Automatic Trigger Generation for End User Written Rules for Home Automation

Chandrakana Nandi

Problem: incorrect triggers

Fails if State_Sleeping is changed to ON after setting State_Away!

Solution

TrigGen

- Automatically generate a set of necessary and sufficient triggers
- Idea: live variable analysis of the action block
- Live device state: state that is read before being written to

TrigGen suggested a necessary and sufficient set of triggers 91 (95%)
False positives 0 (0%)
False negatives 5 (5%)
End user missed triggers 77 (80%)

Number of missing triggers detected by TrigGen

<table>
<thead>
<tr>
<th>Rule</th>
<th>Evaluations</th>
</tr>
</thead>
<tbody>
<tr>
<td>96 real end user written rules</td>
<td>91 (95%)</td>
</tr>
<tr>
<td>Action block size: 1-220 LOC</td>
<td>False positives 0 (0%)</td>
</tr>
<tr>
<td></td>
<td>False negatives 5 (5%)</td>
</tr>
</tbody>
</table>

TrigGen

```
rule "Away rule"
when // trigger block
Item State_Away changed
then // action block
if (State_Away.state == ON) {
  if (State_Sleeping.state != OFF) {
    postUpdate (State_Sleeping, OFF)
  }
}
end
```