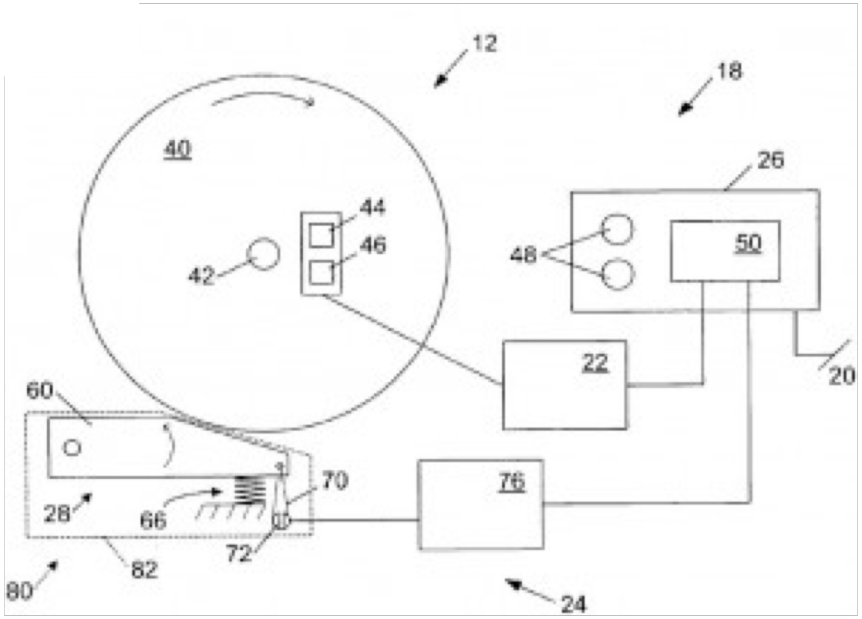
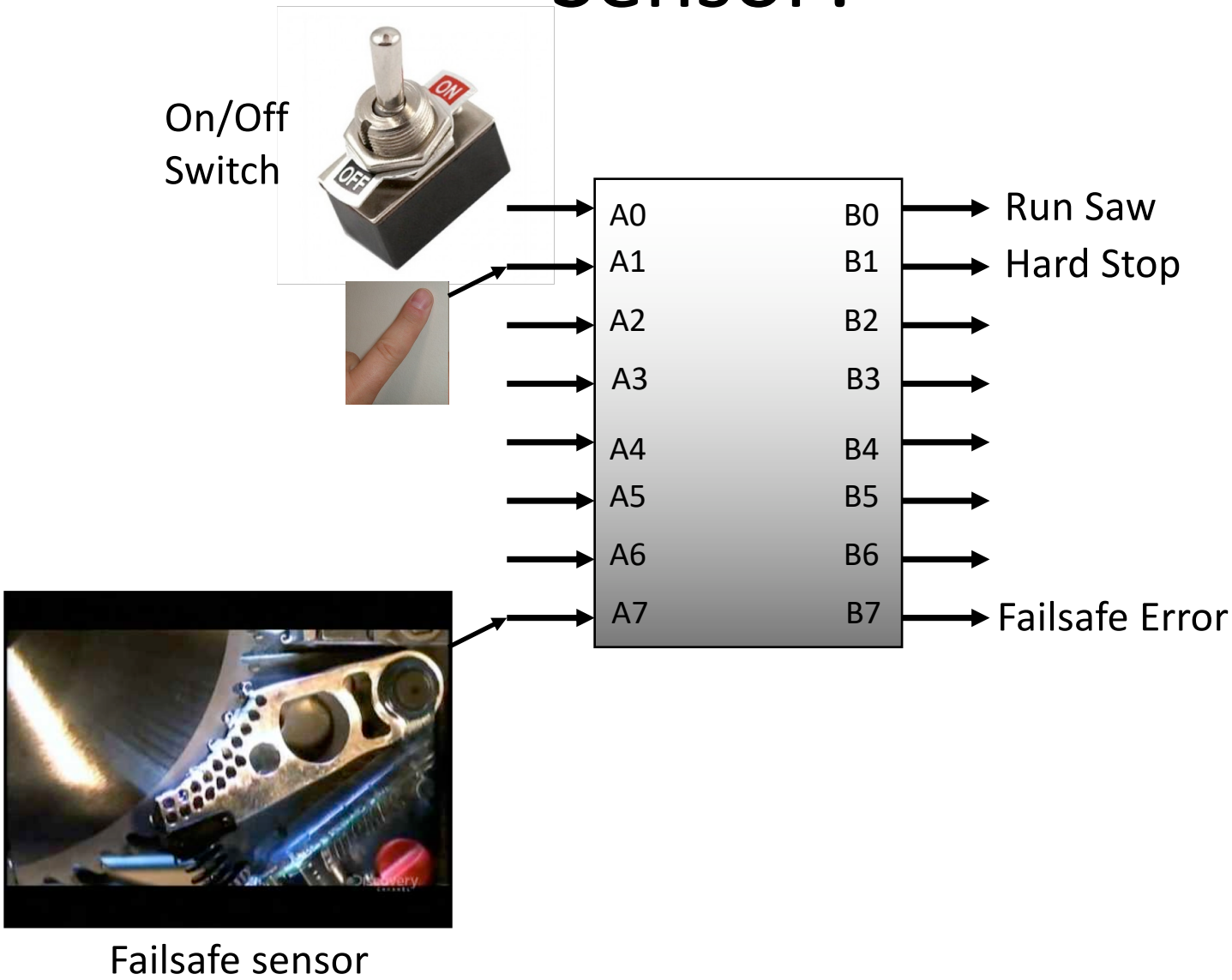
Saw Stop



What if we do not Trust the Failsafe Sensor?



Problem Statement

Inputs

- A0 – On/off **switch**
- A1 – Finger sensor (capacitive touch)
- A7 – Failsafe sensor

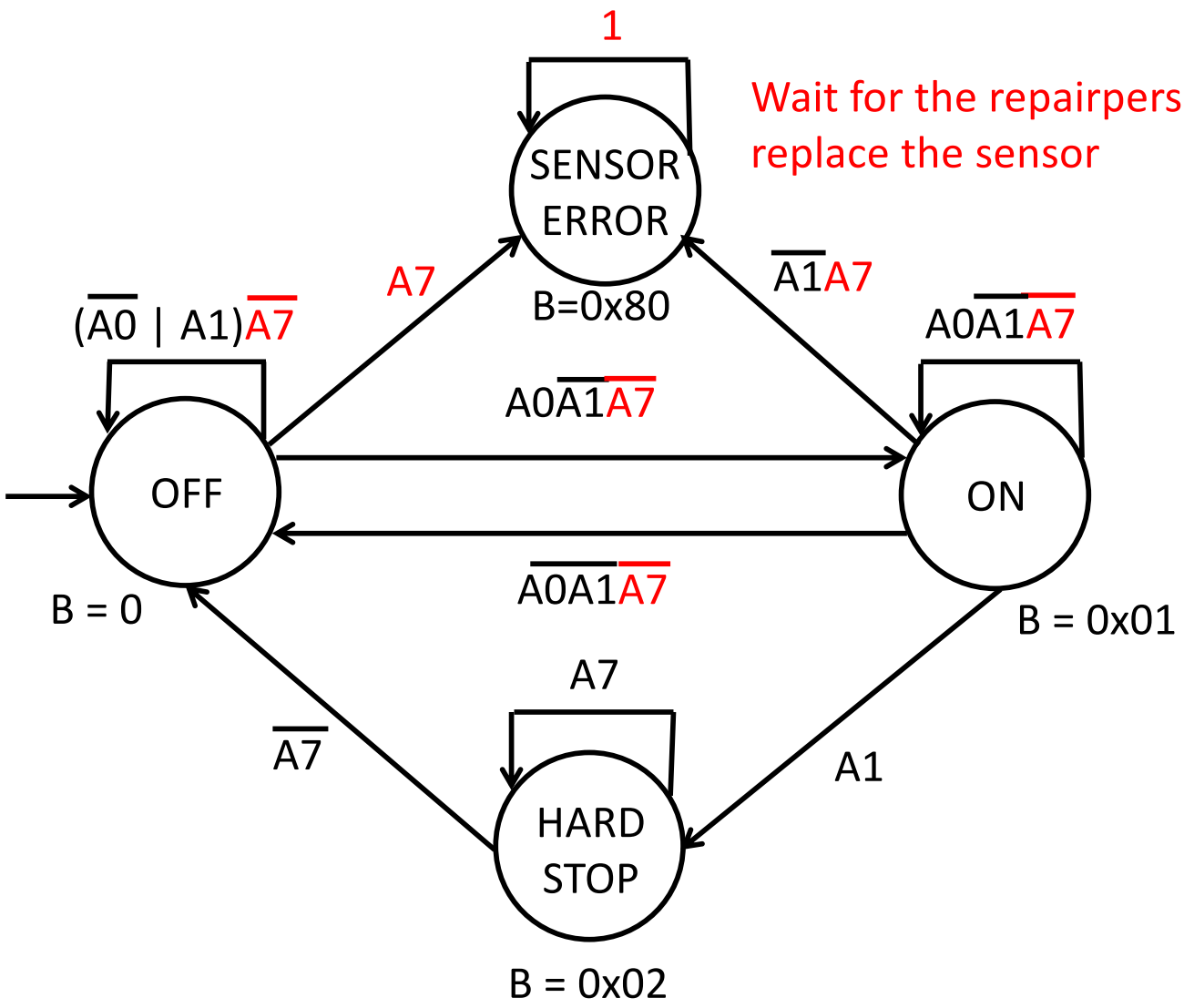
Outputs

- B0 – Run the saw
- B1 – Initiate a hard stop
- B7 – Indicate failsafe sensor misfire

Functionality

- The switch (A0) turns the saw on/off
- The finger sensor (A1) triggers a hard stop
- The failsafe sensor (A7) detects the hard stop
  - Same as the previous problem
- The failsafe sensor (A7) misfires if it turns on during the ON or OFF state
  - Wait and do nothing
  - The repairperson turns the saw off to replace the sensor
  - The state machine re-initializes when the repairperson turns the system back on

Design an SM to Implement the Saw Stop Functionality

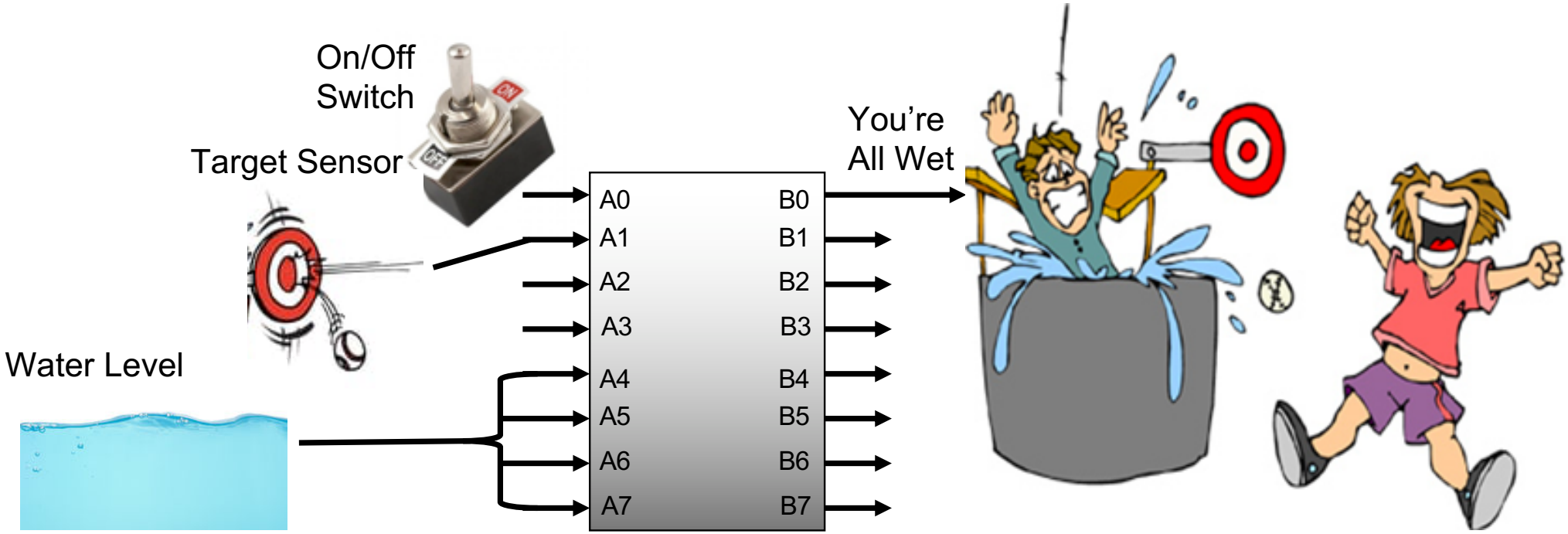


Comments

- Adding new inputs complicates the SM design
  - More states
  - More complex transition functions and actions
  - (Concurrent SMs in Ch. 5 can simplify this)

- What if the sensor fails in the HARD STOP state?
  - Multiple FailSafe sensors?
    - What if they all fail at the same time?
  - Extra sensor to indicate that the technician is working
    - And what if that one fails?

Dunk Tank


On/Off
Switch
Target Sensor
Water Level
A0
A1
A2
A3
A4
A5
A6
A7
B0
B1
B2
B3
B4
B5
B6
B7
You're
All Wet

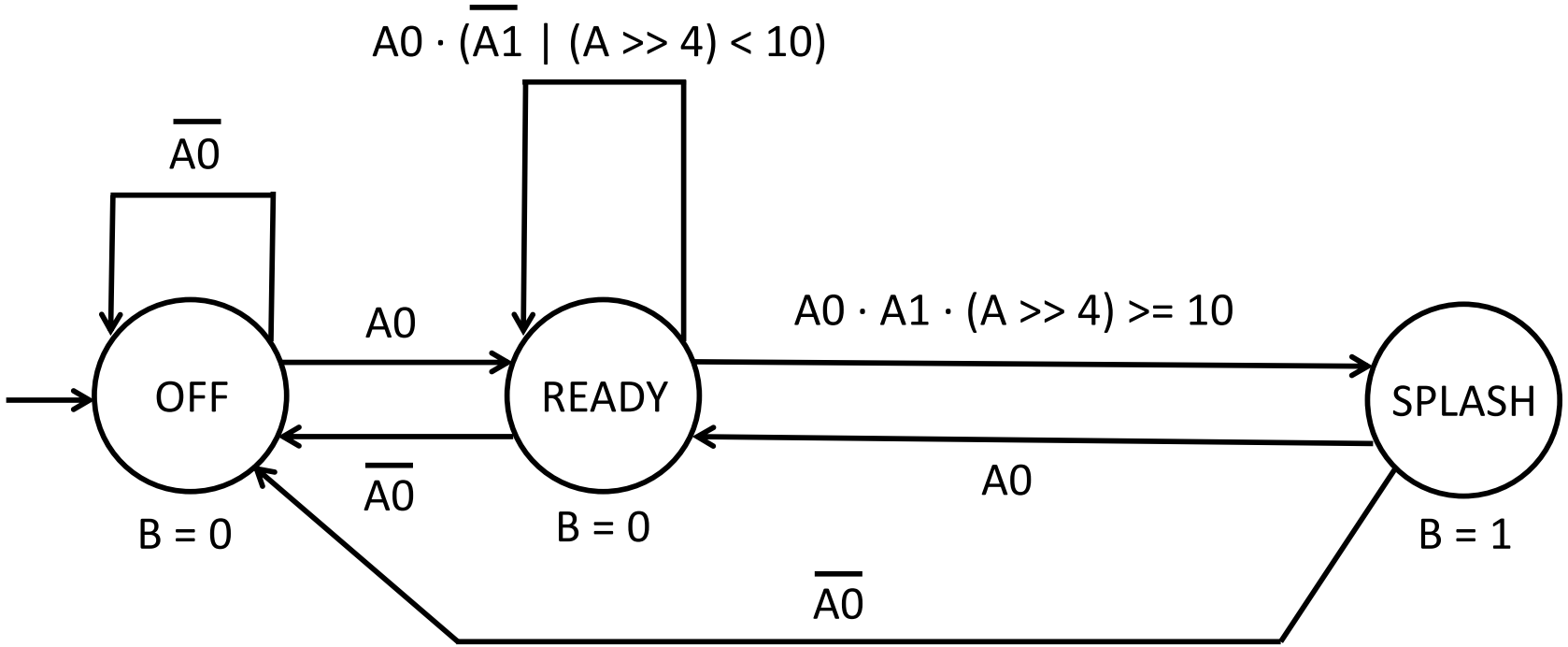
Problem Description

Inputs:
A0 – On/Off Switch
A1 – Sensor (1 if the ball hits the target)
A7… A4 – Water level in the tank

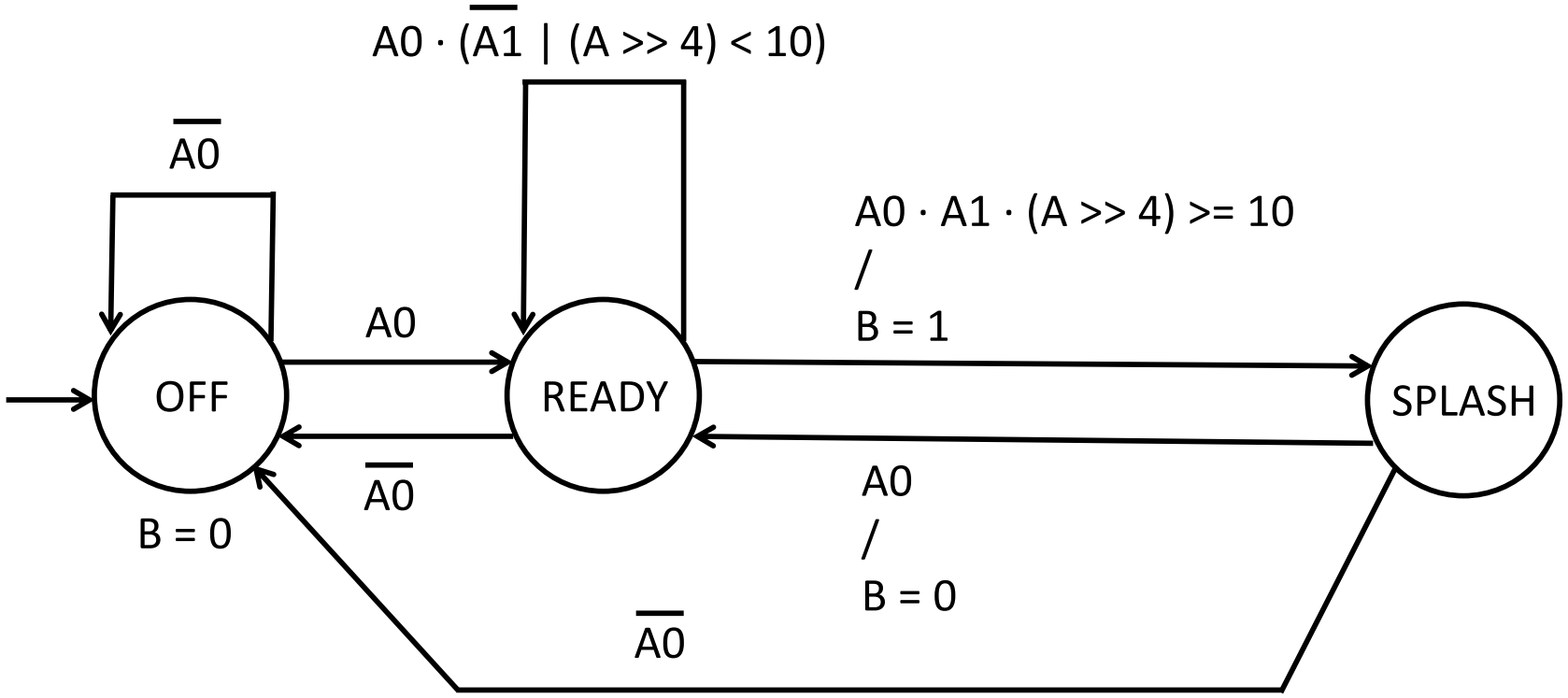
Outputs:
B0 – Triggers the seat collapse

Description
- The On/Off switch turns the system on/off.
- The seat collapse is triggered (B0 = 1 for one tick) if the system is on, the ball hits the target, and the water level in the tank is at least 10.
- The water level is a 4-bit unsigned integer.

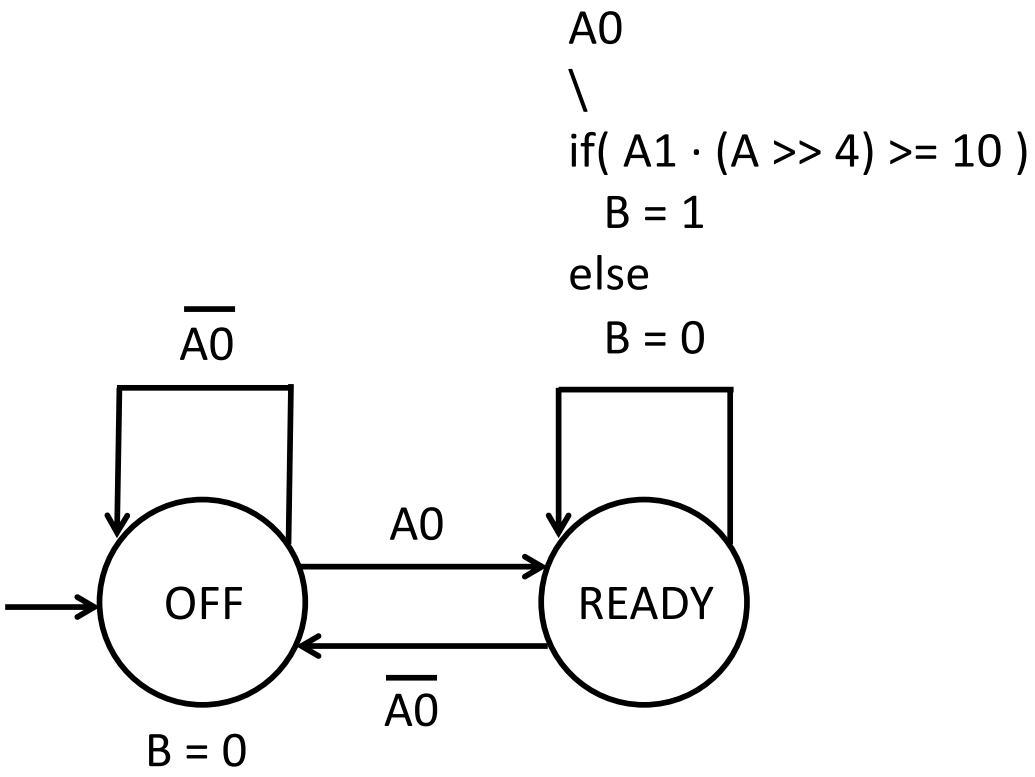
Solution #1



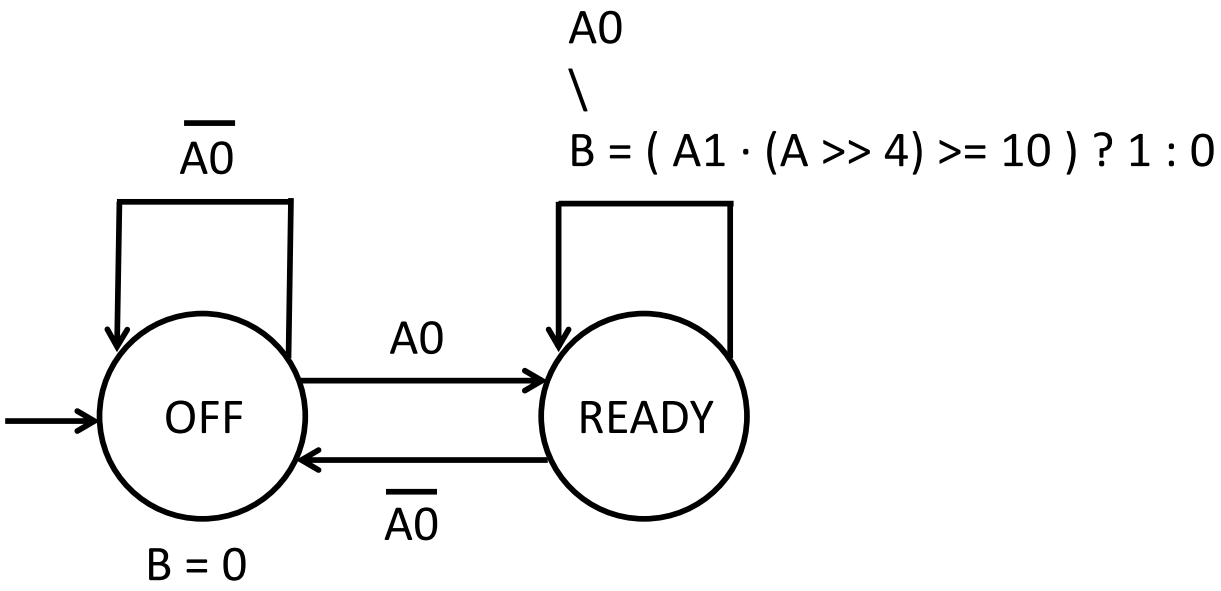
Solution #2



Solution #3


A0
\
if(A1 · (A >> 4) >= 10)
B = 1
else
B = 0
$\overline{A0}$
A0
OFF
READY
$\overline{A0}$
B = 0

Solution #4



Solution #5