this doesn't		i
		V/	-	V/		Flooring Health counting to the		extend.		
		X		X		ElevatorSim_HasHitLowerLimit.vi				
		X	Х	X		ElevatorSim_HasHitUpperLimit.vi ElevatorSim_RKF45_Func.vi				
		^	^			ElevatorSim_RKF45_Func.vi ElevatorSim_New_NoNoise.vi				
						ElevatorSim_New_LinSys.vi				
						ElevatorSim_New_LinSys.vi ElevatorSim_New_LinSys_NoNoise.vi				
	Į					Lievatorolini_tvew_Linoys_tvorvoise.vi				
		Implemented Documented	Not WPILIB	Menu Item Execution Optimized	Test Routine	Sample Program	Function Prototype	Notes	Code Review	Test Program
FL	LYWHEEL SIM			X		FlyWheelSim_GetAngularVelocityRadPerSec.vi	76-		\top	
· -		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			+	
								The state of the s		•
			1			FlyWheelSim_New_LinSys_NoNoise		Future		ļ

FRC LabVIEW Trajectory L Revision 2.X 11/12/2021 – St	<u>library – VI Implementation</u> tate Space Items – (This list is	ı List still mis	sing or	ne VI) Add€	led additional columns for test and sample.					
		Implemented	Documented Not WPILIB	Menu Item	Execution Optimized	Test Routine Sample Program energy	Function Prototype	Notes	Code Review	Test Program	Error Checking
	LINEAR SYSTEM SIM		_	X		LinearSystemSim_GetOutput.vi 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			4	LinearSystemSim_SetInput.vi					-
		X		X		LinearSystemSim_SetInput_Array.vi		Doesn't use clamp ?			
		Χ		X		LinearSystemSim_Setstate.vi		DON'T IMPLEMENT			
		X	_			LinearSystemSim_GetCurrentDrawAmps.vi LinearSystemSim_ClampInput.vi		DONT IMPLEMENT			
	SINGLE JOINT ARM SIM	X . X . X	X X	X X X	Exec	by b	Function Prototype	Notes	Code Review	Test Program	Error Checkin
		X	X	X		SngJntArmSim_GetVelocityRadsPerSec.vi					
		X .		X		SngJntArmSim_HasHitLowerLimit.vi					1
		X .	X	X		SngJntArmSim_HasHitUpperLimit.vi					
		X .	X	X		SngJntArmSim_New.vi					
		X .			4	SngJntArmSim_Rkf45_Func.vi					
		X	<u> </u>	X		SngJntArmSim_SetInputVoltage.vi SngJntArmSim_Update.vi					
		X	Y	X	+	SngJntArmSim_UpdateX.vi					
		X	$\frac{\lambda}{x}$	X	_	SngJntArmSim WouldHitLowerLimit.vi					
		X		X		SngJntArmSim WouldHitUpperLimit.vi					
				+							
							·			'	
IATRIX UTILITIES							•				
		Implemented	ocumented ot WPILIB		ecution Optimized	Test Routine Sample Program element			Code Review	st Program	or Checking
		7	oc oc	ğ ē	ž	Name Sa VI Name	Franchisco Doctob or a	Notos	ŏ	ĕ	μΞ
		7 7	ΔŽ	₹ ≥	Ŵ.	- ω vi name	Function Prototype	Notes	O		
	MAT BUILDER		Ž Ž	× ×	Ш	MatBuilder_Fill.vi MatBuilder Create.vi	Function Prototype	Notes			

FRC LabVIEW Trajectory Library – VI Implementation List									
Revision 2.X 11/12/2021 – State Space Items – (This list is still miss	sing on	e VI)	Added	additional columns for test and sample.					
			ize	5					
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ntec.	itea 1B	8		Programme			Code Revien	Test Program	Error Checking
mplemente	Documente Vot WPILIE	Menu Item	Execution	9 9			Rei	705	Che
ole.	c C C	П	acu acu	S & VI Name			de	St F	0r (
	δΩ	Me	EXE		Function Prototype	Notes	Š	7e.	Err
MATRIX X		X		Matrix_AssignBlock.vi					
X		X		Matrix_Block.vi					
X		X		Matrix_Create.vi					
X		X		Matrix_Diag.vi Matrix_ElementSum.vi					
X		X		Matrix_EiernentSurn.vi Matrix_Exp.vi					
X		X		Matrix ExtractColumnVector.vi					
$\frac{\lambda}{X}$		X		Matrix ExtractFrom.vi					
$\frac{x}{x}$		X		Matrix_ExtractRowVector.vi					
X		X		Matrix_Fill.vi					
X		X		Matrix_Ident.vi					
X		X		Matrix_IsEqual.vi					
X		X		Matrix_LltDecompose.vi					
X		X		Matrix_Pow.vi					
X		X		Matrix_SetColumn.vi					
X		X		Matrix_SetRow.vi					
			imized	<u> </u>					
MATRIX HELPER X	Documented X Not WPILIB	X	Execution Opti	MatrixHelper_Zero.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX HELPER X	X	X		MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
	X			MatrixHelper_Zero.vi	Function Prototype	Notes	Code Review	Test Program	Error Checking
MATRIX HELPER X X X X	X X X	X X X	otimized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi			Review	st Program	r Checking Error
MATRIX HELPER X X X	X	Wenu Item	ized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi	Function Prototype Function Prototype	Notes	view	am	Error
WATRIX HELPER X X X X VECTOR BUILDER X VECTOR BUILDER X	X X X	X Wenu Item	otimized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi ### Document			Review	st Program	r Checking Error
WATRIX HELPER X X X X VECTOR BUILDER X X	X X X	X X Wenu Item	otimized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi			Review	st Program	r Checking Error
VECTOR BUILDER X X X X X X X X X X	X X X	X Wenu Item	otimized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi WatrixHelper_MultCooerceBSize.vi VI Name VecBuilder_1x1Fill.vi VecBuilder_2x1Fill.vi VecBuilder_3x1Fill.vi VecBuilder_4x1Fill.vi			Review	st Program	r Checking Error
VECTOR BUILDER X X X X X X X X X X X	X X X	X X X X X X	otimized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi WatrixHelper_MultCooerceBSize.vi VI Name VecBuilder_1x1Fill.vi VecBuilder_2x1Fill.vi VecBuilder_3x1Fill.vi VecBuilder_4x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_5x1Fill.vi			Review	st Program	r Checking Error
VECTOR BUILDER X X X X X X X X X X X X X X	X X X	X X X X X X	otimized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi MatrixHelper_MultCooerceBSize.vi VI Name VecBuilder_1x1Fill.vi VecBuilder_2x1Fill.vi VecBuilder_3x1Fill.vi VecBuilder_4x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_6x1Fill.vi VecBuilder_6x1Fill.vi			Review	st Program	r Checking Error
VECTOR BUILDER X X X X X X X X X X X X X	X X X	X X X X X X	otimized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi MatrixHelper_MultCooerceBSize.vi VI Name VecBuilder_1x1Fill.vi VecBuilder_2x1Fill.vi VecBuilder_3x1Fill.vi VecBuilder_4x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_6x1Fill.vi VecBuilder_7x1Fill.vi			Review	st Program	r Checking Error
VECTOR BUILDER X X X X X X X X X X X X X	X X X	X X X X X X	otimized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi MatrixHelper_MultCooerceBSize.vi VI Name VecBuilder_1x1Fill.vi VecBuilder_2x1Fill.vi VecBuilder_3x1Fill.vi VecBuilder_4x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_6x1Fill.vi VecBuilder_6x1Fill.vi VecBuilder_7x1Fill.vi VecBuilder_8x1Fill.vi VecBuilder_8x1Fill.vi			Review	st Program	r Checking Error
VECTOR BUILDER X X X X X X X X X X X X X	X X X	X X X X X X	otimized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi MatrixHelper_MultCooerceBSize.vi VI Name VecBuilder_1x1Fill.vi VecBuilder_2x1Fill.vi VecBuilder_3x1Fill.vi VecBuilder_4x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_6x1Fill.vi VecBuilder_7x1Fill.vi VecBuilder_7x1Fill.vi VecBuilder_8x1Fill.vi VecBuilder_9x1Fill.vi VecBuilder_9x1Fill.vi			Review	st Program	r Checking Error
VECTOR BUILDER X X X X X X X X X X X X X X X X X X X	Documented Not WPILIB	X X X X X X X X X X X X X X X X X X X	otimized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi MatrixHelper_MultCooerceBSize.vi VI Name VecBuilder_1x1Fill.vi VecBuilder_2x1Fill.vi VecBuilder_3x1Fill.vi VecBuilder_4x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_6x1Fill.vi VecBuilder_6x1Fill.vi VecBuilder_7x1Fill.vi VecBuilder_8x1Fill.vi VecBuilder_9x1Fill.vi VecBuilder_9x1Fill.vi VecBuilder_9x1Fill.vi VecBuilder_9x1Fill.vi VecBuilder_10x1Fill.vi			Review	st Program	r Checking Error
VECTOR BUILDER X X X X X X X X X X X X X	Documented Not WPILIB	X X X X X X	otimized Execution	MatrixHelper_Zero.vi MatrixHelper_CooerceSize.vi MatrixHelper_MultCooerceBSize.vi MatrixHelper_MultCooerceBSize.vi VI Name VecBuilder_1x1Fill.vi VecBuilder_2x1Fill.vi VecBuilder_3x1Fill.vi VecBuilder_4x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_5x1Fill.vi VecBuilder_6x1Fill.vi VecBuilder_7x1Fill.vi VecBuilder_7x1Fill.vi VecBuilder_8x1Fill.vi VecBuilder_9x1Fill.vi VecBuilder_9x1Fill.vi			Review	st Program	r Checking Error

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C LabVIEW Trajectory Library – VI Implementati	on List	\ //	\ A	1 1 120						
vision 2.X 11/12/2021 – State Space Items – (This list i	ented ented	1B	Optimized	<i>utine</i> Program	onal columns for test and sample.			Review	Test Program	Checking
ANGLE STATISTIC		Not WPIL. X Menu Iten		X Test Rou Sample	VI Name AngleStats_AngleAdd.vi	Function Prototype	Notes	Code Revi	Test F	Ļ
ANGLE STATISTIC	X	X X X		X	AngleStats_AngleAdd_BiFunc.vi AngleStats_AngleMean.vi					
	X	X X X X		X	AngleStats_AngleMean_BiFunc.vi AngleStats_AngleResidual.vi AngleStats_AngleResidual_BiFunc.vi					<u> </u>
	^	<u> </u>			Aligieotats_AligieResidual_Dirulic.vi					
	Implemented Documented	Not WPILIB Menu Item	Execution Optimized	Test Routine Sample Program				Code Review	Test Program	
MATH UTILIT	YX	X		7e Sa	VI Name MathUtil_AngleModulus.vi	Function Prototype	Notes	8	7e	
	X X X	X X X			MathUtil_Clamp.vi MathUtil_Clamp_Int.vi MathUtil_InputModulus.vi					
	Implemented Documented	Not WPILIB Menu Item	Execution Optimizea	Test Routine Sample Program	VI Name	Function Prototype	Notes	Code Review	Test Program	:
MERWE SCALED SIGMA POINT	s X				MerweScSigPts_ComputeWeights.vi MerweScSigPts_GetNumSigmas.vi					<u> </u>
	X				MerweScSigPts_GetWc.vi MerweScSigPts_GetWc_Single.vi					
	X				MerweScSigPts_GetWm.vi MerweScSigPts_GetWm_Single.vi					
	X				MerweScSigPts_New.vi MerweScSigPts_New_Default.vi					+
	X				MerweScSigPts_SigmaPoints.vi					
	<i>ס</i> ס		Optimized	e gram				8	٤	
	Implementea Documented	Not WPILIB	Execution Op	Test Routine Sample Prog				e Revie	Test Program	
NUMERICAL INTEGRATIO				Sam	VI Name	Function Prototype	Notes	Code	Test	
NUMERICAL INTEGRATION	X	No No			NumIntegrate_Func_Ax_Bu_K.vi NumIntegrate_Func_Bs.vi					
	X	No No			NumIntegrate_Func_Ch.vi NumIntegrate_Func_Ct.vi					\pm
	/				NumIntegrate_Rk4_Dbl.vi NumIntegrate_Rk4_K_Dbl.vi		NOT DONE NOT DONE			\blacksquare
	X	X			NumIntegrate_Rk4_Mat_X.vi		INOT DOINE			
	X	X			NumIntegrate Rk4_Mat_X_U.vi NumIntegrate Rkf45.vi					
	X	No			NumIntegrate_Rkf45Impl.vi					士
	X	X			NumIntegrate_Trap_Dbl.vi					

FRC LabVIEW Trajectory Library – VI Implementation	n List										
Revision 2.X 11/12/2021 - State Space Items - (This list is	still mi	issing c	one VI	l) <i>I</i>	Added	additional columns for test and sample.					
	Χ			Χ		NumIntegrate_Trap_Mat.vi					
NUMERICAL JACOBIAN	X Implemented	X Documented			Test Routine	S VI Name NumJacobianX.vi	Function Prototype	Notes There are others that may need implemented.	Code Review	Test Program	Error Checking
RICCAT	/ / Implemented	Documented		2	Test Routine	Riccati_Check_Detectable.vi	Function Prototype	Notes Routine exists, it is just a shell Not really done !!!	Code Review	Test Program	Error Checking
	/	V						inot really done !!!			
	X	X		X	X						
	X			X	X						
	X	X				Riccati_DARE_N.vi					
	X			X		Riccati_Input_Check.vi					

'========							
TYPE DEFINITIONS							
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	Implemented	Documented	Not WPILIB	Menu Item	Execution Opt	Test Routine	Sample Progra	VI Name	Function Prototype	Notes
TypeDef	Ζ		Χ	X	N/A			ARM_FF.CTL		
	١		Χ	X	N/A			BICon-Matrix_FUNC_TYPE.CTL		
	Ζ		Χ	X	N/A			BiFun_Matrix_FUNC_TYPE.CTL		
	Ζ	Χ	X	X	N/A			CHASSIS_SPEEDS.CTL		
	Ζ	Χ	X	X	N/A			CONTRAINED_STATE.CTL		
	Ζ		Χ	X	N/A			DCMOTOR.CTL		
	Ζ	X	X	X	N/A			DIFF_DRIVE_KINEMATICS.CTL		
	Ζ		Χ		N/A			DIFF_DRIVE_Kitbot_WheelSize_ENUM.ctl		
	Ζ		Χ		N/A			DiFF_DRIVE_POSE_EST.ctl		
	Ζ		Χ		N/A			DIFF_DRIVE_ToughBoxMini_GearChoice_ENUM.ctl		
	Ζ		Χ		N/A			DIFF_DRIVE_ToughBoxMini_MotorChoice_ENUM.ctl		
	Ζ		Χ		N/A			DIFF_DRIVE_TRAIN_SIM.ctl		
	Ζ		Χ	X	N/A			ELEVATOR_SIM.CTL		
	Ζ		Χ	X	N/A			ELEV_FF.CTL		
	Ζ		Χ	X	N/A			EXTENDED_KALMAN_CORRECT_FUNC_GROUP.CTL		
	Ζ		Χ	X	N/A			ExTENDED_KALMAN_FILTER.CTL		
	Ζ		Χ	X	N/A			FLYWHEEL_SIM.ctl		
	Ζ		Χ	X	N/A			HOLONOMIC_DRV_CTRL.CTL		New 1/26/21
	Ζ		Χ	X	N/A			KALMAN_FILTER.ctl		
	١		Χ	X	N/A			KALMAN_FILTER_LATENCY_COMP.CTL		
	Ζ	X	X	X	N/A			LINEAR_FILTER.CTL		

e etill m		a one	\/I) Δdded s	dditional columns for test and sample.	
Z	االحجا			N/A	LINEAR PLANT INV FF.ctl	
Z		X		N/A	LINEAR_QUADRATIC_REGULATOR.ctl	
Z		Χ		N/A	LINEAR_SYSTEM_LOOP.ctl	
Z		X		N/A	LINEAR_SYSTEM_SIM.ctl	
Z		X		N/A	LINEAR_SYSTEM.ctl	
Ζ	Χ	X		N/A	MECA_DRIVE_KINEMATICS.CTL	
Z	X	X		N/A	MECA_DRIVE_ODOMETRY.CTL	
Z	X	X	X	N/A	MECA_WHEEL_SPEEDS.CTL	
Z		Χ	X	N/A	MEDIAN FILTER.CTL	
Z		Χ		N/A	MERWE SCALED SIGMA PTS.ctl	
Z		X		N/A	OBSERVER SNAPSHOT.CTL	
Z		X		N/A	OBSERVER SNAP LIST ITEM.CTL	
Z	X	X	Y	N/A	PARAM_STACK_ITEM.CTL	
Z	\hat{X}	X		N/A	PARAM STACK.CTL	
	^			N/A		
Z		X			PID_ADV_LIMITS.CTL	
Z		X		N/A	PID_ADV_TUNING.CTL	
Z		X	X	N/A	PID_CONTROLLER.CTL	
Z		X		N/A	PID_ERROR_TOLERANCE.CTL	
Z		X		N/A	PID_INPUT_LIMITS.CTL	
Z		X		N/A	PID_TUNING.CTL	
Z	Χ	X		N/A	POSE2D.CTL	
Z	Χ	X		N/A	POSEwCURVATURE.CTL	
Z		X		N/A	PROFILED PID CONTROLLER.CTL	
Z	Χ	X		N/A	RAMSETE.CTL	
Z	X	X		N/A	ROTATION2D.CTL	
Z		X		N/A	SINGLE JOINT ARM SIM.CTL	
Z	Х	X		N/A	SIMPLE MOTOR FF.CTL	
Z	^	X		N/A	SLEW RATE LIMITER.CTL	
Z	Χ	X	÷	N/A	SPLINE_CTRL_VECTOR.CTL	
Z	Χ	X		N/A	SPLINE.CTL	
Z	X	X		N/A	SWERVE_DRIVE_KINEMATICS.CTL	
Z	Χ	X		N/A	SWERVE_DRIVE_MODULE_STATE.CTL	
Z	Χ	X		N/A	SWERVE_DRIVE_ODOMETRY.CTL	
Z		X	Χ	N/A	TIMER.CTL	
Ζ	Χ	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	
١		Χ		N/A	TRAJ CONSTRAINT JERK.CTL	Routine exists, it is just a shell
Z	Χ		Χ	N/A	TRAJ_CONSTRAINT_MECA_DRIVE_KINEMATICS.CTL	
Z	X			N/A	TRAJ CONSTRAINT MINMAX.CTL	
Z	X	X		N/A	TRAJ_CONSTRAINT_SWERVE_DRIVE_KINEMATICS.CTL	
Z	X			N/A	TRAJ STATE.CTL	
Z	\overline{X}				TRAJECTORY.CTL	
Z	\hat{X}	\hat{x}		N/A	TRANSFORM2D.CTL	
	X			N/A	TRANSFORM2D.CTL TRANSLATION2D.CTL	
Z	٨					
Z		X		N/A	TRAPEZOID_PROFILE_CONSTRAINT.CTL	
Z		X		N/A	TRAPEZOID_PROFILE_STATE.CTL	
Z		X		N/A	TRAPEZOID_PROFILE.CTL	
Z	Χ	X	Χ	N/A	TWIST2D.CTL	
Ζ		Χ		N/A	UNSCENTED_KALMAN_FILTER.ctl	
Ζ		Χ		N/A	UNSCENTED_KALMAN_NEW_FUNC_GROUP.CTL	
Z		Χ		N/A	UNSCENTED_KALMAN_CORRECT_FUNC_GROUP.CTL	
Z	Χ	X	Χ	N/A	UTIL_PATHFINDER_CONFIG.CTL	
Z	Χ	X		NA	UTIL_WAYPOINT.ctl	
Z		Х		NA	UTIL WEIGHTED WAYPOINT.ctl	New V1.5
N/A		N/A		N/A	WAYPOINTS.CTL	Delete – obsolete
Z		Х	Х	NA	WEIGHTED WAYPOINT.CTL	New V1.5
N/A		N/A		N/A	X Y HEADINGS.CTL	Delete – obsolete
, , ,						251000 00001010