saps_3_0

Design Description

USER

saps_3_0: Design Description

USER

Publication date 25-Jan-2017 02:09:22

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Version: 1.264

Last modified: Wed Jan 25 01:35:58 2017

Checksum: 4241890882 1962929579 1480348973 4225555743

Chapter 2. Root System

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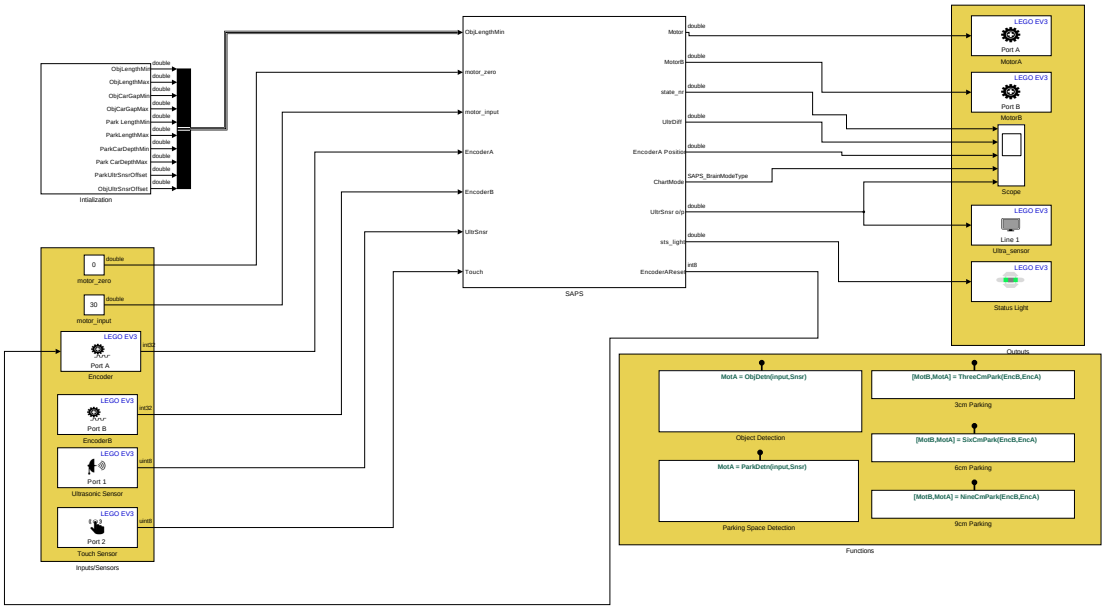
Figure 2.1. saps_3_0



2.1. Blocks

2.1.1. Parameters

2.1.1.1. "Bus Creator" (BusCreator)

Table 2.1. "Bus Creator" Parameters

Parameter	Value
Number of inputs	10
Display option	bar
Data type	Inherit: auto
Output as nonvirtual bus	off
Override bus signal names from inputs	on

2.1.1.2. "Encoder" (S-Function)

Table 2.2. "Encoder" Parameters

Parameter	Value
EV3 brick output port	A
Reset mode	Reset by external signal
Sample time	0.01

2.1.1.3. "EncoderB" (S-Function)

Table 2.3. "EncoderB" Parameters

Parameter	Value
EV3 brick output port	B
Reset mode	No reset
Sample time	0.01

2.1.1.4. "motor_input" (Constant)

Table 2.4. "motor_input" Parameters

Parameter	Value
Constant value	30
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

2.1.1.5. "motor_zero" (Constant)

Table 2.5. "motor_zero" Parameters

Parameter	Value
Constant value	0

Parameter	Value
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

2.1.1.6. "Touch Sensor" (S-Function)

Table 2.6. "Touch Sensor" Parameters

Parameter	Value
EV3 brick input port	2
Sample time	0.01

2.1.1.7. "Ultrasonic Sensor" (S-Function)

Table 2.7. "Ultrasonic Sensor" Parameters

Parameter	Value
EV3 brick input port	1
Sample time	0.01

2.1.2. Block Execution Order

1. sfcn_inserted_server (S-Function)
2. *3cm Parking*
    1. FromWs (FromWorkspace)
    2. EncB [9] (ArgIn)
    3. Gain1 [10] (Gain)
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3. sfcn_inserted_server1 (S-Function)
4. *6cm Parking*
    1. FromWs (FromWorkspace)
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    8. Gain [16] (Gain)
    9. *rear_wheel_ function*
        1. SFunction (S-Function)
    10. MotA [17] (ArgOut)
5. sfcn_inserted_server2 (S-Function)
6. *9cm Parking*
    1. FromWs (FromWorkspace)
    2. EncB [21] (ArgIn)
    3. Gain1 [22] (Gain)
    4. *Steering_Function*
        1. SFunction (S-Function)
    5. MotB [23] (ArgOut)
    6. FromWs (FromWorkspace)
    7. EncA [21] (ArgIn)
    8. Gain [22] (Gain)
    9. *rear_wheel_ function*
        1. SFunction (S-Function)
    10. MotA [23] (ArgOut)
7. ObjLengthMin [27] (Constant)
8. ObjLengthMax [27] (Constant)
9. ObjCarGapMin [27] (Constant)
10. ObjCarGapMax [26] (Constant)
11. ParkLengthMin [35] (Constant)
12. ParkLengthMax [35] (Constant)
13. ParkCarDepthMin [35] (Constant)
14. ParkCarDepthMax [34] (Constant)
15. ParkUltrSnsrOffset [36] (Constant)
16. ObjUltrSnsrOffset [28] (Constant)
17. motor_zero [3] (Constant)
18. motor_input [3] (Constant)
19. Delay1 [52] (Delay)
20. Encoder [3] (S-Function)
21. Data Type Conversion2 [50] (DataTypeConversion)
22. Gain1 [55] (Gain)
23. EncoderB [3] (S-Function)
24. Data Type Conversion4 [51] (DataTypeConversion)
25. Gain2 [56] (Gain)
26. Ultrasonic Sensor [4] (S-Function)
27. Data Type Conversion1 [50] (DataTypeConversion)
28. Delay2 [53] (Delay)
29. Touch Sensor [4] (S-Function)
30. *SAPS Brain*
    1. SFunction (S-Function)
31. Data Type Conversion [37] (DataTypeConversion)

32. Motor [37] (S-Function)
33. Data Type Conversion (DataTypeConversion)
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35. Add1 [48] (Sum)
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37. Data Type Conversion [69] (DataTypeConversion)
38. Status Lights [70] (S-Function)
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40. LCD (S-Function)
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43. Data Type Conversion3 [50] (DataTypeConversion)
44. sfcn_inserted_server3 (S-Function)
45. *Object Detection*
    1. input [39] (ArgIn)
    2. Snsr [41] (ArgIn)
    3. *MATLAB Function*
        1. SFunction (S-Function)
    4. MotA [40] (ArgOut)
    5. Data Type Conversion [42] (DataTypeConversion)
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    2. Snsr [46] (ArgIn)
    3. *MATLAB Function*
        1. SFunction (S-Function)
    4. Mot [45] (ArgOut)
    5. Data Type Conversion (DataTypeConversion)
    6. LCD (S-Function)

Chapter 3. Subsystems

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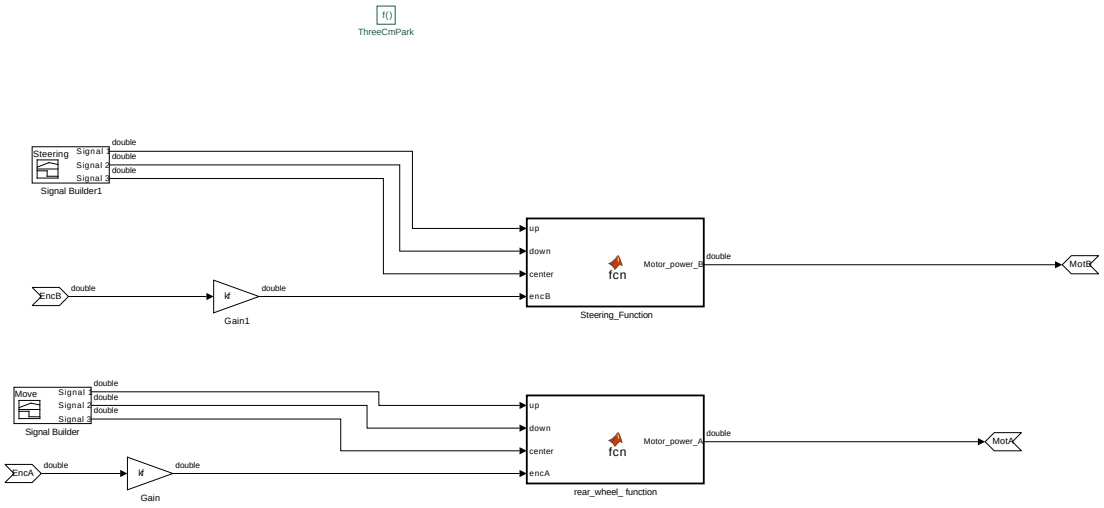
3.1. 3cm Parking

Checksum: 738232731 1369086778 2572962417 552625229

Figure 3.1. saps_3_0/3cm Parking



3.1.1. Blocks

3.1.1.1. Parameters

3.1.1.1.1. " Steering_Function" (MATLAB Function)

Table 3.1. Steering_Function Function Properties

Property	Value
Update Method	INHERITED
Sample Time	
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
Input fi math	fimath(...)
Description	

Table 3.2. Steering_Function Argument Summary

Name	Scope	Port	Data Type	Size
up	Input	1	double	1
down	Input	2	double	1
center	Input	3	double	1
Motor_power_B	Output	1	double	1

Name	Scope	Port	Data Type	Size
encB	Input	4	double	1

Steering_Function Function Script

```
function Motor_power_B=fcn(up,down,center,encB)
%#codegen
if(up==1)&&(encB>=-400)
   Motor_power_B=-70;
elseif(down==1)&&(encB<=400)
   Motor_power_B=70;
elseif (center==1)&&(encB>=5)
 %%  while(encB~=0)
   Motor_power_B=-70;
else
   Motor_power_B=0;
end
end
```

3.1.1.1.2. "EncA" (ArgIn)

Table 3.3. "EncA" Parameters

Parameter	Value
Port number	2
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	EncA

3.1.1.1.3. "EncB" (ArgIn)

Table 3.4. "EncB" Parameters

Parameter	Value
Port number	1
Minimum	[]
Maximum	[]

Parameter	Value
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	EncB

3.1.1.1.4. "Gain" (Gain)

Table 3.5. "Gain" Parameters

Parameter	Value
Gain	kf
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.1.1.1.5. "Gain1" (Gain)

Table 3.6. "Gain1" Parameters

Parameter	Value
Gain	kf
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Inherit via internal rule
Output minimum	[]

Parameter	Value
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.1.1.1.6. "MotA" (ArgOut)

Table 3.7. "MotA" Parameters

Parameter	Value
Port number	2
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	MotA

3.1.1.1.7. "MotB" (ArgOut)

Table 3.8. "MotB" Parameters

Parameter	Value
Port number	1
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real

Parameter	Value
Argument name	MotB

3.1.1.1.8. "rear_wheel_ function" (MATLAB Function)

Table 3.9. rear_wheel_ function Function Properties

Property	Value
Update Method	INHERITED
Sample Time	
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
Input fi math	fimath(...)
Description	

Table 3.10. rear_wheel_ function Argument Summary

Name	Scope	Port	Data Type	Size
Motor_power_A	Output	1	double	1
up	Input	1	double	1
down	Input	2	double	1
center	Input	3	double	1
encA	Input	4	double	1

rear_wheel_ function Function Script

```
function Motor_power_A=fcn(up, down,center,encA)
%#codegen
if (up==1)&&(encA>=-240)
  Motor_power_A = -30;
elseif (down==1)&&(encA>=-500)
     Motor_power_A = -30;
elseif (center==1)&&(encA<=-435)
    Motor_power_A=30;
else
    Motor_power_A=0;
end
end
```

3.1.1.1.9. "ThreeCmPark" (TriggerPort)

Table 3.11. "ThreeCmPark" Parameters

Parameter	Value
Trigger type	function-call
Treat as Simulink Function	on
Function name	ThreeCmPark
States when enabling	held
Propagate sizes of variable-size signals	During execution
Show output port	off
Sample time type	triggered
Sample time	1
Enable zero-crossing detection	on
Port dimensions	-1
Trigger signal sample time	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Interpolate data	on
	[MotB,MotA] = ThreeCmPark(EncB,EncA)

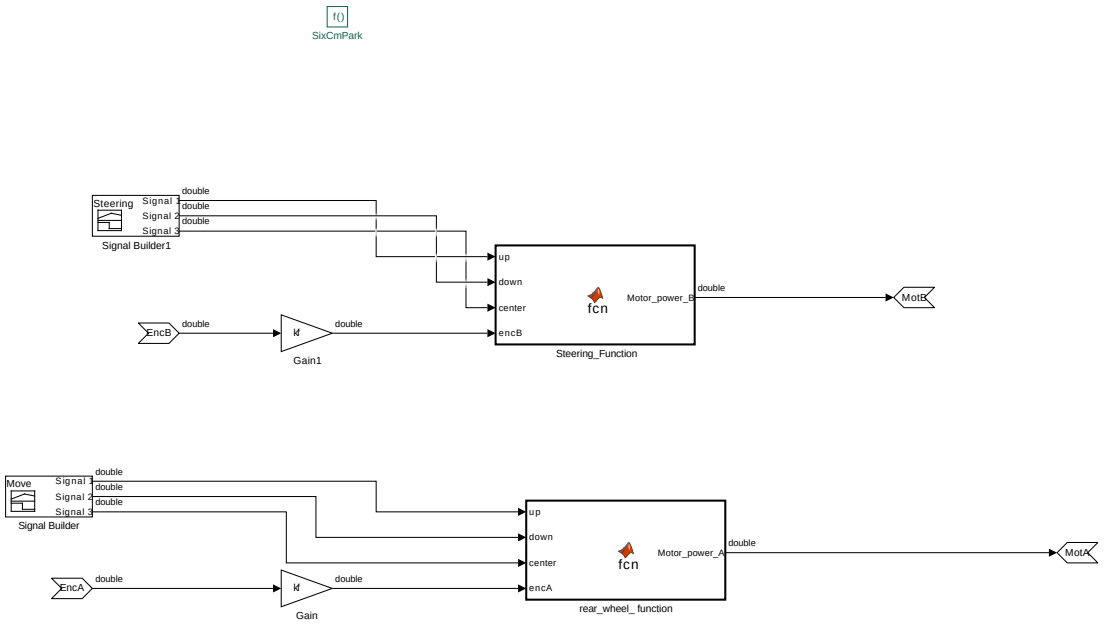
3.1.2. Block Execution Order

1. FromWs (FromWorkspace)
2. EncB [9] (ArgIn)
3. Gain1 [10] (Gain)
4. *Steering_Function*
    1. SFunction (S-Function)
5. MotB [11] (ArgOut)
6. FromWs (FromWorkspace)
7. EncA [9] (ArgIn)
8. Gain [10] (Gain)
9. *rear_wheel_ function*
    1. SFunction (S-Function)
10. MotA [11] (ArgOut)

3.2. 6cm Parking

Checksum: 861514029 2082552591 4079750187 3266707739

Figure 3.2. saps_3_0/6cm Parking



3.2.1. Blocks

3.2.1.1. Parameters

3.2.1.1.1. " Steering_Function" (MATLAB Function)

Table 3.12. Steering_Function Function Properties

Property	Value
Update Method	INHERITED
Sample Time	
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
Input fi math	fimath(...)
Description	

Table 3.13. Steering_Function Argument Summary

Name	Scope	Port	Data Type	Size
up	Input	1	double	1

Name	Scope	Port	Data Type	Size
down	Input	2	double	1
center	Input	3	double	1
Motor_power_B	Output	1	double	1
encB	Input	4	double	1

Steering_Function Function Script

```
function Motor_power_B=fcn(up,down,center,encB)
%#codegen
if(up==1)&&(encB>=-400)
   Motor_power_B=-70;
elseif(down==1)&&(encB<=400)
   Motor_power_B=70;
elseif (center==1)&&(encB>=5)
 %%  while(encB~=0)
   Motor_power_B=-70;
else
   Motor_power_B=0;
end
end
```

3.2.1.1.2. "EncA" (ArgIn)

Table 3.14. "EncA" Parameters

Parameter	Value
Port number	2
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	EncA

3.2.1.1.3. "EncB" (ArgIn)

Table 3.15. "EncB" Parameters

Parameter	Value
Port number	1

Parameter	Value
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	EncB

3.2.1.1.4. "Gain" (Gain)

Table 3.16. "Gain" Parameters

Parameter	Value
Gain	kf
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.2.1.1.5. "Gain1" (Gain)

Table 3.17. "Gain1" Parameters

Parameter	Value
Gain	kf
Multiplication	Element-wise(K.*u)
Parameter minimum	[]

Parameter	Value
Parameter maximum	[]
Parameter data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.2.1.1.6. "MotA" (ArgOut)

Table 3.18. "MotA" Parameters

Parameter	Value
Port number	2
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	MotA

3.2.1.1.7. "MotB" (ArgOut)

Table 3.19. "MotB" Parameters

Parameter	Value
Port number	1
Minimum	[]
Maximum	[]
Data type	double

Parameter	Value
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	MotB

3.2.1.1.8. "rear_wheel_ function" (MATLAB Function)

Table 3.20. rear_wheel_ function Function Properties

Property	Value
Update Method	INHERITED
Sample Time	
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
Input fi math	fimath(...)
Description	

Table 3.21. rear_wheel_ function Argument Summary

Name	Scope	Port	Data Type	Size
Motor_power_A	Output	1	double	1
up	Input	1	double	1
down	Input	2	double	1
center	Input	3	double	1
encA	Input	4	double	1

rear_wheel_ function Function Script

```
function Motor_power_A=fcn(up, down,center,encA)
%#codegen
if (up==1)&&(encA>=-260)
  Motor_power_A = -30;
elseif (down==1)&&(encA>=-530)
     Motor_power_A = -30;
elseif (center==1)&&(encA<=-500)
    Motor_power_A=30;
else
```

```
    Motor_power_A=0;
end
end
```

3.2.1.1.9. "SixCmPark" (TriggerPort)

Table 3.22. "SixCmPark" Parameters

Parameter	Value
Trigger type	function-call
Treat as Simulink Function	on
Function name	SixCmPark
States when enabling	held
Propagate sizes of variable-size signals	During execution
Show output port	off
Sample time type	triggered
Sample time	1
Enable zero-crossing detection	on
Port dimensions	-1
Trigger signal sample time	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Interpolate data	on
	[MotB,MotA] = SixCmPark(EncB,EncA)

3.2.2. Block Execution Order

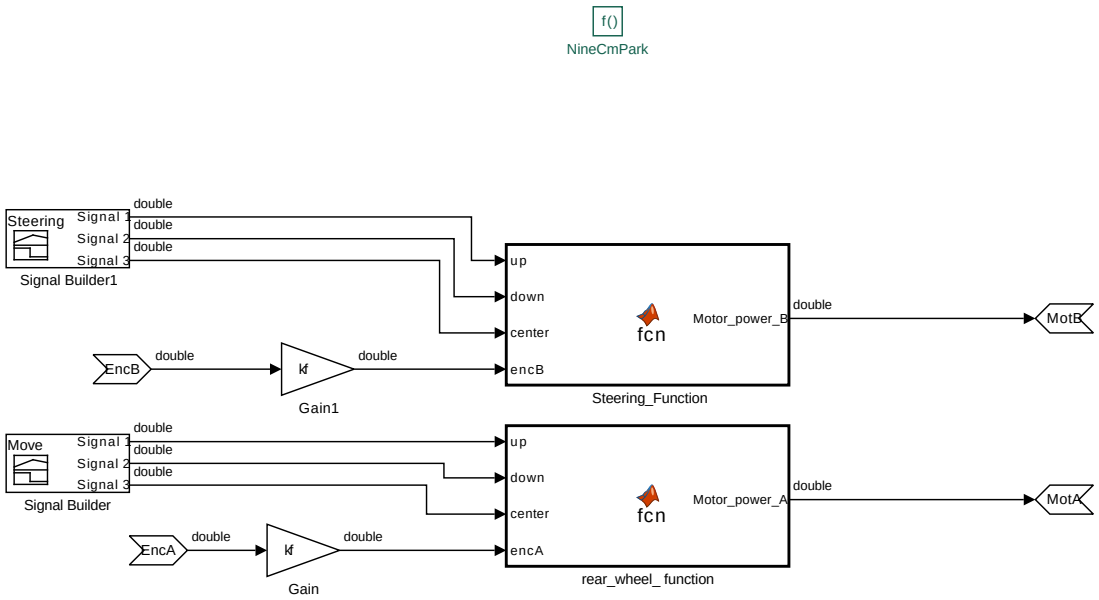
1. FromWs (FromWorkspace)
2. EncB [15] (ArgIn)
3. Gain1 [16] (Gain)
4. *Steering_Function*
    1. SFunction (S-Function)
5. MotB [17] (ArgOut)
6. FromWs (FromWorkspace)
7. EncA [15] (ArgIn)
8. Gain [16] (Gain)
9. *rear_wheel_ function*
    1. SFunction (S-Function)

10. MotA [17] (ArgOut)

3.3. 9cm Parking

Checksum: 1422747930 3773152008 3174706231 2174827943

Figure 3.3. saps_3_0/9cm Parking



3.3.1. Blocks

3.3.1.1. Parameters

3.3.1.1.1. " Steering_Function" (MATLAB Function)

Table 3.23. Steering_Function Function Properties

Property	Value
Update Method	INHERITED
Sample Time	
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
Input fi math	fimath(...)

Property	Value
Description	

Table 3.24. Steering_Function Argument Summary

Name	Scope	Port	Data Type	Size
up	Input	1	double	1
down	Input	2	double	1
center	Input	3	double	1
Motor_power_B	Output	1	double	1
encB	Input	4	double	1

Steering_Function Function Script

```
function Motor_power_B=fcn(up,down,center,encB)
%#codegen
if(up==1)&&(encB>=-400)
   Motor_power_B=-70;
elseif(down==1)&&(encB<=400)
   Motor_power_B=70;
elseif (center==1)&&(encB>=5)
 %%  while(encB~=0)
   Motor_power_B=-70;
else
   Motor_power_B=0;
end
end
```

3.3.1.1.2. "EncA" (ArgIn)

Table 3.25. "EncA" Parameters

Parameter	Value
Port number	2
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	EncA

3.3.1.1.3. "EncB" (ArgIn)

Table 3.26. "EncB" Parameters

Parameter	Value
Port number	1
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	EncB

3.3.1.1.4. "Gain" (Gain)

Table 3.27. "Gain" Parameters

Parameter	Value
Gain	kf
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.3.1.1.5. "Gain1" (Gain)

Table 3.28. "Gain1" Parameters

Parameter	Value
Gain	kf

Parameter	Value
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.3.1.1.6. "MotA" (ArgOut)

Table 3.29. "MotA" Parameters

Parameter	Value
Port number	2
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	MotA

3.3.1.1.7. "MotB" (ArgOut)

Table 3.30. "MotB" Parameters

Parameter	Value
Port number	1
Minimum	[]
Maximum	[]

Parameter	Value
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	MotB

3.3.1.1.8. "NineCmPark" (TriggerPort)

Table 3.31. "NineCmPark" Parameters

Parameter	Value
Trigger type	function-call
Treat as Simulink Function	on
Function name	NineCmPark
States when enabling	held
Propagate sizes of variable-size signals	During execution
Show output port	off
Sample time type	triggered
Sample time	1
Enable zero-crossing detection	on
Port dimensions	-1
Trigger signal sample time	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Interpolate data	on
	[MotB,MotA] = NineCmPark(EncB,EncA)

3.3.1.1.9. "rear_wheel_ function" (MATLAB Function)

Table 3.32. rear_wheel_ function Function Properties

Property	Value
Update Method	INHERITED

Property	Value
Sample Time	
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
Input fi math	fimath(...)
Description	

Table 3.33. rear_wheel_ function Argument Summary

Name	Scope	Port	Data Type	Size
Motor_power_A	Output	1	double	1
up	Input	1	double	1
down	Input	2	double	1
center	Input	3	double	1
encA	Input	4	double	1

rear_wheel_ function Function Script

```
function Motor_power_A=fcn(up, down,center,encA)
%#codegen
if (up==1)&&(encA>=-300)
  Motor_power_A = -30;
elseif (down==1)&&(encA>=-600)
     Motor_power_A = -30;
elseif (center==1)&&(encA<=-520)
    Motor_power_A=30;
else
    Motor_power_A=0;
end
end
```

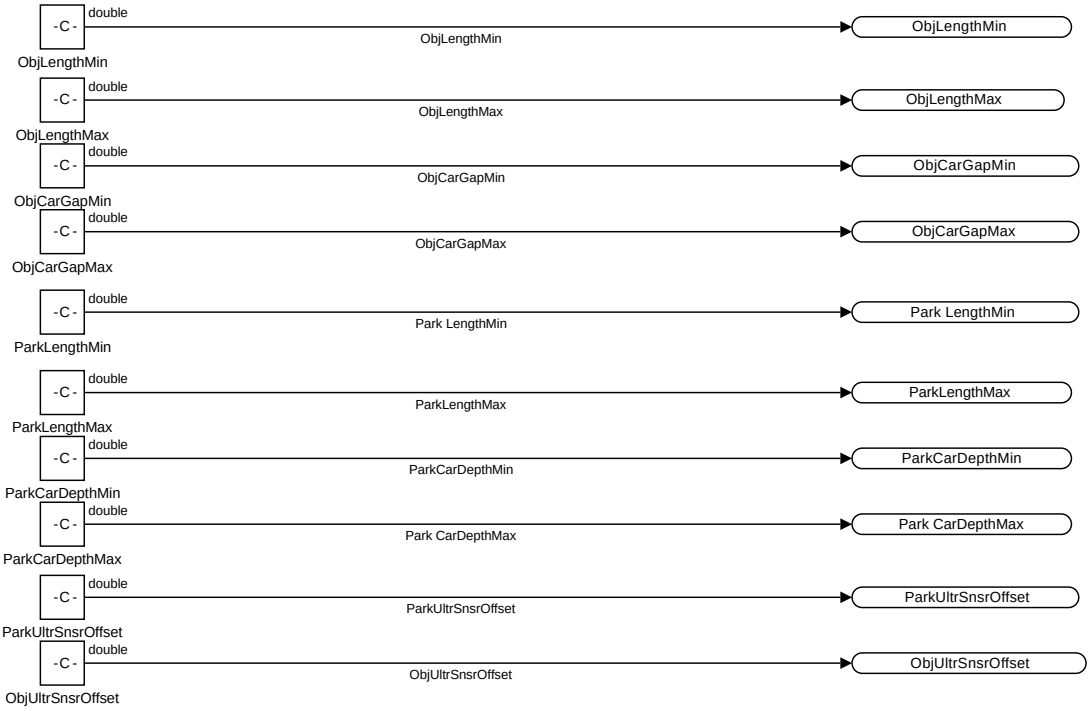
3.3.2. Block Execution Order

1. FromWs (FromWorkspace)
2. EncB [21] (ArgIn)
3. Gain1 [22] (Gain)
4. *Steering_Function*
    1. SFunction (S-Function)
5. MotB [23] (ArgOut)

6. FromWs (FromWorkspace)
7. EncA [21] (ArgIn)
8. Gain [22] (Gain)
9. *rear_wheel_ function*
    1. SFunction (S-Function)
10. MotA [23] (ArgOut)

3.4. Intialization

Figure 3.4. saps_3_0/Intialization



3.4.1. Blocks

3.4.1.1. Parameters

3.4.1.1.1. "ObjCarGapMax" (Constant)

Table 3.34. "ObjCarGapMax" Parameters

Parameter	Value
Constant value	ObjCarGapMax
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]

Parameter	Value
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

3.4.1.1.2. "ObjCarGapMin" (Constant)

Table 3.35. "ObjCarGapMin" Parameters

Parameter	Value
Constant value	ObjCarGapMin
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

3.4.1.1.3. "ObjLengthMax" (Constant)

Table 3.36. "ObjLengthMax" Parameters

Parameter	Value
Constant value	ObjLengthMax
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

3.4.1.1.4. "ObjLengthMin" (Constant)

Table 3.37. "ObjLengthMin" Parameters

Parameter	Value
Constant value	ObjLengthMin
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

3.4.1.1.5. "ObjUltrSnsrOffset" (Constant)

Table 3.38. "ObjUltrSnsrOffset" Parameters

Parameter	Value
Constant value	ObjUltrSnsrOffset
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

3.4.1.1.6. "Out1" (Outport)

Table 3.39. "Out1" Parameters

Parameter	Value
Port number	1
Icon display	Signal name
Minimum	[]
Maximum	[]

Parameter	Value
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.4.1.1.7. "Out10" (Outport)

Table 3.40. "Out10" Parameters

Parameter	Value
Port number	10
Icon display	Signal name
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.4.1.1.8. "Out2" (Outport)

Table 3.41. "Out2" Parameters

Parameter	Value
Port number	2
Icon display	Signal name
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.4.1.1.9. "Out3" (Outport)

Table 3.42. "Out3" Parameters

Parameter	Value
Port number	3
Icon display	Signal name
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit

Parameter	Value
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.4.1.1.10. "Out4" (Outport)

Table 3.43. "Out4" Parameters

Parameter	Value
Port number	4
Icon display	Signal name
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.4.1.1.11. "Out5" (Outport)

Table 3.44. "Out5" Parameters

Parameter	Value
Port number	5
Icon display	Signal name
Minimum	[]
Maximum	[]

Parameter	Value
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.4.1.1.12. "Out6" (Outport)

Table 3.45. "Out6" Parameters

Parameter	Value
Port number	6
Icon display	Signal name
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.4.1.1.13. "Out7" (Outport)

Table 3.46. "Out7" Parameters

Parameter	Value
Port number	7
Icon display	Signal name
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.4.1.1.14. "Out8" (Outport)

Table 3.47. "Out8" Parameters

Parameter	Value
Port number	8
Icon display	Signal name
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit

Parameter	Value
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.4.1.1.15. "Out9" (Outport)

Table 3.48. "Out9" Parameters

Parameter	Value
Port number	9
Icon display	Signal name
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.4.1.1.16. "ParkCarDepthMax" (Constant)

Table 3.49. "ParkCarDepthMax" Parameters

Parameter	Value
Constant value	ParkCarDepthMax
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]

Parameter	Value
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

3.4.1.1.17. "ParkCarDepthMin" (Constant)

Table 3.50. "ParkCarDepthMin" Parameters

Parameter	Value
Constant value	ParkCarDepthMin
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

3.4.1.1.18. "ParkLengthMax" (Constant)

Table 3.51. "ParkLengthMax" Parameters

Parameter	Value
Constant value	ParkLengthMax
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

3.4.1.1.19. "ParkLengthMin" (Constant)

Table 3.52. "ParkLengthMin" Parameters

Parameter	Value
Constant value	ParkLengthMin
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

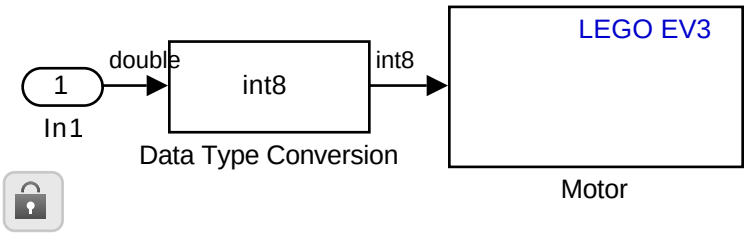
3.4.1.1.20. "ParkUltrSnsrOffset" (Constant)

Table 3.53. "ParkUltrSnsrOffset" Parameters

Parameter	Value
Constant value	ParkUltrSnsrOffset
Interpret vector parameters as 1-D	on
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit from 'Constant value'
Lock output data type setting against changes by the fixed-point tools	off
Sample time	inf
Frame period	inf

3.5. MotorA

Figure 3.5. saps_3_0/MotorA



3.5.1. Blocks

3.5.1.1. Parameters

3.5.1.1.1. "Data Type Conversion" (DataTypeConversion)

Table 3.54. "Data Type Conversion" Parameters

Parameter	Value
Output minimum	[]
Output maximum	[]
Output data type	int8
Lock output data type setting against changes by the fixed-point tools	off
Input and output to have equal	Real World Value (RWV)
Integer rounding mode	Floor
Saturate on integer overflow	on
Sample time (-1 for inherited)	-1

3.5.1.1.2. "In1" (Inport)

Table 3.55. "In1" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

3.5.1.1.3. "Motor" (S-Function)

Table 3.56. "Motor" Parameters

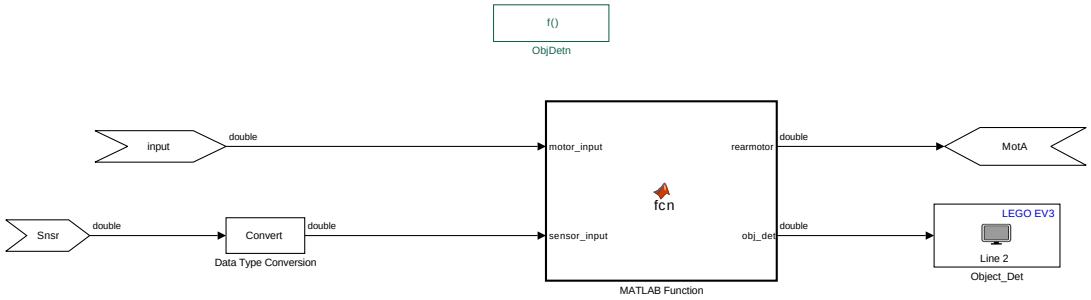
Parameter	Value
EV3 Outport Port	A

Parameter	Value
Stop Action	Brake

3.6. Object Detection

Checksum: 3913702660 3540075425 9324022 2131094301

Figure 3.6. saps_3_0/Object Detection



3.6.1. Blocks

3.6.1.1. Parameters

3.6.1.1.1. "Data Type Conversion" (DataTypeConversion)

Table 3.57. "Data Type Conversion" Parameters

Parameter	Value
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via back propagation
Lock output data type setting against changes by the fixed-point tools	off
Input and output to have equal	Real World Value (RWV)
Integer rounding mode	Floor
Saturate on integer overflow	off

Parameter	Value
Sample time (-1 for inherited)	-1

3.6.1.1.2. "input" (ArgIn)

Table 3.58. "input" Parameters

Parameter	Value
Port number	1
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	input

3.6.1.1.3. "MATLAB Function" (MATLAB Function)

Table 3.59. MATLAB Function Function Properties

Property	Value
Update Method	INHERITED
Sample Time	
Support variable-size arrays	1
Saturate on integer overflow	1
Treat these inherited Simulink signal types as fi objects	Fixed-point
Input fi math	fimath(...)
Description	

Table 3.60. MATLAB Function Argument Summary

Name	Scope	Port	Data Type	Size
motor_input	Input	1	double	1

Name	Scope	Port	Data Type	Size
sensor_input	Input	2	double	1
rearmotor	Output	1	double	1
obj_det	Output	2	double	1

MATLAB Function Function Script

```
function [rearmotor,obj_det] = fcn(motor_input,sensor_input)
%#codegen
if(sensor_input>4)&&(sensor_input<=20)
    rearmotor=motor_input;
    obj_det=1;
else
    rearmotor = motor_input;
    obj_det=0;
end
end
```

3.6.1.1.4. "MotA" (ArgOut)

Table 3.61. "MotA" Parameters

Parameter	Value
Port number	1
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	MotA

3.6.1.1.5. "ObjDetn" (TriggerPort)

Table 3.62. "ObjDetn" Parameters

Parameter	Value
Trigger type	function-call
Treat as Simulink Function	on
Function name	ObjDetn

Parameter	Value
States when enabling	held
Propagate sizes of variable-size signals	During execution
Show output port	off
Sample time type	triggered
Sample time	1
Enable zero-crossing detection	on
Port dimensions	-1
Trigger signal sample time	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Interpolate data	on
	MotA = ObjDetn(input,Snsr)

3.6.1.1.6. "Snsr" (ArgIn)

Table 3.63. "Snsr" Parameters

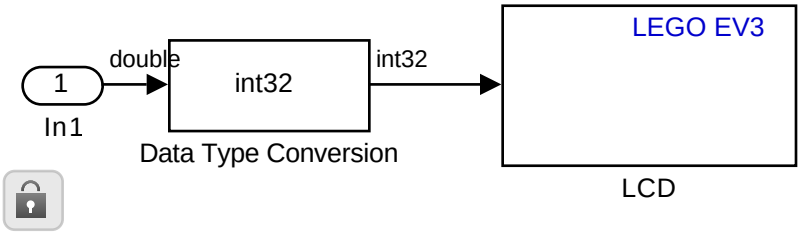
Parameter	Value
Port number	2
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	Snsr

3.6.2. Block Execution Order

1. input [39] (ArgIn)
2. Snsr [41] (ArgIn)
3. *MATLAB Function*
    1. SFunction (S-Function)
4. MotA [40] (ArgOut)
5. Data Type Conversion [42] (DataTypeConversion)
6. LCD [43] (S-Function)

3.7. Object_Det

Figure 3.7. saps_3_0/Object Detection/Object_Det



3.7.1. Blocks

3.7.1.1. Parameters

3.7.1.1.1. "Data Type Conversion" (DataTypeConversion)

Table 3.64. "Data Type Conversion" Parameters

Parameter	Value
Output minimum	[]
Output maximum	[]
Output data type	int32
Lock output data type setting against changes by the fixed-point tools	off
Input and output to have equal	Real World Value (RWV)
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.7.1.1.2. "In1" (Inport)

Table 3.65. "In1" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1

Parameter	Value
Minimum	[]
Maximum	[]
Data type	Inherit: auto

3.7.1.1.3. "LCD" (S-Function)

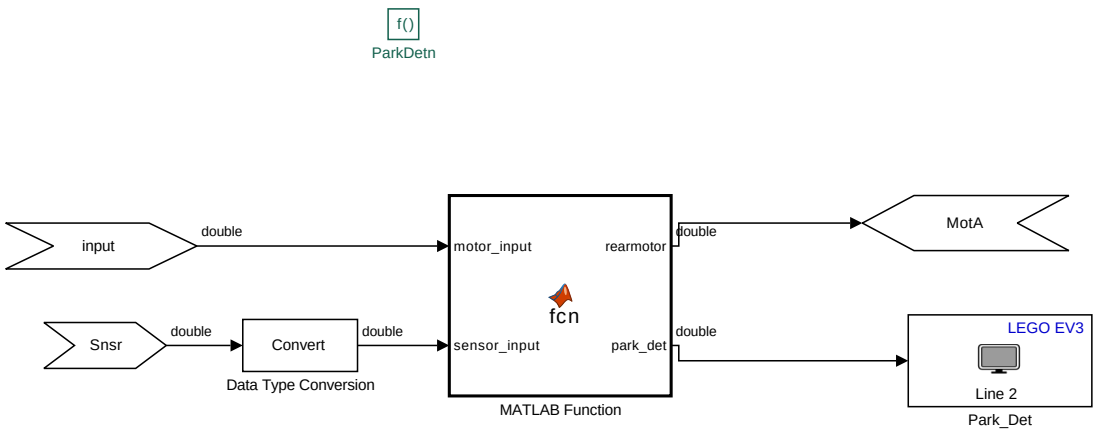
Table 3.66. "LCD" Parameters

Parameter	Value
Prefix String (MAX 8 Characters)	OBJ_DECT
Display at Line	2
Display Format	Decimal

3.8. Parking Space Detection

Checksum: 763674292 3117347789 2325775074 3263976522

Figure 3.8. saps_3_0/Parking Space Detection



3.8.1. Blocks

3.8.1.1. Parameters

3.8.1.1.1. "Data Type Conversion" (DataTypeConversion)

Table 3.67. "Data Type Conversion" Parameters

Parameter	Value
Output minimum	[]

Parameter	Value
Output maximum	[]
Output data type	Inherit: Inherit via back propagation
Lock output data type setting against changes by the fixed-point tools	off
Input and output to have equal	Real World Value (RWV)
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.8.1.1.2. "input" (ArgIn)

Table 3.68. "input" Parameters

Parameter	Value
Port number	1
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	input

3.8.1.1.3. "MATLAB Function" (MATLAB Function)

Table 3.69. MATLAB Function Function Properties

Property	Value
Update Method	INHERITED
Sample Time	
Support variable-size arrays	1
Saturate on integer overflow	1

Property	Value
Treat these inherited Simulink signal types as fi objects	Fixed-point
Input fi math	fimath(...)
Description	

Table 3.70. MATLAB Function Argument Summary

Name	Scope	Port	Data Type	Size
motor_input	Input	1	double	1
sensor_input	Input	2	double	1
rearmotor	Output	1	double	1
park_det	Output	2	double	1

MATLAB Function Function Script

```
function [rearmotor,park_det] = fcn(motor_input,sensor_input)
%#codegen
if(sensor_input>24)&&(sensor_input<=40)
    rearmotor=motor_input;
    park_det=1;
else
    rearmotor = motor_input;
    park_det=0;
end
end
```

3.8.1.1.4. "Mot" (ArgOut)

Table 3.71. "Mot" Parameters

Parameter	Value
Port number	1
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	MotA

3.8.1.1.5. "ParkDetn" (TriggerPort)

Table 3.72. "ParkDetn" Parameters

Parameter	Value
Trigger type	function-call
Treat as Simulink Function	on
Function name	ParkDetn
States when enabling	held
Propagate sizes of variable-size signals	During execution
Show output port	off
Sample time type	triggered
Sample time	1
Enable zero-crossing detection	on
Port dimensions	-1
Trigger signal sample time	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Interpolate data	on
	MotA = ParkDetn(input,Snsr)

3.8.1.1.6. "Snsr" (ArgIn)

Table 3.73. "Snsr" Parameters

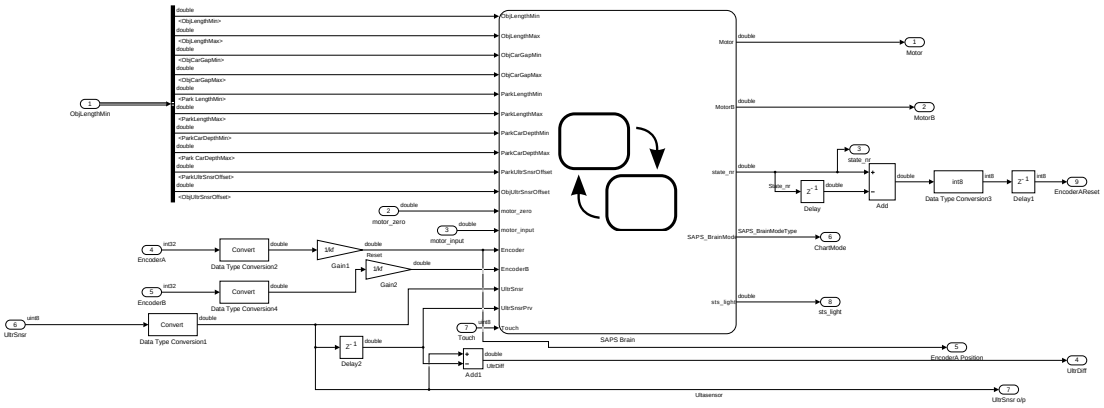
Parameter	Value
Port number	2
Minimum	[]
Maximum	[]
Data type	double
Lock output data type setting against changes by the fixed-point tools	off
Port dimensions	1
Signal type	real
Argument name	Snsr

3.8.2. Block Execution Order

1. input [44] (ArgIn)
2. Snsr [46] (ArgIn)
3. *MATLAB Function*
   1. SFunction (S-Function)
4. Mot [45] (ArgOut)
5. Data Type Conversion (DataTypeConversion)
6. LCD (S-Function)

3.9. SAPS

Figure 3.9. saps_3_0/SAPS



3.9.1. Blocks

3.9.1.1. Parameters

3.9.1.1.1. "Add" (Sum)

Table 3.74. "Add" Parameters

Parameter	Value
Icon shape	rectangular
List of signs	+-
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	off
Accumulator data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule

Parameter	Value
Lock data type settings against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.9.1.1.2. "Add1" (Sum)

Table 3.75. "Add1" Parameters

Parameter	Value
Icon shape	rectangular
List of signs	+-
Sum over	All dimensions
Dimension	1
Require all inputs to have the same data type	off
Accumulator data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock data type settings against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.9.1.1.3. "Bus Selector" (BusSelector)

Table 3.76. "Bus Selector" Parameters

Parameter	Value
Output signals	ObjLengthMin,ObjLengthMax,ObjCarGapMin,ObjCarGapMax,Park LengthMin,ParkLengthMax,ParkCarDepthMin,Park CarDepthMax,ParkUltrSnsrOffset,ObjUltrSnsrOffset
Output as bus	off
	ObjLengthMin

Parameter	Value
	ObjLengthMax ObjCarGapMin ObjCarGapMax Park LengthMin ParkLengthMax ParkCarDepthMin Park CarDepthMax ParkUltrSnsrOffset ObjUltrSnsrOffset

Output Hierarchy:

1. *Bus Selector*
    1. <ObjLengthMin>
    2. <ObjLengthMax>
    3. <ObjCarGapMin>
    4. <ObjCarGapMax>
    5. <Park LengthMin>
    6. <ParkLengthMax>
    7. <ParkCarDepthMin>
    8. <Park CarDepthMax>
    9. <ParkUltrSnsrOffset>
    10. <ObjUltrSnsrOffset>

3.9.1.1.4. "ChartMode" (Outport)

Table 3.77. "ChartMode" Parameters

Parameter	Value
Port number	6
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog

Parameter	Value
Output when disabled	held
Initial output	[]

3.9.1.1.5. "Data Type Conversion1" (DataTypeConversion)

Table 3.78. "Data Type Conversion1" Parameters

Parameter	Value
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via back propagation
Lock output data type setting against changes by the fixed-point tools	off
Input and output to have equal	Real World Value (RWV)
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.9.1.1.6. "Data Type Conversion2" (DataTypeConversion)

Table 3.79. "Data Type Conversion2" Parameters

Parameter	Value
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via back propagation
Lock output data type setting against changes by the fixed-point tools	off
Input and output to have equal	Real World Value (RWV)
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.9.1.1.7. "Data Type Conversion3" (DataTypeConversion)

Table 3.80. "Data Type Conversion3" Parameters

Parameter	Value
Output minimum	[]
Output maximum	[]
Output data type	int8
Lock output data type setting against changes by the fixed-point tools	off
Input and output to have equal	Real World Value (RWV)
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.9.1.1.8. "Data Type Conversion4" (DataTypeConversion)

Table 3.81. "Data Type Conversion4" Parameters

Parameter	Value
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via back propagation
Lock output data type setting against changes by the fixed-point tools	off
Input and output to have equal	Real World Value (RWV)
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.9.1.1.9. "Delay" (Delay)

Table 3.82. "Delay" Parameters

Parameter	Value
Delay length source	Dialog

Parameter	Value
Delay length	1
Delay upper limit	100
Initial condition source	Dialog
Initial condition	0
External reset	None
Show enable port	off
Prevent direct feedthrough by increasing delay length to lower limit	off
Diagnostic for out-of-range delay length	None
Remove protection against out-of-range delay length in generated code	off
Input processing	Elements as channels (sample based)
Use circular buffer for state	off
Sample time (-1 for inherited)	-1
State name must resolve to Simulink signal object	off

3.9.1.1.10. "Delay1" (Delay)

Table 3.83. "Delay1" Parameters

Parameter	Value
Delay length source	Dialog
Delay length	1
Delay upper limit	100
Initial condition source	Dialog
Initial condition	0
External reset	None
Show enable port	off
Prevent direct feedthrough by increasing delay length to lower limit	off
Diagnostic for out-of-range delay length	None
Remove protection against out-of-range delay length in generated code	off

Parameter	Value
Input processing	Elements as channels (sample based)
Use circular buffer for state	off
Sample time (-1 for inherited)	-1
State name must resolve to Simulink signal object	off

3.9.1.1.11. "Delay2" (Delay)

Table 3.84. "Delay2" Parameters

Parameter	Value
Delay length source	Dialog
Delay length	1
Delay upper limit	100
Initial condition source	Dialog
Initial condition	0
External reset	None
Show enable port	off
Prevent direct feedthrough by increasing delay length to lower limit	off
Diagnostic for out-of-range delay length	None
Remove protection against out-of-range delay length in generated code	off
Input processing	Elements as channels (sample based)
Use circular buffer for state	off
Sample time (-1 for inherited)	-1
State name must resolve to Simulink signal object	off

3.9.1.1.12. "EncoderA" (Inport)

Table 3.85. "EncoderA" Parameters

Parameter	Value
Port number	4

Parameter	Value
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

3.9.1.1.13. "EncoderA Position" (Outport)

Table 3.86. "EncoderA Position" Parameters

Parameter	Value
Port number	5
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.9.1.1.14. "EncoderAReset" (Outport)

Table 3.87. "EncoderAReset" Parameters

Parameter	Value
Port number	9
Icon display	Port number

Parameter	Value
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.9.1.1.15. "EncoderB" (Inport)

Table 3.88. "EncoderB" Parameters

Parameter	Value
Port number	5
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

3.9.1.1.16. "Gain1" (Gain)

Table 3.89. "Gain1" Parameters

Parameter	Value
Gain	1/kf
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]

Parameter	Value
Parameter data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.9.1.1.17. "Gain2" (Gain)

Table 3.90. "Gain2" Parameters

Parameter	Value
Gain	1/kf
Multiplication	Element-wise(K.*u)
Parameter minimum	[]
Parameter maximum	[]
Parameter data type	Inherit: Inherit via internal rule
Output minimum	[]
Output maximum	[]
Output data type	Inherit: Inherit via internal rule
Lock output data type setting against changes by the fixed-point tools	off
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.9.1.1.18. "Motor" (Outport)

Table 3.91. "Motor" Parameters

Parameter	Value
Port number	1

Parameter	Value
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.9.1.1.19. "motor_input" (Inport)

Table 3.92. "motor_input" Parameters

Parameter	Value
Port number	3
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

3.9.1.1.20. "motor_zero" (Inport)

Table 3.93. "motor_zero" Parameters

Parameter	Value
Port number	2
Port dimensions (-1 for inherited)	-1

Parameter	Value
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

3.9.1.1.21. "MotorB" (Outport)

Table 3.94. "MotorB" Parameters

Parameter	Value
Port number	2
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.9.1.1.22. "ObjLengthMin" (Inport)

Table 3.95. "ObjLengthMin" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1

Parameter	Value
Minimum	[]
Maximum	[]
Data type	Inherit: auto

3.9.1.1.23. "state_nr" (Outport)

Table 3.96. "state_nr" Parameters

Parameter	Value
Port number	3
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.9.1.1.24. "sts_light" (Outport)

Table 3.97. "sts_light" Parameters

Parameter	Value
Port number	8
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Inherit: auto

Parameter	Value
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.9.1.1.25. "Touch" (Inport)

Table 3.98. "Touch" Parameters

Parameter	Value
Port number	7
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

3.9.1.1.26. "UltrDiff" (Outport)

Table 3.99. "UltrDiff" Parameters

Parameter	Value
Port number	4
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off

Parameter	Value
Output as nonvirtual bus in parent model	off
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.9.1.1.27. "UltrSnsr" (Inport)

Table 3.100. "UltrSnsr" Parameters

Parameter	Value
Port number	6
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

3.9.1.1.28. "UltrSnsr o/p" (Outport)

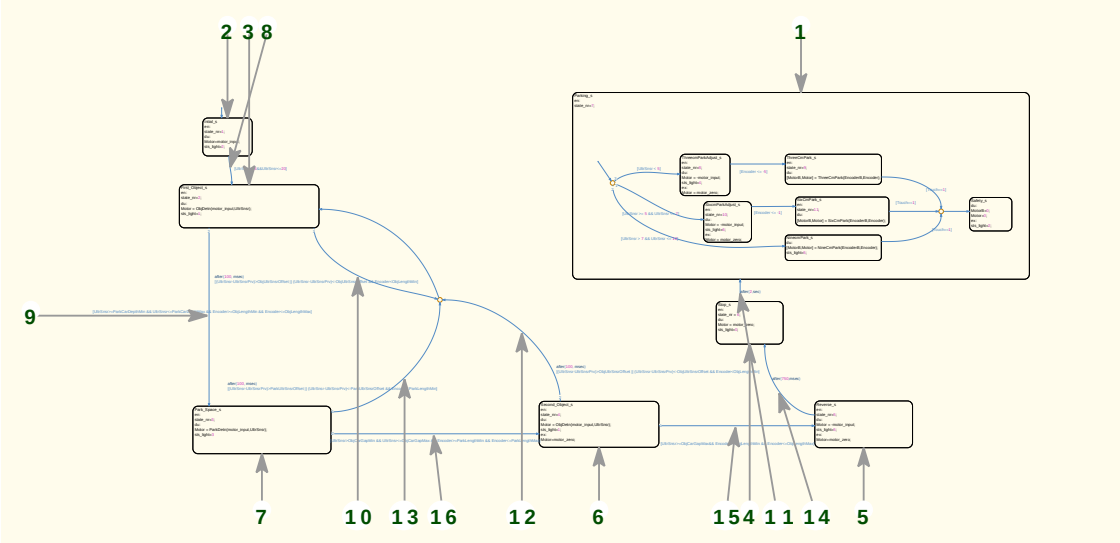
Table 3.101. "UltrSnsr o/p" Parameters

Parameter	Value
Port number	7
Icon display	Port number
Minimum	[]
Maximum	[]
Data type	Inherit: auto
Lock output data type setting against changes by the fixed-point tools	off
Output as nonvirtual bus in parent model	off

Parameter	Value
Port dimensions (-1 for inherited)	-1
Variable-size signal	Inherit
Sample time (-1 for inherited)	-1
Source of initial output value	Dialog
Output when disabled	held
Initial output	[]

3.9.2. State Charts

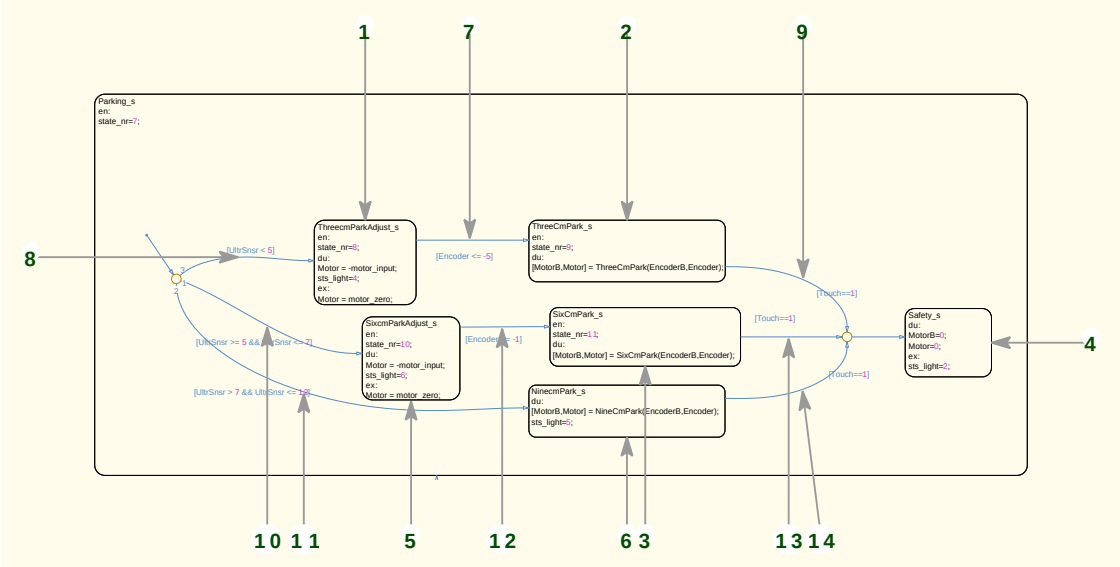
3.9.2.1. Chart



❶ Parking_s [63]
❷ Intial_s [63]
❸ First_Object_s [64]
❹ Stop_s [64]
❺ Reverse_s [64]
❻ Second_Object_s [65]
❼ Park_Space_s [65]
❽ [UltrSnsr>=4&&UltrSnsr<=20]
❾ [UltrSnsr>=ParkCarDepthMin && UltrSnsr<=ParkCarDepthMax && Encoder>=ObjLengthMin && Encoder<=ObjLengthMax]
❿ after(100, msec)...
⓫ after(2,sec)
⓬ after(100, msec)...
⓭ after(100, msec)...
⓮ after(750,msec)
⓯ [UltrSnsr>=ObjCarGapMax&& Encoder>=ObjLengthMin && Encoder<=ObjLengthMax]
⓰ [UltrSnsr>ObjCarGapMin && UltrSnsr<=ObjCarGapMax && Encoder>=ParkLengthMin && Encoder<=ParkLengthMax]

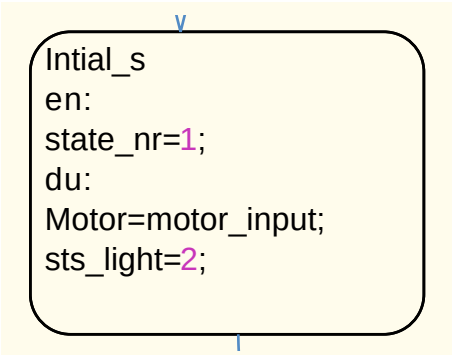
3.9.2.2. States

3.9.2.2.1. OR State - Parking_s

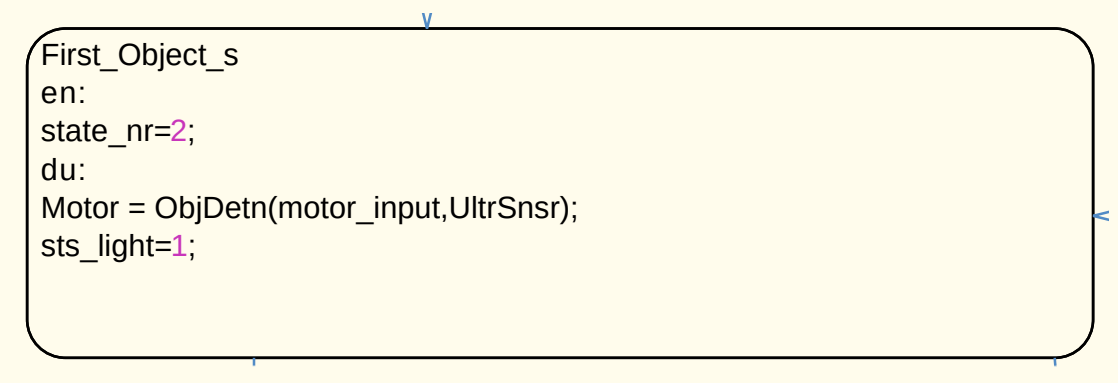


❶ ThreecmParkAdjust_s [65]
❷ ThreeCmPark_s [66]
❸ SixCmPark_s [66]
❹ Safety_s [66]
❺ SixcmParkAdjust_s [66]
❻ NinecmPark_s [67]
❼ ...
❽ [UltrSnsr < 5]
❾ [Touch==1]
❿ [UltrSnsr >= 5 && UltrSnsr <= 7]
⓫ [UltrSnsr > 7 && UltrSnsr <= 12]
⓬ [Encoder <= -1]
⓭ [Touch==1]
⓮ [Touch==1]

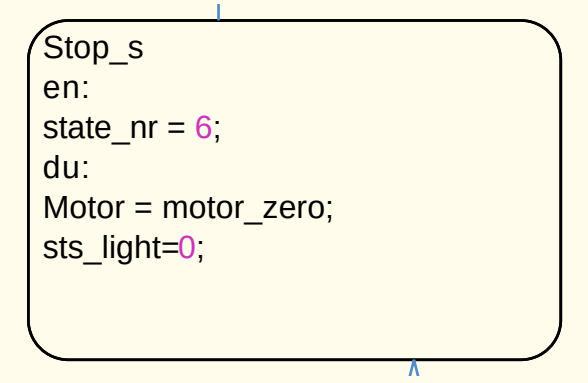
3.9.2.2.2. OR State - Intial_s



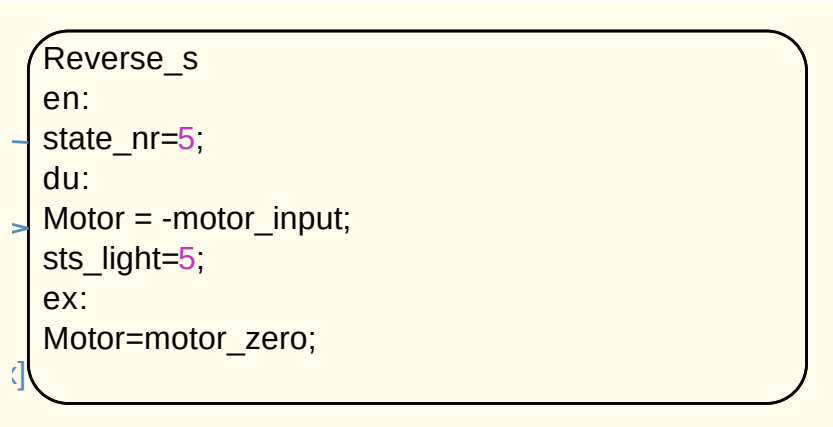
3.9.2.2.3. OR State - First_Object_s



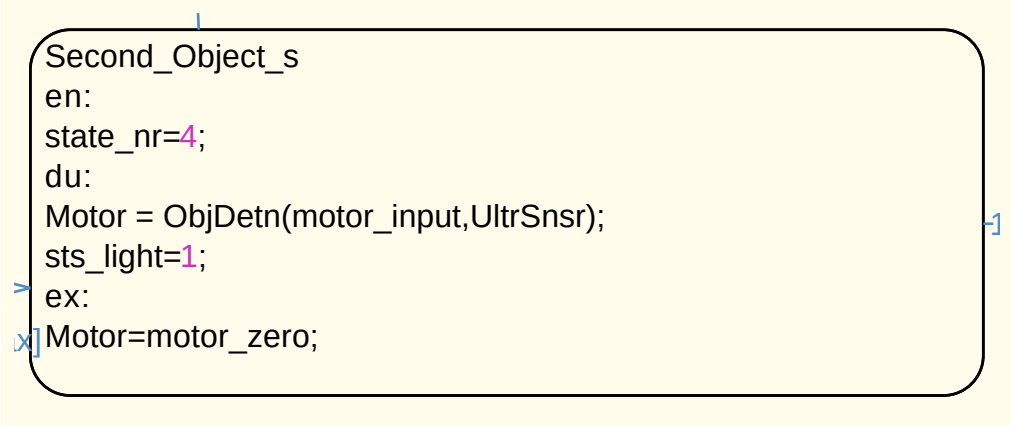
3.9.2.2.4. OR State - Stop_s



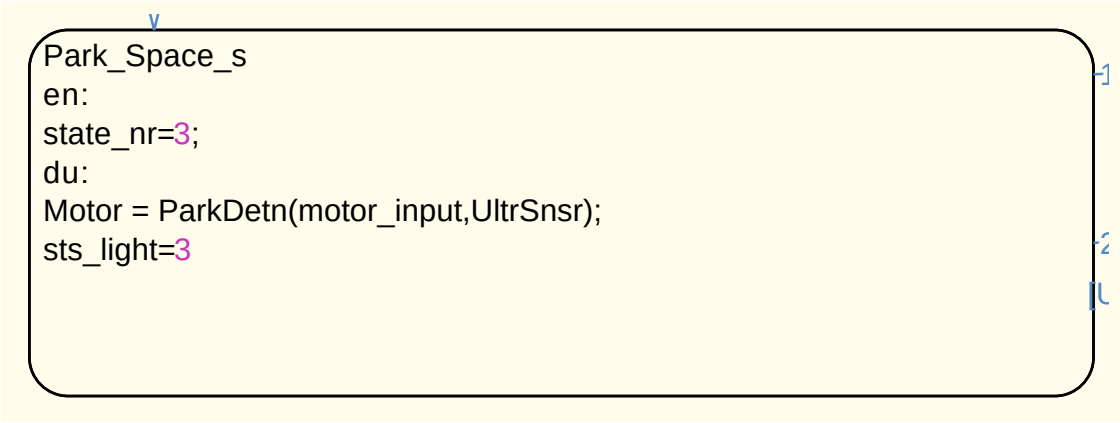
3.9.2.2.5. OR State - Reverse_s



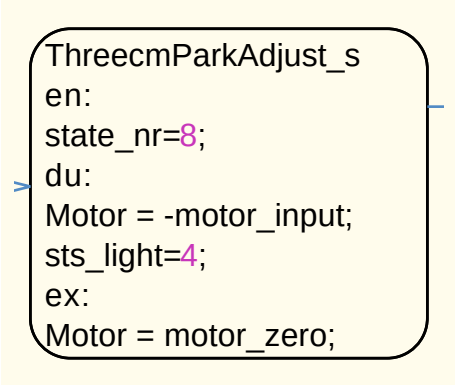
3.9.2.2.6. OR State - Second_Object_s



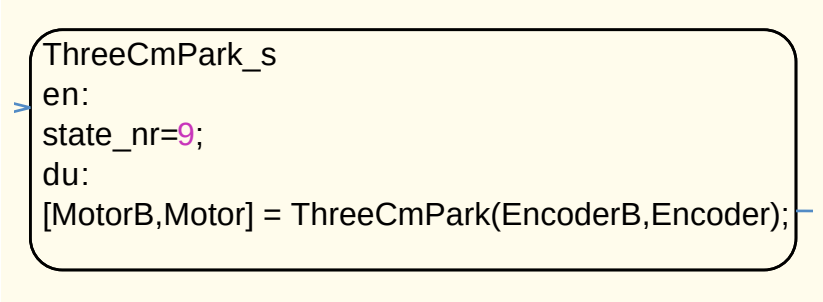
3.9.2.2.7. OR State - Park_Space_s



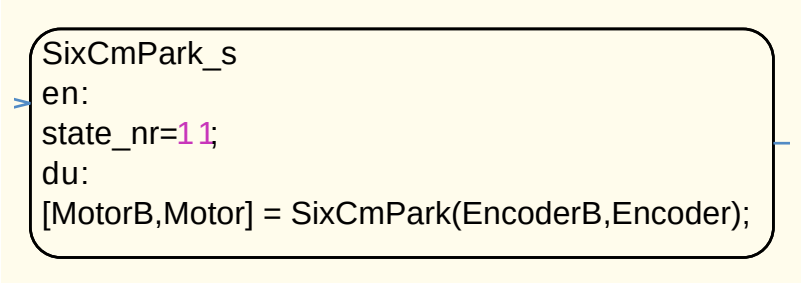
3.9.2.2.8. OR State - ThreecmParkAdjust_s



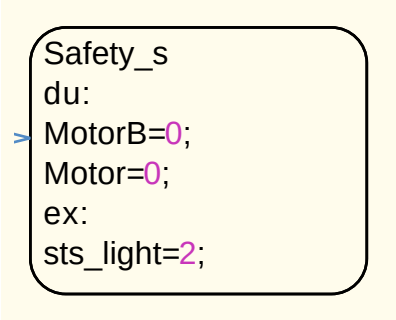
3.9.2.2.9. OR State - ThreeCmPark_s



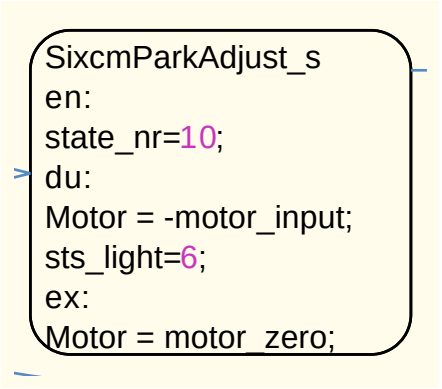
3.9.2.2.10. OR State - SixCmPark_s



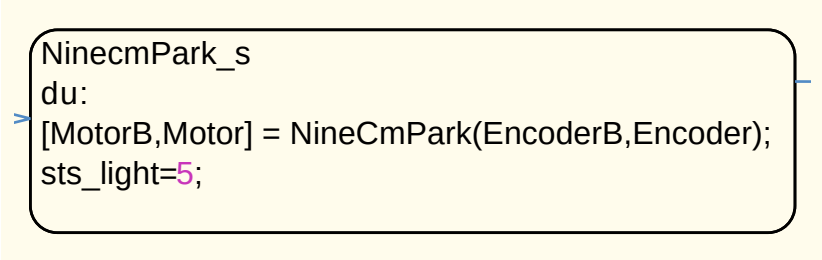
3.9.2.2.11. OR State - Safety_s



3.9.2.2.12. OR State - SixcmParkAdjust_s



3.9.2.2.13. OR State - NinecmPark_s



3.9.2.3. Data

Table 3.102. Data - Encoder

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.103. Data - EncoderB

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.104. Data - Motor

Scope	Output
Data Type	Inherit: Same as Simulink

Table 3.105. Data - motor_input

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.106. Data - motor_zero

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.107. Data - MotorB

Scope	Output
Data Type	Inherit: Same as Simulink

Table 3.108. Data - ObjCarGapMax

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.109. Data - ObjCarGapMin

Scope	Input

Data Type	Inherit: Same as Simulink

Table 3.110. Data - ObjLengthMax

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.111. Data - ObjLengthMin

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.112. Data - ObjUltrSnsrOffset

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.113. Data - ParkCarDepthMax

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.114. Data - ParkCarDepthMin

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.115. Data - ParkLengthMax

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.116. Data - ParkLengthMin

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.117. Data - ParkUltrSnsrOffset

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.118. Data - SAPS_BrainMode

Scope	Output
Data Type	Enum: SAPS_BrainModeType

Table 3.119. Data - state_nr

Scope	Output

Data Type	Inherit: Same as Simulink

Table 3.120. Data - sts_light

Scope	Output
Data Type	Inherit: Same as Simulink

Table 3.121. Data - Touch

Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.122. Data - UltrSnsr

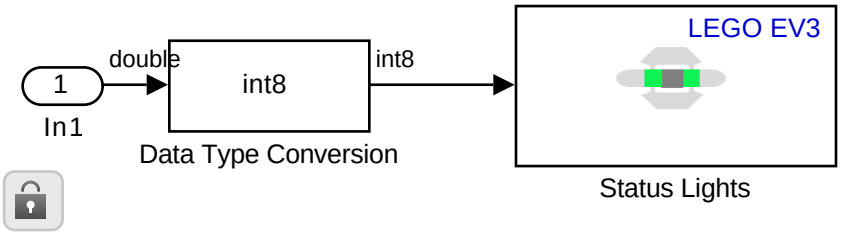
Scope	Input
Data Type	Inherit: Same as Simulink

Table 3.123. Data - UltrSnsrPrv

Scope	Input
Data Type	Inherit: Same as Simulink

3.10. Status Light

Figure 3.10. saps_3_0/Status Light



3.10.1. Blocks

3.10.1.1. Parameters

3.10.1.1.1. "Data Type Conversion" (DataTypeConversion)

Table 3.124. "Data Type Conversion" Parameters

Parameter	Value
Output minimum	[]
Output maximum	[]
Output data type	int8

Parameter	Value
Lock output data type setting against changes by the fixed-point tools	off
Input and output to have equal	Real World Value (RWV)
Integer rounding mode	Floor
Saturate on integer overflow	off
Sample time (-1 for inherited)	-1

3.10.1.1.2. "In1" (Inport)

Table 3.125. "In1" Parameters

Parameter	Value
Port number	1
Port dimensions (-1 for inherited)	-1
Sample time (-1 for inherited)	-1
Minimum	[]
Maximum	[]
Data type	Inherit: auto

3.10.1.1.3. "Status Lights" (S-Function)

Table 3.126. "Status Lights" Parameters

Parameter	Value
Function Name	ev3_led
SFunction Modules	''

Chapter 4. System Design Variables

Table of Contents

4.1. Design Variable Summary

Table 4.1. Design Variables

Variable Name	Parent Blocks	Size	Bytes	Class	Value
ObjCarGapMax	ObjCarGapMax [26]	1x1	8	double	20
ObjCarGapMin	ObjCarGapMin [27]	1x1	8	double	3
ObjLengthMax	ObjLengthMax [27]	1x1	8	double	50
ObjLengthMin	ObjLengthMin [27]	1x1	8	double	15
ObjUltrSnsrOffset	ObjUltrSnsrOffset [28]	1x1	8	double	5
ParkCarDepthMax	ParkCarDepthMax [34]	1x1	8	double	40
ParkCarDepthMin	ParkCarDepthMin [35]	1x1	8	double	22
ParkLengthMax	ParkLengthMax [35]	1x1	8	double	43
ParkLengthMin	ParkLengthMin [35]	1x1	8	double	38
ParkUltrSnsrOffset	ParkUltrSnsrOffset [36]	1x1	8	double	5
kf	Gain [10] Gain1 [10] Gain [16] Gain1 [16] Gain [22] Gain1 [22] Gain1 [55] Gain2 [56]	1x1	8	double	9.9200

4.2. Design Variable Details

ObjCarGapMax. 20

Used by Blocks:

- saps_3_0/Intialization/ObjCarGapMax [26]

Resolved in: model workspace (saps_3_0)

ObjCarGapMin. 3

Used by Blocks:

- saps_3_0/Intialization/ObjCarGapMin [27]

Resolved in: model workspace (saps_3_0)

ObjLengthMax. 50

Used by Blocks:

- saps_3_0/Intialization/ObjLengthMax [27]

Resolved in: model workspace (saps_3_0)

ObjLengthMin. 15

Used by Blocks:

- saps_3_0/Intialization/ObjLengthMin [27]

Resolved in: model workspace (saps_3_0)

ObjUltrSnsrOffset. 5

Used by Blocks:

- saps_3_0/Intialization/ObjUltrSnsrOffset [28]

Resolved in: model workspace (saps_3_0)

ParkCarDepthMax. 40

Used by Blocks:

- saps_3_0/Intialization/ParkCarDepthMax [34]

Resolved in: model workspace (saps_3_0)

ParkCarDepthMin. 22

Used by Blocks:

- saps_3_0/Intialization/ParkCarDepthMin [35]

Resolved in: model workspace (saps_3_0)

ParkLengthMax. 43

Used by Blocks:

- saps_3_0/Intialization/ParkLengthMax [35]

Resolved in: model workspace (saps_3_0)

ParkLengthMin. 38

Used by Blocks:

- saps_3_0/Intialization/ParkLengthMin [35]

Resolved in: model workspace (saps_3_0)

ParkUltrSnsrOffset. 5

Used by Blocks:

- saps_3_0/Intialization/ParkUltrSnsrOffset [36]

Resolved in: model workspace (saps_3_0)

PortNumber. 1

Used by Blocks:

- saps_3_0/Ultrasonic Sensor [4]

Resolved in: mask workspace (saps_3_0/Ultrasonic Sensor)

kf. 9.9200

Used by Blocks:

- saps_3_0/3cm Parking/Gain [10]
- saps_3_0/3cm Parking/Gain1 [10]
- saps_3_0/6cm Parking/Gain [16]
- saps_3_0/6cm Parking/Gain1 [16]
- saps_3_0/9cm Parking/Gain [22]
- saps_3_0/9cm Parking/Gain1 [22]
- saps_3_0/SAPS/Gain1 [55]
- saps_3_0/SAPS/Gain2 [56]

Resolved in: model workspace (saps_3_0)

opMode. 3

Used by Blocks:

- saps_3_0/Encoder [3]

Resolved in: mask workspace (saps_3_0/Encoder)

opMode. 1

Used by Blocks:

- saps_3_0/EncoderB [3]

Resolved in: mask workspace (saps_3_0/EncoderB)

portNumber. 1

Used by Blocks:

- saps_3_0/Encoder [3]

Resolved in: mask workspace (saps_3_0/Encoder)

portNumber. 2

Used by Blocks:

- saps_3_0/EncoderB [3]

Resolved in: mask workspace (saps_3_0/EncoderB)

portNumber. 2

Used by Blocks:

- saps_3_0/Touch Sensor [4]

Resolved in: mask workspace (saps_3_0/Touch Sensor)

sampleTime. 0.0100

Used by Blocks:

- saps_3_0/Encoder [3]

Resolved in: mask workspace (saps_3_0/Encoder)

sampleTime. 0.0100

Used by Blocks:

- saps_3_0/EncoderB [3]

Resolved in: mask workspace (saps_3_0/EncoderB)

sampleTime. 0.0100

Used by Blocks:

- saps_3_0/Touch Sensor [4]

Resolved in: mask workspace (saps_3_0/Touch Sensor)

sampleTime. 0.0100

Used by Blocks:

- saps_3_0/Ultrasonic Sensor [4]

Resolved in: mask workspace (saps_3_0/Ultrasonic Sensor)

Chapter 5. Requirements Traceability

saps_3_0 does not contain requirements traceability links.

Chapter 6. System Model Configuration

Table 6.1. saps_3_0 Configuration Set

Property	Value
Description	
Components	[saps_3_0 Configuration Set.Components(1) [-77], saps_3_0 Configuration Set.Components-(2) [78], saps_3_0 Configuration Set.Components(3) [79], saps_3_0 Configuration Set.Components(4) [80], saps_3_0 Configuration Set.-Components(5) [82], saps_3_0 Configuration Set.Components(6) [84], saps_3_0 Configuration Set.Components(7) [84], saps_3_0 Configuration Set.Components(8) [85], saps_3_0 Configuration Set.Components(9) [86]]
Name	Run on Hardware Configuration2
SimulationMode	external

Table 6.2. saps_3_0 Configuration Set.Components [77](1)

Property	Value
Name	Solver
Description	
Components	
StartTime	0.0
StopTime	inf
AbsTol	auto
FixedStep	auto
InitialStep	auto
MaxNumMinSteps	-1
MaxOrder	5
ZcThreshold	auto
ConsecutiveZCsStepRelTol	10*128*eps
MaxConsecutiveZCs	1000
ExtrapolationOrder	4
NumberNewtonIterations	1
MaxStep	auto
MinStep	auto
MaxConsecutiveMinStep	1
RelTol	1e-3
SolverMode	Auto
EnableConcurrentExecution	off

ConcurrentTasks	off
Solver	ode3
SolverName	ode3
SolverType	Fixed-step
SolverJacobianMethodControl	auto
ShapePreserveControl	DisableAll
ZeroCrossControl	UseLocalSettings
ZeroCrossAlgorithm	Nonadaptive
SolverResetMethod	Fast
PositivePriorityOrder	off
AutoInsertRateTranBlk	off
SampleTimeConstraint	Unconstrained
InsertRTBMode	Whenever possible
SampleTimeProperty	

Table 6.3. saps_3_0 Configuration Set.Components [77](2)

Property	**Value**
Name	Data Import/Export
Description	
Components	
Decimation	1
ExternalInput	[t, u]
FinalStateName	xFinal
InitialState	xInitial
LimitDataPoints	on
MaxDataPoints	1000
LoadExternalInput	off
LoadInitialState	off
SaveFinalState	off
SaveCompleteFinalSimState	off
SaveFormat	Array
SignalLoggingSaveFormat	Dataset
SaveOutput	on
SaveState	off
SignalLogging	on
DSMLogging	on
InspectSignalLogs	off
VisualizeSimOutput	on
SaveTime	on

ReturnWorkspaceOutputs	off
StateSaveName	xout
TimeSaveName	tout
OutputSaveName	yout
SignalLoggingName	logsout
DSMLoggingName	dsmout
OutputOption	RefineOutputTimes
OutputTimes	[]
ReturnWorkspaceOutputsName	out
Refine	1

Table 6.4. saps_3_0 Configuration Set.Components [77](3)

Property	Value
Name	Optimization
Description	
Components	
BlockReduction	on
BooleanDataType	on
ConditionallyExecuteInputs	on
InlineParams	off
UseDivisionForNetSlopeComputation	off
UseFloatMulNetSlope	off
DefaultUnderspecifiedDataType	double
UseSpecifiedMinMax	off
InlineInvariantSignals	off
OptimizeBlockIOStorage	on
BufferReuse	on
GlobalBufferReuse	on
GlobalVariableUsage	None
StrengthReduction	off
AdvancedOptControl	
EnforceIntegerDowncast	on
ExpressionFolding	on
BooleansAsBitfields	off
BitfieldContainerType	uint_T
EnableMemcpy	on
MemcpyThreshold	64
PassReuseOutputArgsAs	Structure reference
PassReuseOutputArgsThreshold	12

FoldNonRolledExpr	on
LocalBlockOutputs	on
RollThreshold	5
StateBitsets	off
DataBitsets	off
ActiveStateOutputEnumStorageType	Native Integer
UseTempVars	off
ZeroExternalMemoryAtStartup	on
ZeroInternalMemoryAtStartup	on
InitFltsAndDblsToZero	off
NoFixptDivByZeroProtection	off
EfficientFloat2IntCast	off
EfficientMapNaN2IntZero	on
OptimizeModelRefInitCode	on
LifeSpan	1
EvaledLifeSpan	1
MaxStackSize	Inherit from target
BufferReusableBoundary	on
SimCompilerOptimization	off
AccelVerboseBuild	off

Table 6.5. saps_3_0 Configuration Set.Components [77](4)

Property	**Value**
Name	Diagnostics
Description	
Components	
RTPrefix	error
ConsistencyChecking	none
ArrayBoundsChecking	none
SignalInfNanChecking	none
SignalRangeChecking	none
ReadBeforeWriteMsg	UseLocalSettings
WriteAfterWriteMsg	UseLocalSettings
WriteAfterReadMsg	UseLocalSettings
AlgebraicLoopMsg	warning
ArtificialAlgebraicLoopMsg	warning
SaveWithDisabledLinksMsg	warning
SaveWithParameterizedLinksMsg	warning
CheckSSInitialOutputMsg	on

UnderspecifiedInitializationDetection	Classic
MergeDetectMultiDrivingBlocksExec	none
CheckExecutionContextPreStartOutputMsg	off
CheckExecutionContextRuntimeOutputMsg	off
SignalResolutionControl	UseLocalSettings
BlockPriorityViolationMsg	warning
MinStepSizeMsg	warning
TimeAdjustmentMsg	none
MaxConsecutiveZCsMsg	error
MaskedZcDiagnostic	warning
IgnoredZcDiagnostic	warning
SolverPrmCheckMsg	none
InheritedTsInSrcMsg	warning
DiscreteInheritContinuousMsg	warning
MultiTaskDSMMsg	error
MultiTaskCondExecSysMsg	error
MultiTaskRateTransMsg	error
SingleTaskRateTransMsg	none
TasksWithSamePriorityMsg	warning
SigSpecEnsureSampleTimeMsg	warning
CheckMatrixSingularityMsg	none
IntegerOverflowMsg	warning
Int32ToFloatConvMsg	warning
ParameterDowncastMsg	error
ParameterOverflowMsg	error
ParameterUnderflowMsg	none
ParameterPrecisionLossMsg	warning
ParameterTunabilityLossMsg	warning
FixptConstUnderflowMsg	none
FixptConstOverflowMsg	none
FixptConstPrecisionLossMsg	none
UnderSpecifiedDataTypeMsg	none
UnnecessaryDatatypeConvMsg	none
VectorMatrixConversionMsg	none
InvalidFcnCallConnMsg	error
FcnCallInpInsideContextMsg	EnableAllAsError
SignalLabelMismatchMsg	none
UnconnectedInputMsg	warning
UnconnectedOutputMsg	warning

UnconnectedLineMsg	warning
SFcnCompatibilityMsg	none
FrameProcessingCompatibilityMsg	error
UniqueDataStoreMsg	none
BusObjectLabelMismatch	warning
RootOutportRequireBusObject	warning
AssertControl	UseLocalSettings
Echo	
EnableOverflowDetection	off
ModelReferenceIOMsg	none
ModelReferenceVersionMismatchMessage	none
ModelReferenceIOMismatchMessage	none
ModelReferenceCSMismatchMessage	none
ModelReferenceSimTargetVerbose	off
UnknownTsInhSupMsg	warning
ModelReferenceDataLoggingMessage	warning
ModelReferenceSymbolNameMessage	warning
ModelReferenceExtraNoncontSigs	error
StateNameClashWarn	none
SimStateInterfaceChecksumMismatchMsg	warning
SimStateOlderReleaseMsg	error
InitInArrayFormatMsg	warning
StrictBusMsg	ErrorLevel1
BusNameAdapt	WarnAndRepair
NonBusSignalsTreatedAsBus	none
SFUnusedDataAndEventsDiag	warning
SFUnexpectedBacktrackingDiag	warning
SFInvalidInputDataAccessInChartInitDiag	warning
SFNoUnconditionalDefaultTransitionDiag	warning
SFTransitionOutsideNaturalParentDiag	warning
SFUnconditionalTransitionShadowingDiag	warning
SFUndirectedBroadcastEventsDiag	warning
SFTransitionActionBeforeConditionDiag	warning
SFOutputUsedAsStateInMooreChartDiag	error
IntegerSaturationMsg	warning

Table 6.6. saps_3_0 Configuration Set.Components [77](5)

Property	Value
Name	Hardware Implementation

Description	
Components	
ProdBitPerChar	8
ProdBitPerShort	16
ProdBitPerInt	32
ProdBitPerLong	32
ProdBitPerLongLong	64
ProdBitPerFloat	32
ProdBitPerDouble	64
ProdBitPerPointer	32
ProdLargestAtomicInteger	Long
ProdLargestAtomicFloat	Float
ProdIntDivRoundTo	Undefined
ProdEndianess	LittleEndian
ProdWordSize	32
ProdShiftRightIntArith	on
ProdLongLongMode	off
ProdHWDeviceType	ARM Compatible->ARM 9
TargetBitPerChar	8
TargetBitPerShort	16
TargetBitPerInt	32
TargetBitPerLong	32
TargetBitPerLongLong	64
TargetBitPerFloat	32
TargetBitPerDouble	64
TargetBitPerPointer	32
TargetLargestAtomicInteger	Char
TargetLargestAtomicFloat	None
TargetShiftRightIntArith	on
TargetLongLongMode	off
TargetIntDivRoundTo	Undefined
TargetEndianess	Unspecified
TargetWordSize	32
TargetTypeEmulationWarnSuppressLevel	0
TargetPreprocMaxBitsSint	32
TargetPreprocMaxBitsUint	32
TargetHWDeviceType	Specified
TargetUnknown	off
ProdEqTarget	on

Table 6.7. saps_3_0 Configuration Set.Components [77](6)

Property	Value
Name	Model Referencing
Description	
Components	
UpdateModelReferenceTargets	IfOutOfDateOrStructuralChange
CheckModelReferenceTargetMessage	error
EnableParallelModelReferenceBuilds	off
ParallelModelReferenceErrorOnInvalidPool	on
ParallelModelReferenceMATLABWorkerInit	None
ModelReferenceNumInstancesAllowed	Multi
PropagateVarSize	Infer from blocks in model
ModelDependencies	
ModelReferencePassRootInputsByReference	on
ModelReferenceMinAlgLoopOccurrences	off
PropagateSignalLabelsOutOfModel	off
SupportModelReferenceSimTargetCustomCode	off

Table 6.8. saps_3_0 Configuration Set.Components [77](7)

Property	Value
Name	Simulation Target
Description	
Components	
SimCustomSourceCode	
SimCustomHeaderCode	
SimCustomInitializer	
SimCustomTerminator	
SimReservedNameArray	
SimUserSources	
SimUserIncludeDirs	
SimUserLibraries	
SFSimEnableDebug	off
SFSimOverflowDetection	on
SFSimEcho	on
SimBlas	on
SimCtrlC	on
SimExtrinsic	on
SimIntegrity	on

SimUseLocalCustomCode	off
SimParseCustomCode	on
SimBuildMode	sf_incremental_build
SimDataInitializer	
SimGenImportedTypeDefs	off

Table 6.9. saps_3_0 Configuration Set.Components [77](8)

Property	Value
Name	Code Generation
SystemTargetFile	realtime.tlc
TLCOptions	
CodeGenDirectory	
GenCodeOnly	on
MakeCommand	make_rtw
GenerateMakefile	off
PackageGeneratedCodeAndArtifacts	off
PackageName	
TemplateMakefile	realtime.tmf
PostCodeGenCommand	
Description	Run on Target Hardware
GenerateReport	off
SaveLog	off
RTWVerbose	off
RetainRTWFile	off
ProfileTLC	off
TLCDebug	off
TLCCoverage	off
TLCAssert	off
ProcessScriptMode	Default
ConfigurationMode	Optimized
ProcessScript	realtime_make_rtw_hook
ConfigurationScript	
ConfigAtBuild	off
RTWUseLocalCustomCode	off
RTWUseSimCustomCode	off
CustomSourceCode	
CustomHeaderCode	
CustomInclude	
CustomSource	

CustomLibrary	
CustomInitializer	
CustomTerminator	
Toolchain	Automatically locate an installed toolchain
BuildConfiguration	Faster Builds
CustomToolchainOptions	
IncludeHyperlinkInReport	on
LaunchReport	off
PortableWordSizes	off
GenerateErtSFunction	off
CreateSILPILBlock	None
CodeExecutionProfiling	off
CodeExecutionProfileVariable	executionProfile
CodeProfilingSaveOptions	AllData
CodeProfilingInstrumentation	off
SILDebugging	off
TargetLang	C
IncludeERTFirstTime	off
GenerateTraceInfo	off
GenerateTraceReport	off
GenerateTraceReportSl	off
GenerateTraceReportSf	off
GenerateTraceReportEml	off
GenerateCodeInfo	off
GenerateWebview	off
GenerateCodeMetricsReport	off
GenerateCodeReplacementReport	off
RTWCompilerOptimization	off
ObjectivePriorities	
RTWCustomCompilerOptimizations	
CheckMdlBeforeBuild	Off
CustomRebuildMode	OnUpdate
DataInitializer	
Components	[saps_3_0 Configuration Set.Components(8).Components(1) [87], saps_3_0 Configuration Set.Components(8).Components(2) [88]]

Table 6.10. saps_3_0 Configuration Set.Components [77](9)

Property	Value

Description	Run on Hardware Dialog
Components	
Name	Run on Hardware
TargetExtensionData	saps_3_0 Configuration Set.Components(9).TargetExtensionData [89]
TargetExtensionPlatform	LEGO MINDSTORMS EV3

Table 6.11. saps_3_0 Configuration Set.Components(8).Components [86](1)

Property	**Value**
Name	Code Appearance
Description	
Components	
Comment	
ForceParamTrailComments	off
GenerateComments	on
CommentStyle	Auto
IgnoreCustomStorageClasses	on
IgnoreTestpoints	off
IncHierarchyInIds	off
MaxIdLength	31
PreserveName	off
PreserveNameWithParent	off
ShowEliminatedStatement	off
OperatorAnnotations	off
IncAutoGenComments	off
SimulinkDataObjDesc	off
SFDataObjDesc	off
MATLABFcnDesc	off
IncDataTypeInIds	off
PrefixModelToSubsysFcnNames	on
MangleLength	1
CustomSymbolStr	RN$M
CustomSymbolStrGlobalVar	RN$M
CustomSymbolStrType	NR$M_T
CustomSymbolStrField	NM
CustomSymbolStrFcn	RNMF
CustomSymbolStrFcnArg	rt$I$N$M
CustomSymbolStrBlkIO	rtb_NM
CustomSymbolStrTmpVar	NM

CustomSymbolStrMacro	RN$M
CustomSymbolStrUtil	NC
CustomCommentsFcn	
DefineNamingRule	None
DefineNamingFcn	
ParamNamingRule	None
ParamNamingFcn	
SignalNamingRule	None
SignalNamingFcn	
InsertBlockDesc	off
InsertPolySpaceComments	off
SimulinkBlockComments	on
MATLABSourceComments	off
EnableCustomComments	off
InternalIdentifier	Shortened
InlinedPrmAccess	Literals
ReqsInCode	off
UseSimReservedNames	off
ReservedNameArray	

Table 6.12. saps_3_0 Configuration Set.Components(8).Components [86](2)

Property	**Value**
Name	Target
Description	
IsERTTarget	on
TargetFcnLib	ansi_tfl_table_tmw.mat
TargetLibSuffix	.a
TargetPreCompLibLocation	
GenFloatMathFcnCalls	NOT IN USE
TargetLangStandard	C89/C90 (ANSI)
TargetFunctionLibrary	NOT IN USE
CodeReplacementLibrary	None
UtilityFuncGeneration	Auto
ERTMultiwordTypeDef	System defined
ERTMultiwordLength	256
MultiwordLength	2048
GenerateFullHeader	on
InferredTypesCompatibility	off

GenerateSampleERTMain	on
GenerateTestInterfaces	off
ModelReferenceCompliant	on
ParMdlRefBuildCompliant	off
CompOptLevelCompliant	off
ConcurrentExecutionCompliant	off
IncludeMdlTerminateFcn	on
GeneratePreprocessorConditionals	Use local settings
CombineOutputUpdateFcns	off
CombineSignalStateStructs	off
SuppressErrorStatus	off
ERTFirstTimeCompliant	off
IncludeFileDelimiter	Auto
ERTCustomFileBanners	on
SupportAbsoluteTime	on
LogVarNameModifier	rt_
MatFileLogging	off
MultiInstanceERTCode	off
CodeInterfacePackaging	Nonreusable function
SupportNonFinite	on
SupportComplex	on
PurelyIntegerCode	off
SupportContinuousTime	on
SupportNonInlinedSFcns	off
SupportVariableSizeSignals	on
ParenthesesLevel	Nominal
CastingMode	Nominal
GenerateClassInterface	off
ModelStepFunctionPrototypeControlCompliant	off
CPPClassGenCompliant	off
AutosarCompliant	off
GRTInterface	off
GenerateAllocFcn	off
UseToolchainInfoCompliant	off
GenerateSharedConstants	on
Components	saps_3_0 Configuration Set.Components(8).Components(2).Components [90]

Table 6.13. saps_3_0 Configuration Set.Components(9) [86].TargetExtensionData

Field	Value
IP_Address	192.168.0.100
Enable_overrun_detection	0

Table 6.14. saps_3_0 Configuration Set.Components(8).Components(2) [88].Components

Property	Value
Name	Target
Description	
Components	
IsERTTarget	on
TargetFcnLib	ansi_tfl_table_tmw.mat
TargetLibSuffix	.a
TargetPreCompLibLocation	
GenFloatMathFcnCalls	NOT IN USE
TargetLangStandard	C89/C90 (ANSI)
TargetFunctionLibrary	NOT IN USE
CodeReplacementLibrary	None
UtilityFuncGeneration	Auto
ERTMultiwordTypeDef	System defined
ERTMultiwordLength	256
MultiwordLength	2048
GenerateFullHeader	on
InferredTypesCompatibility	off
GenerateSampleERTMain	on
GenerateTestInterfaces	off
ModelReferenceCompliant	on
ParMdlRefBuildCompliant	off
CompOptLevelCompliant	off
ConcurrentExecutionCompliant	off
IncludeMdlTerminateFcn	on
GeneratePreprocessorConditionals	Use local settings
CombineOutputUpdateFcns	off
CombineSignalStateStructs	off
SuppressErrorStatus	off
ERTFirstTimeCompliant	off
IncludeFileDelimiter	Auto

ERTCustomFileBanners	on
SupportAbsoluteTime	on
LogVarNameModifier	rt_
MatFileLogging	off
MultiInstanceERTCode	off
CodeInterfacePackaging	Nonreusable function
SupportNonFinite	on
SupportComplex	on
PurelyIntegerCode	off
SupportContinuousTime	on
SupportNonInlinedSFcns	off
SupportVariableSizeSignals	on
ParenthesesLevel	Nominal
CastingMode	Nominal
GenerateClassInterface	off
ModelStepFunctionPrototypeControlCompliant	off
CPPClassGenCompliant	off
AutosarCompliant	off
GRTInterface	off
GenerateAllocFcn	off
UseToolchainInfoCompliant	off
GenerateSharedConstants	on
GenerateASAP2	off
ExtMode	on
ExtModeTransport	0
ExtModeStaticAlloc	off
ExtModeStaticAllocSize	1000000
ExtModeTesting	off
ExtModeMexFile	ext_comm
ExtModeMexArgs	'192.168.0.104' 0 17725
ExtModeIntrfLevel	Level1
InlinedParameterPlacement	NonHierarchical
TargetOS	BareBoardExample
MultiInstanceErrorCode	Error
RateGroupingCode	on
RootIOFormat	Individual arguments
RTWCAPISignals	off
RTWCAPIParams	off
RTWCAPIStates	off

RTWCAPIRootIO	off
ERTSrcFileBannerTemplate	realtime_code_template.cgt
ERTHdrFileBannerTemplate	realtime_code_template.cgt
ERTDataSrcFileTemplate	realtime_code_template.cgt
ERTDataHdrFileTemplate	realtime_code_template.cgt
ERTCustomFileTemplate	realtime_file_process.tlc
EnableDataOwnership	off
SignalDisplayLevel	10
ParamTuneLevel	10
GlobalDataDefinition	Auto
DataDefinitionFile	global.c
GlobalDataReference	Auto
ERTFilePackagingFormat	Modular
DataReferenceFile	global.h
PreserveExpressionOrder	off
PreserveIfCondition	off
ConvertIfToSwitch	off
PreserveExternInFcnDecls	on
SuppressUnreachableDefaultCases	off
EnableSignedLeftShifts	on
IndentStyle	K&R
IndentSize	2
EnableUserReplacementTypes	off
ReplacementTypes	saps_3_0 Configuration Set.Components(8).C-omponents(2).Components.ReplacementTypes-[93]
MaxIdInt32	MAX_int32_T
MinIdInt32	MIN_int32_T
MaxIdUint32	MAX_uint32_T
MaxIdInt16	MAX_int16_T
MinIdInt16	MIN_int16_T
MaxIdUint16	MAX_uint16_T
MaxIdInt8	MAX_int8_T
MinIdInt8	MIN_int8_T
MaxIdUint8	MAX_uint8_T
BooleanTrueId	true
BooleanFalseId	false
TypeLimitIdReplacementHeaderFile	
MemSecPackage	--- None ---

MemSecDataConstants	Default
MemSecDataIO	Default
MemSecDataInternal	Default
MemSecDataParameters	Default
MemSecFuncInitTerm	Default
MemSecFuncExecute	Default
MemSecFuncSharedUtil	Default

Table 6.15. saps_3_0 Configuration Set.Components(8).Components(2).Components [90].ReplacementTypes

Field	Value
double	
single	
int32	
int16	
int8	
uint32	
uint16	
uint8	
boolean	
int	
uint	
char	

Chapter 7. Glossary

Atomic Subsystem. A subsystem treated as a unit by an implementation of the design documented in this report. The implementation computes the outputs of all the blocks in the atomic subsystem before computing the next block in the parent system's block execution order (sorted list).

Block Diagram. A Simulink block diagram represents a set of simultaneous equations that relate a system or subsystem's inputs to its outputs as a function of time. Each block in the diagram represents an equation of the form y = f(t, x, u) where t is the current time, u is a block input, y is a block output, and x is a system state (see the Simulink documentation for information on the functions represented by the various types of blocks that make up the diagram). Lines connecting the blocks represent dependencies among the blocks, i.e., inputs whose current values are the outputs of other blocks. An implementation of a design described in this document computes a root or atomic system's outputs at each time step by computing the outputs of the blocks in an order determined by block input/output dependencies.

Block Parameter. A variable that determines the output of a block along with its inputs, for example, the gain parameter of a Gain block.

Block Execution Order. The order in which Simulink evaluates blocks during simulation of a model. The block execution order determined by Simulink ensures that a block executes only after all blocks on whose outputs it depends are executed.

Checksum. A number that indicates whether different versions of a model or atomic subsystem differ functionally or only cosmetically. Different checksums for different versions of the same model or subsystem indicate that the versions differ functionally.

Design Variable. A symbolic (MATLAB) variable or expression used as the value of a block parameter. Design variables allow the behavior of the model to be altered by altering the value of the design variable.

Signal. A block output, so-called because block outputs typically vary with time.

Virtual Subsystem. A subsystem that is purely graphical, i.e., is intended to reduce the visual complexity of the block diagram of which it is a subsystem. An implementation of the design treats the blocks in the subsystem as part of the first nonvirtual ancestor of the virtual subsystem (see Atomic Subsystem).

Chapter 8. About this Report

Table of Contents

8.1. Report Overview

This report describes the design of the saps_3_0 system. The report was generated automatically from a Simulink model used to validate the design. It contains the following sections:

Model Version. Specifies information about the version of the model from which this design description was generated. Includes the model checksum, a number that indicates whether different versions of the model differ functionally or only cosmetically. Different checksums for different versions indicate that the versions differ functionally.

Root System. Describes the design's root system.

Subsystems. Describes each of the design's subsystems.

Design Variables. Describes system design variables, i.e., MATLAB variables and expressions used as block parameter values.

System Model Configuration. Lists the configuration parameters, e.g., start and stop time, of the model used to simulate the system described by this report.

Requirements Traceability. Shows design requirements associated with elements of the design model. This section appears only if the design model contains requirements links.

Glossary. Defines Simulink terms used in this report.

8.2. Root System Description

This section describes a design's root system. It contains the following sections:

Diagram. Simulink block diagram that represents the algorithm used to compute the root system's outputs.

Description. Description of the root system. This section appears only if the model's root system has a Documentation property or a Doc block.

Interface. Name, data type, width, and other properties of the root system's input and output signals. The number of the block port that outputs the signal appears in angle brackets appended to the signal name. This section appears only if the root system has input or output ports.

Blocks. This section has two subsections:

- **Parameters.** Describes key parameters of blocks in the root system. This section also includes graphical and/or tabular representations of lookup table data used by lookup table blocks, i.e., blocks that use lookup tables to compute their outputs.

- **Block Execution Order.** Order in which blocks must be executed at each time step in order to ensure that each block's inputs are available when it executes.

State Charts. Describes state charts used in the root system. This section appears only if the root system contains Stateflow blocks.

8.3. Subsystem Descriptions

This section describes a design's subsystems. Each subsystem description contains the following sections:

Checksum. This section appears only if the subsystem is an atomic subsystem. The checksum indicates whether the version of the model subsystem used to generate this report differs functionally from other versions of the model subsystem. If two model checksums differ, the corresponding versions of the model differ functionally.

Diagram. Simulink block diagram that graphically represents the algorithm used to compute the subsystem's outputs.

Description. Description of the subsystem. This section appears only if the subsystem has a Documentation property or contains a Doc block.

Interface. Name, data type, width, and other properties of the subsystem's input and output signals. The number of the block port that outputs the signal appears in angle brackets appended to the signal name. This section appears only if the subsystem is atomic and has input or output ports.

Blocks. Blocks that this subsystem contains. This section has two subsections:

- **Parameters.** Key parameters of blocks in the subsystem. This section also includes graphical and/or tabular representations of lookup table data used by lookup table blocks, blocks that use lookup tables to compute their outputs.
- **Block Execution Order.** Order in which the subsystem's blocks must be executed at each time step in order to ensure that each block's inputs are available when the block executes .This section appears only if the subsystem is atomic. Note: in Acrobat(PDF) reports, the number in square brackets next to the block name is a hyperlink to the block parameter table. The number has no model significance.

State Charts. Describes state charts used in the subsystem. This section appears only if the root system contains Stateflow blocks.

8.4. State Chart Descriptions

This section describes the state machines used by Stateflow blocks to compute their outputs, i.e., Stateflow blocks. Each state machine description contains the following sections:

Chart. Diagram representing the state machine.

States. Describes the state machine's states. Each state description includes the state's diagram and diagrams and/or descriptions of graphical functions, Simulink functions, truth tables, and MATLAB functions parented by the state.

Transitions. Transitions between the state machine's states. Each transition description specifies the values of key transition properties. Appears only if a transition has properties that do not appear on the chart.

Junctions. Transition junctions. Each junction description specifies the values of key junction properties. Appears only if a junction has properties that do not appear on the chart.

Events. Events that trigger state transitions. Each event description specifies the values of key event properties.

Data. Data types and other properties of the Stateflow block's inputs, outputs, and other state machine data.

Targets. Executable implementations of the state machine used to compute the outputs of the corresponding Stateflow block.

MATLAB Supporting Functions. List of functions invoked by MATLAB functions defined in the chart.