

TRANSLATION OF SIMULINK / STATEFLOW MODEL IN HyTECH

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1 Modeling Methodologies in Simulink / Stateflow

2 Translation Mechanism



Model of a Thermostat in StateFlow

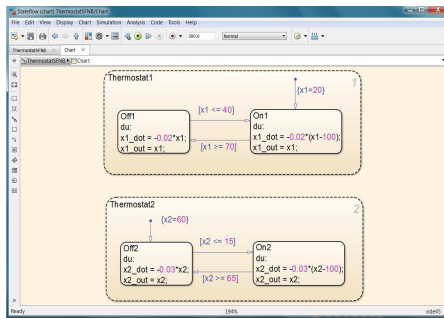
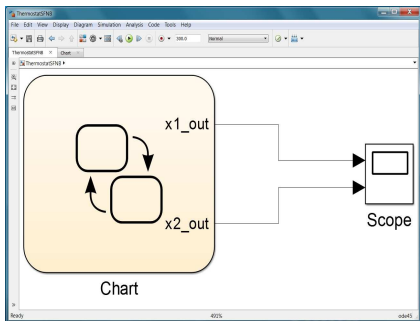


Figure: Stateflow Model of a Simple Thermostat



Model of the Thermostat in Simulink / StateFlow

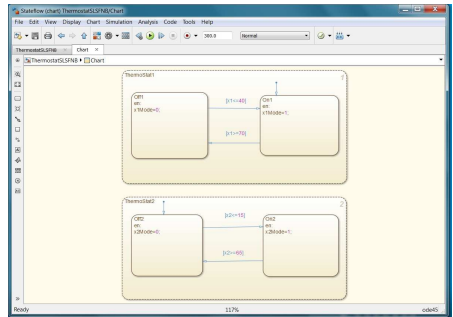
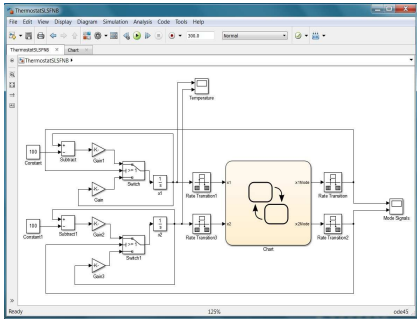


Figure: Stateflow Model of a Simple Thermostat without Sync Label



Model of the Thermostat in Simulink / StateFlow with Sync

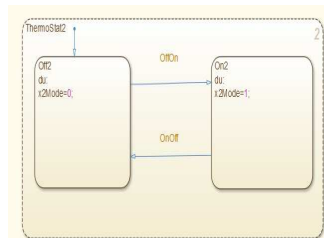
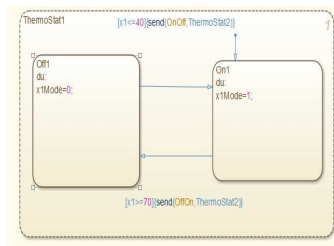
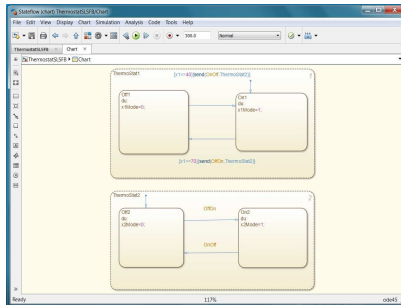


Figure: Stateflow Model of a Simple Thermostat with Sync Label



1 Modeling Methodologies in Simulink / Stateflow

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Hierarchy Tree of Stateflow Chart Model

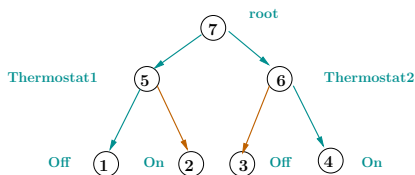


Figure: Hierarchy of States in Thermostat Stateflow Model

Possible Configurations :

- 1 7.5.6.1.3
- 2 7.5.6.2.3
- 3 7.5.6.1.4
- 4 7.5.6.2.4

Possible Bottlenecks

- 1 Only applicable for small stateflow chart.
- 2 In reality, different transitions in different charts are synchronized.
- 3 In large state space models, taking product will cause a state space explosion.



Translated Code in Hytech

```
var
x1,
x2: analog;
x1_out,
x2_out: discrete;

automaton default_automaton
synclabs;;

loc Thermostat1.Off1.Thermostat2.Off2: while True wait {dx1 = -0.02*x1, dx1_out = x1
dx2 = -0.03*x2, dx2_out = x2}

loc Thermostat1.Off1.Thermostat2.On2: while x1>=40 & x1>=40 & x1>=40 & x1>=40 wait
{dx1 = -0.02*x1, dx1_out = x1, dx2 = -0.03*x2-100, dx2_out = x2}
when x1<=40 goto Thermostat1.On1.Thermostat2.On2;
```



Hierarchy Tree of Stateflow Chart Model with Sync Label

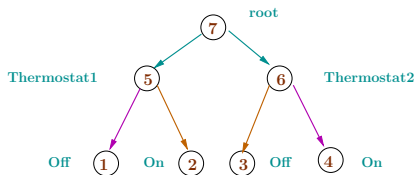


Figure: Hierarchy of States in Thermostat Stateflow Model with Sync Label

Possible Configurations :

- 1 7.5.6.2.3
- 2 7.5.6.1.4

State Space Reduced :

- 1 Using the *sync* labels, some state configurations removed.
- 2 Still, state space can be very large for large state machines.

[Go To Model](#)



Flowchart for the Translation

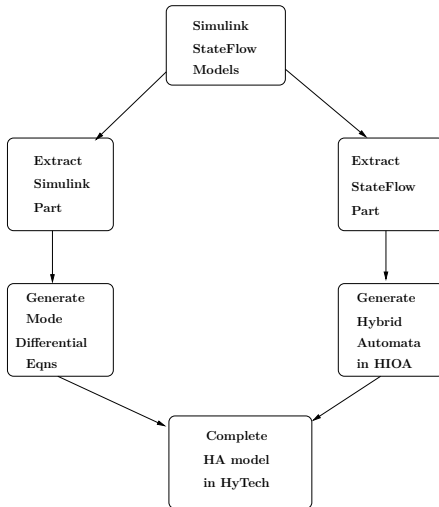


Figure: Flowchart for the Translation Mechanism



Thank You !!!

