Full-Project Of

Wiper Controller System Using Stateflow

Implementation & Testing

By:

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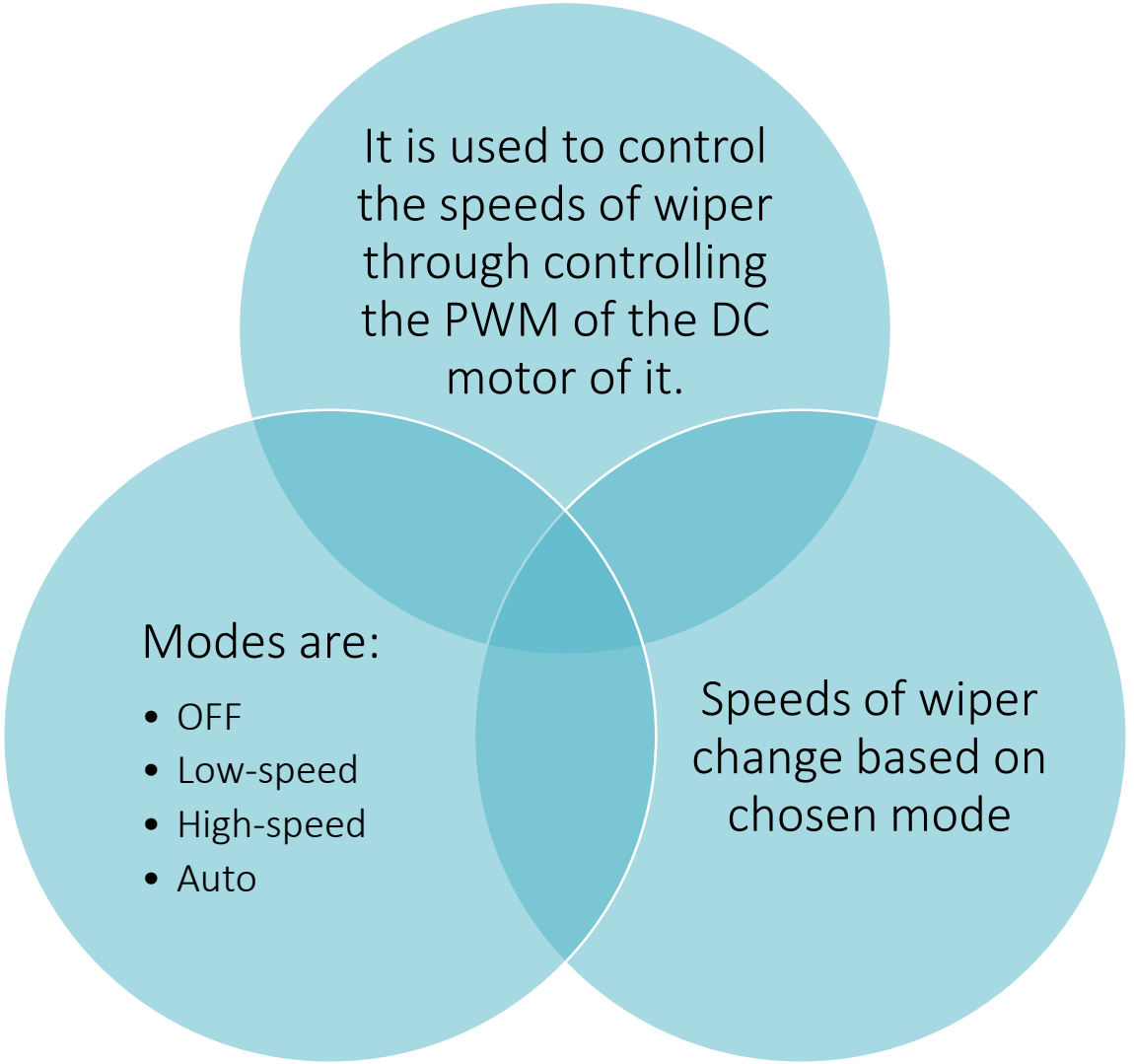
Specifications



Parameters

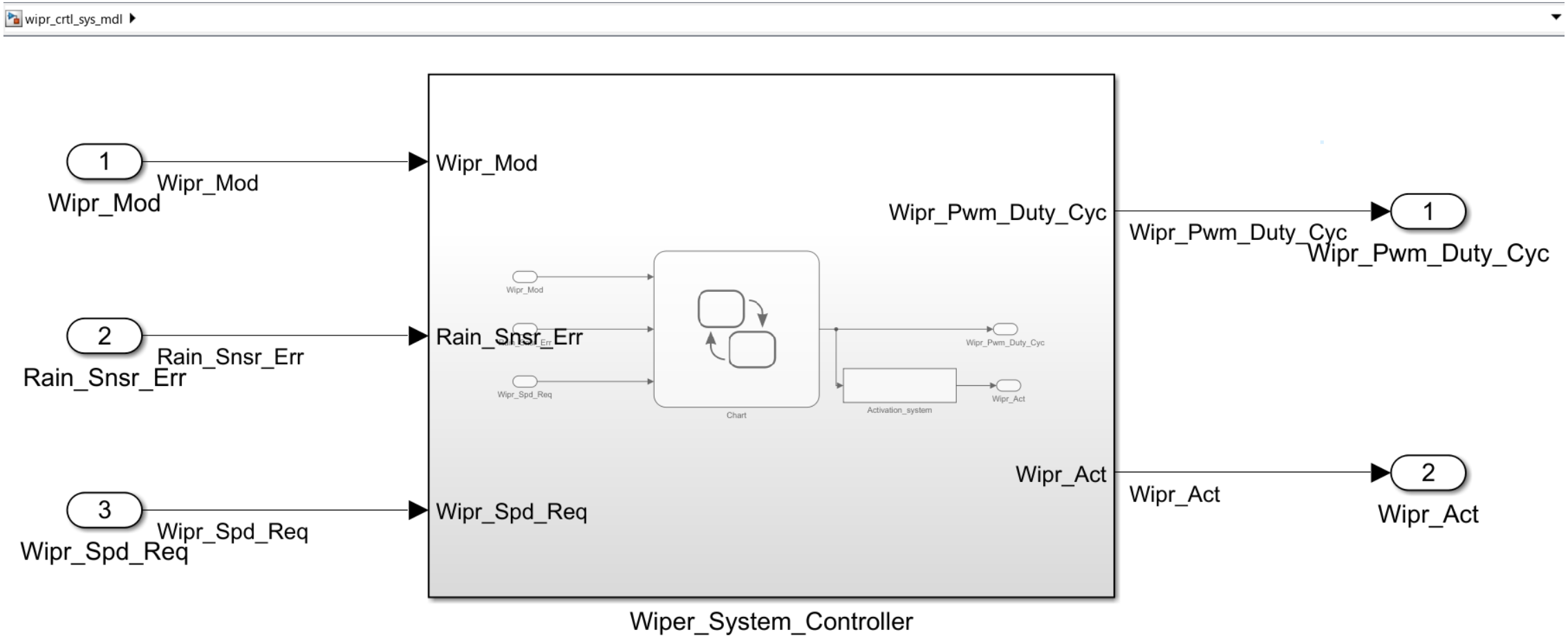
Parameter	Direction	Data_type	Function	Min	Max	Description
Wipr_Mod	Input	Uint8	The mode of operation	0	3	0 ➔ OFF 1 ➔ Auto 2 ➔ Low_speed 3 ➔ High_speed
Rain_Snsr_Err	Input	Bool	The error of the rain sensor	0	1	0 ➔ Normal 1 ➔ Error
Wipr_Spd_Req	Input	Uint8	Required speed level in case of auto mode	0	7	Vector of speeds [0 1 2 3 4 5 6 7]
Wipr_Pwm_Duty_Cyc	Output	Single	PWM command to wiper motor	0	1	Motor PWM
Wipr_Act	Output	Bool	Indication if motor is running	0	1	0 ➔ Stop 1 ➔ Running

Requirements

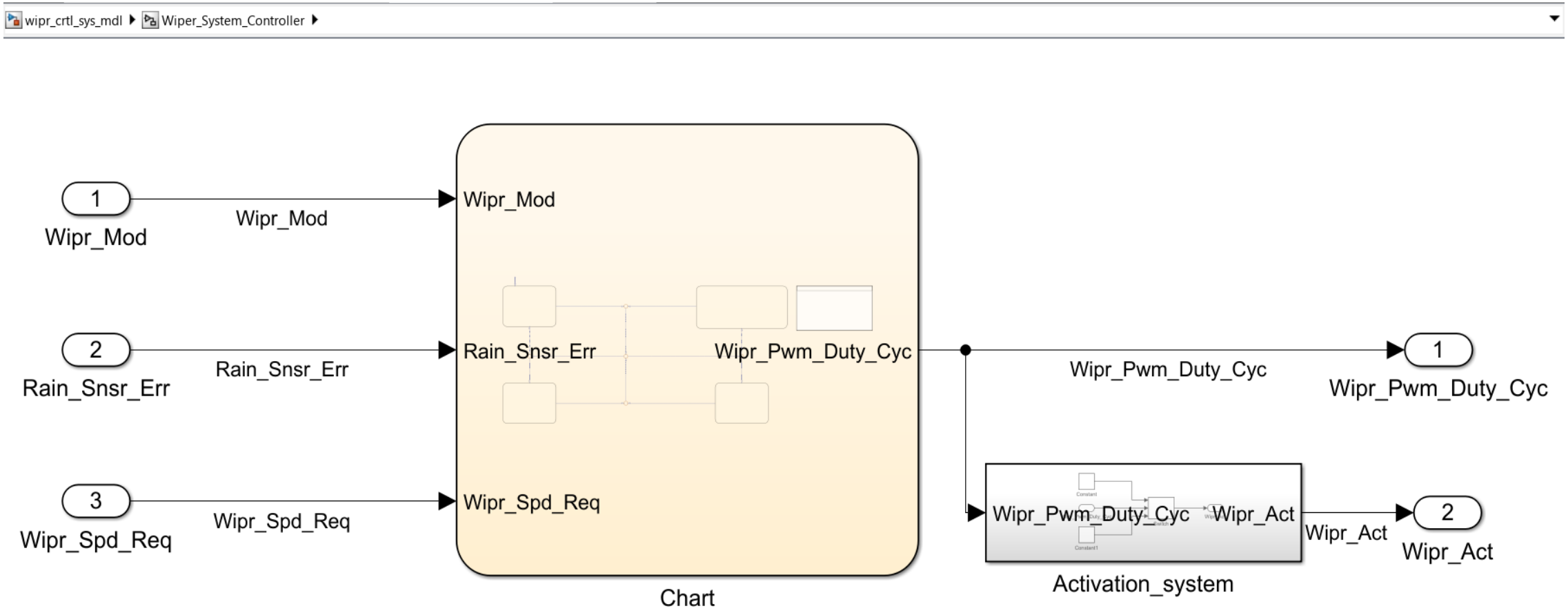
- Wiper system shall set Wipr_Pwm_Duty_Cyc with ‘0’ if Wipr_Mod is OFF.
- Wiper system shall set Wipr_Pwm_Duty_Cyc with ‘40%’ if Wipr_Mod is Low_speed.
- Wiper system shall set Wipr_Pwm_Duty_Cyc with ‘70%’ if Wipr_Mod is High_speed.
- Wiper system shall set Wipr_Pwm_Duty_Cyc with ‘0’ if Wipr_Mod is Auto and Rain_Snsr_Err is True.
- Wiper system shall set Wipr_Pwm_Duty_Cyc with a value of PWM table corresponding for Wipr_Spd_Req if Wipr_Mod is Auto and Rain_Snsr_Err is False.
- Wiper system shall set Wipr_Act with ‘0’ if system is not activated.
- Wiper system shall set Wipr_Act with ‘1’ if system is activated.
- **Sampling time is 10 ms.**

Wipr_Spd_Req	0	1	2	3	4	5	6	7
PWM	0%	40%	45%	50%	55%	60%	65%	70%

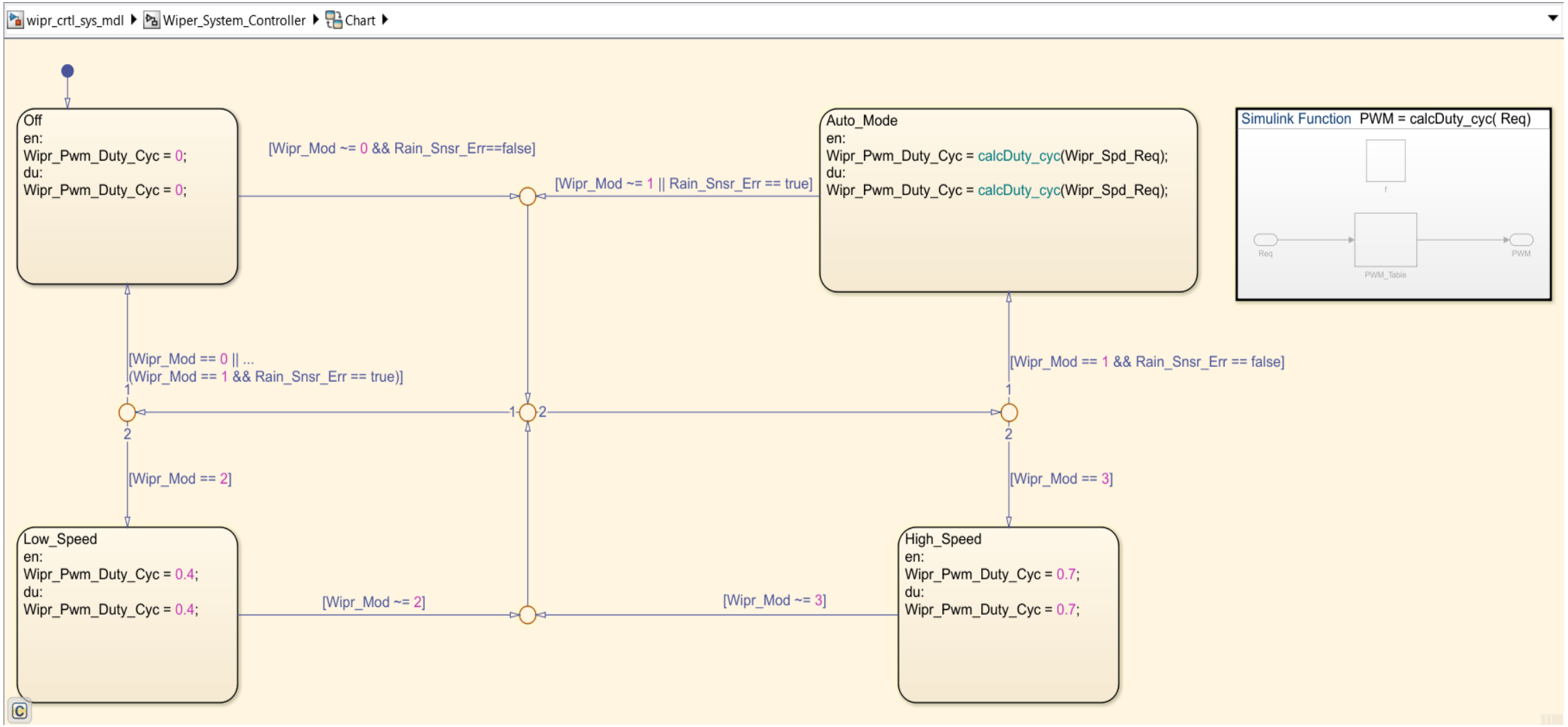
Simulink System Model 1st Level



Simulink System Model 2nd Level

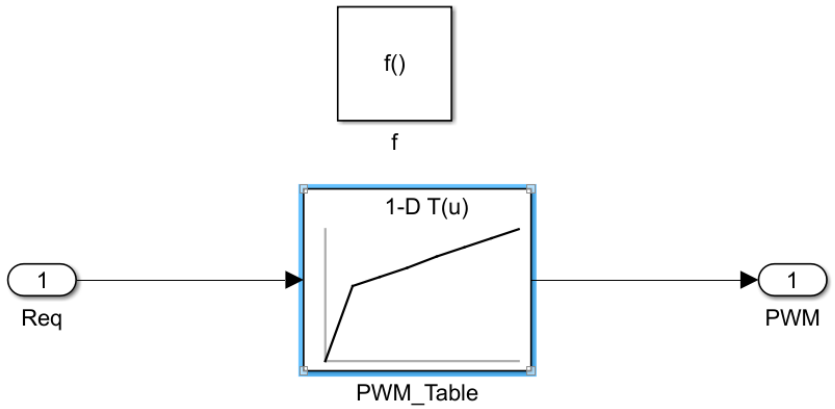


Stateflow System Model 3rd Level

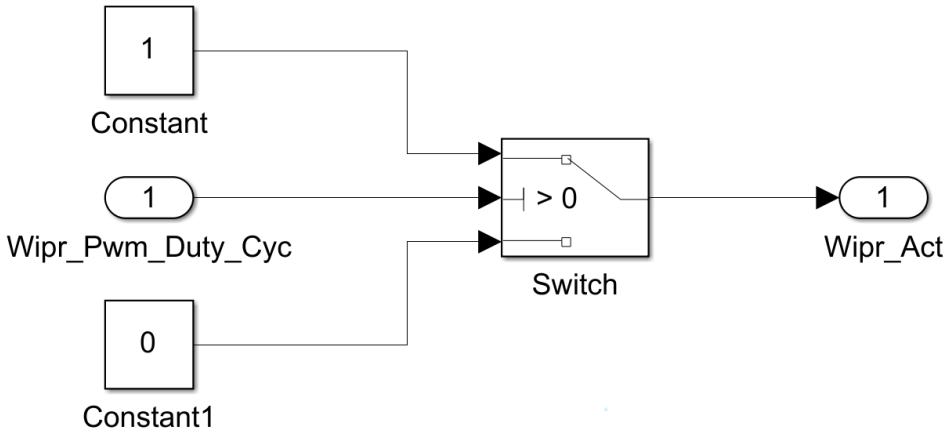


Helper Systems

Simulink Function To Calculate Duty Cycle In Auto Mode.



Subsystem To Determine If System Is Active Or Not.



Testing The Model

TC_1

Test Result Information

Result Type:	Test Case Result
Parent:	None
Start Time:	15-Feb-2025 14:32:52
End Time:	15-Feb-2025 14:33:09
Outcome:	Passed

Test Case Information

Name:	TC_1
Type:	Baseline Test

Aggregated Coverage Results

Analyzed Model	Sim Mode	Complexity	Decision	Condition	Execution
wipr_crtl_sys_mdl	Normal	20	96%	83%	100%

Verify Result

Name
Test Sequence/step_1:verify(Wipr_Pwm_Duty_Cyc == 0)
Test Sequence/step_1:verify(Wipr_Act == false)
Test Sequence/step_3:verify(Wipr_Pwm_Duty_Cyc == single(0.4))
Test Sequence/step_3:verify(Wipr_Act == true)
Test Sequence/step_5:verify(Wipr_Pwm_Duty_Cyc == single(0.7))
Test Sequence/step_5:verify(Wipr_Act == true)
Test Sequence/step_7:verify(Wipr_Pwm_Duty_Cyc == 0)
Test Sequence/step_7:verify(Wipr_Act == 0)
Test Sequence/step_9:verify(Wipr_Pwm_Duty_Cyc == single(0.45))
Test Sequence/step_9:verify(Wipr_Act == 1)
Test Sequence/step_11:verify(Wipr_Pwm_Duty_Cyc == single(0.65))
Test Sequence/step_11:verify(Wipr_Act == 1)
Test Sequence/step_13:verify(Wipr_Pwm_Duty_Cyc == 0)
Test Sequence/step_13:verify(Wipr_Act == 0)

Completion Certification