ELECTRONIC DESIGN COMPETITION

2023

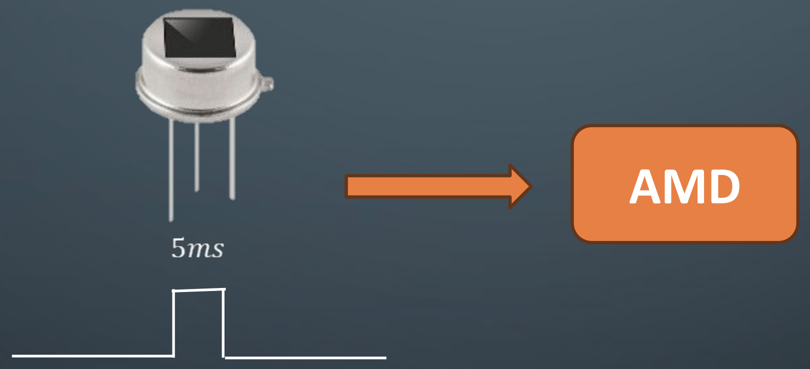
Thamidu Naveen

INTRODUCTION

- The Advanced Motion Detector **(AMD)** module is a cutting-edge technology that can help achieve the goals of energy-saving and safe cities in 2030. By detecting motion and triggering output when required, the AMD module can help reduce energy consumption by ensuring that lights and other electronic devices are only activated when needed. This can lead to significant energy savings and a reduction in carbon emissions.
- In addition, the AMD module can also contribute to safer cities by providing an additional layer of security. By detecting motion in restricted areas, the module can alert security personnel to potential threats, allowing them to respond quickly and effectively. This can help prevent crime and improve the overall safety of cities.

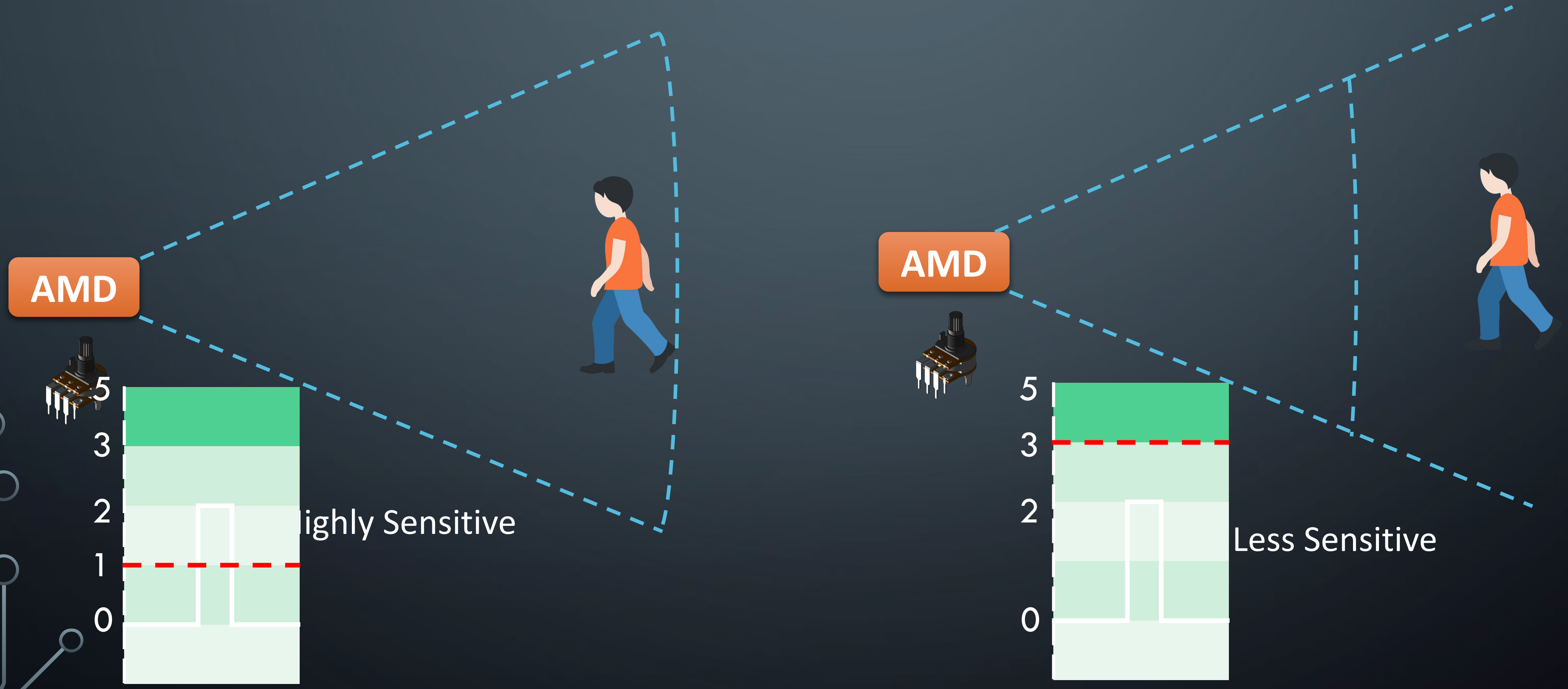
WHAT TO BUILD?

- The AMD module contains a Pyroelectric Passive Infrared Sensor that produces a **5ms square pulse with a varying amplitude from 0.5V to 5V.** The closer the motion is to the sensor, the higher the amplitude that can be observed. In the simulation, a square pulse with the given specification should be used as the output from the sensor and input to the AMD unit.



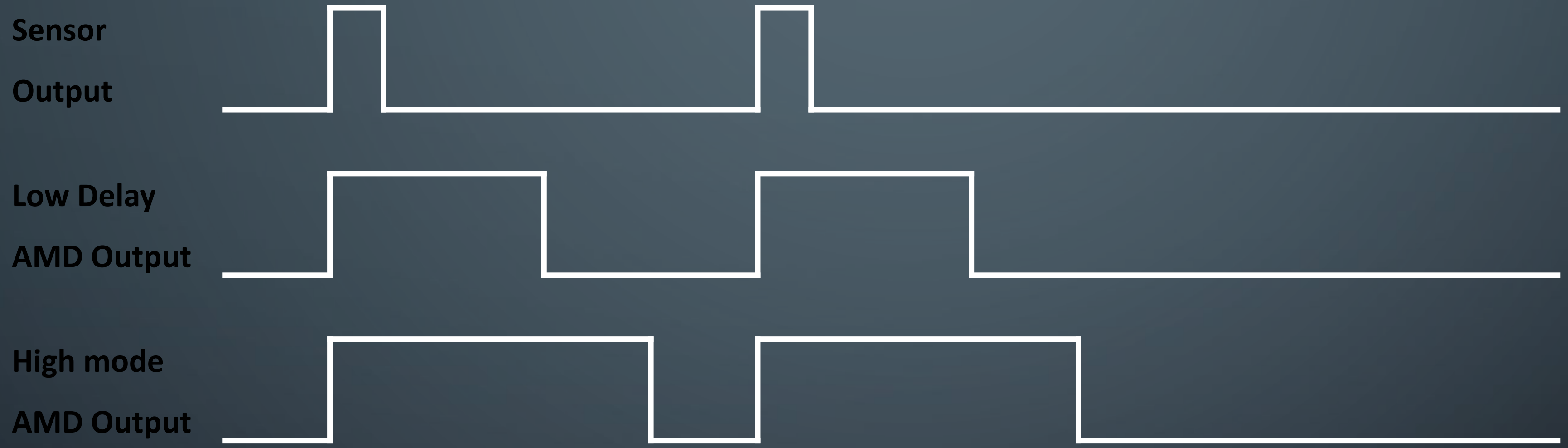
SENSITIVITY

- There should be a **sensitivity adjustment**, so that differently sized IR emitting objects moving at different distances from the sensor can be detected.



DELAY

- There should be a **Delay time adjustment** (How long the output of the AMD module will remain HIGH after detection of motion of an IR emitting object).



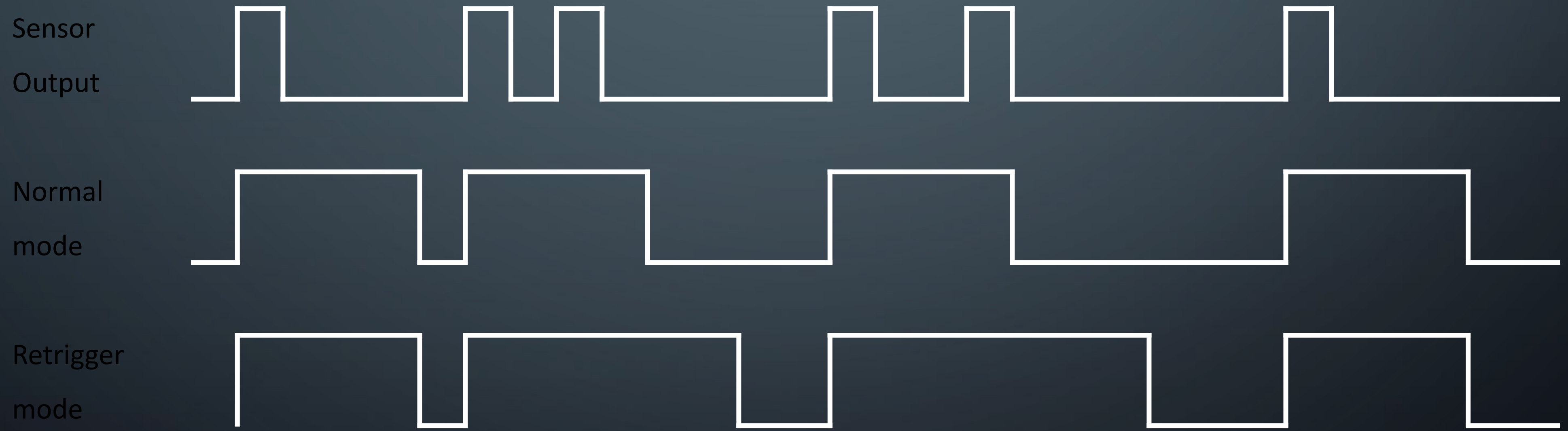
Min delay	~10s
Max delay	~120s

TRIGGER MODE

Retrigger mode – AMD module will start counting the delay again when any detection happens when the output of the module is HIGH.

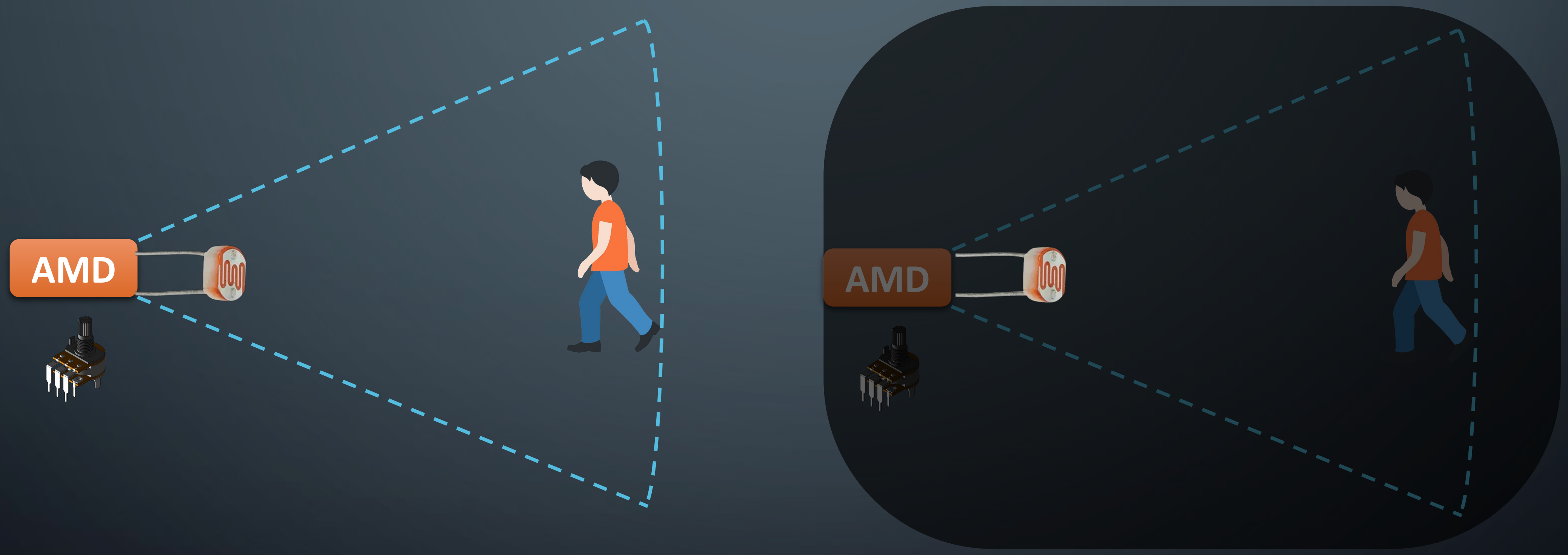
Normal mode – AMD module will ignore any detections when the output of the module is HIGH.

Use a switch to change trigger mode.



DAYLIGHT ADJUSTMENT

- There should be a **sensitivity adjustment for daylight** so that the device operates only at night/low light Conditions (Use a LDR for this adjustment).

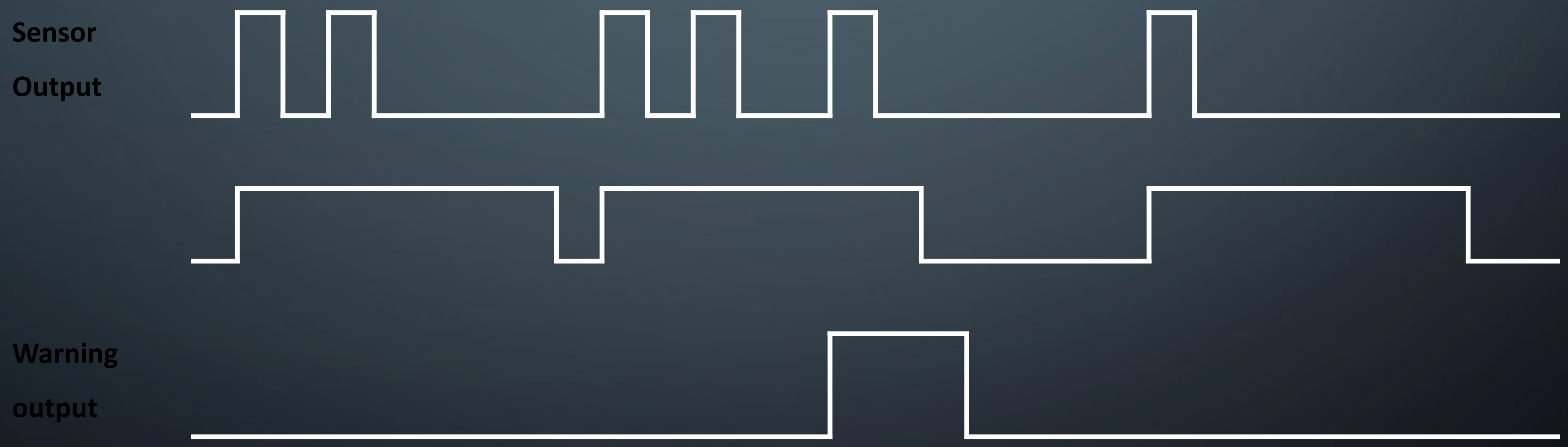


Output Not Triggered

Output Triggered

WARNING OUTPUT

- The AMD module should be designed to trigger a **warning output** if **2 to 9 triggers** (N_w) **occur within a given interval** (t_w) . This will allow the device to provide an alert if multiple triggers are detected in quick succession. The **interval should be adjustable [~120s – 600s]**, and **three switches** should be used to change the number of occurrences. An additional switch should be used to **switch this feature ON/OFF.** (Use a **fixed delay [~30s],** for warning output.)



Ex: $N_w = 3$

WARNING OUTPUT

SW1	SW2	SW3	
0	0	0	2
0	0	1	3
0	1	0	4
0	1	1	5
1	0	0	6
1	0	1	7
1	1	0	8
1	1	1	9

NOTE

- **Programmable ICs** are not allowed.
- **Pre-built ICs** that render a specified task are not allowed.
- Participants **can use** gate ICs and flip flops.

WHAT TO UPLOAD?

A folder containing,

1. **All simulation files** that you used to create the final task.
2. **A short screen video** (less than 8 minutes) of the working simulation that shows all working features.
3. A **document** (less than 15 pages) which includes:
   - Brief explanations of how you achieved each feature, explaining key decisions and assumptions made, and screenshots of relevant circuit parts.
   - All software versions that you used.
   - Any other supportive information that you think will help us to run your simulation.

THANK YOU!!!