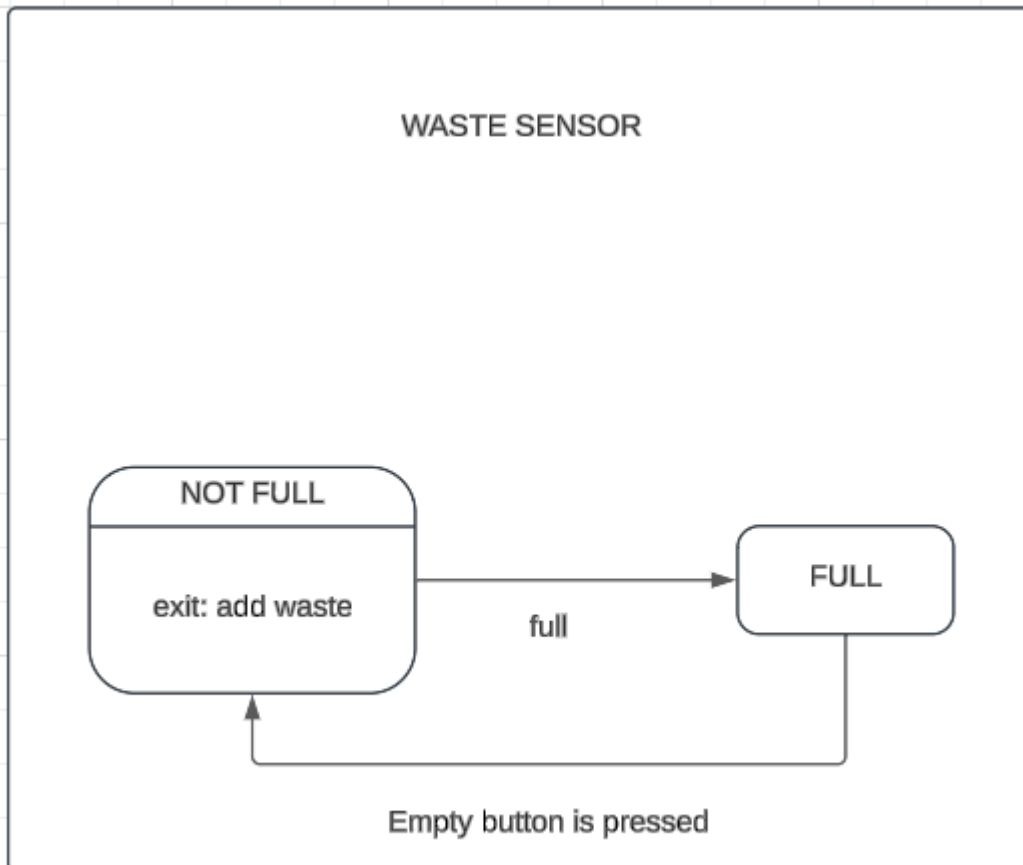


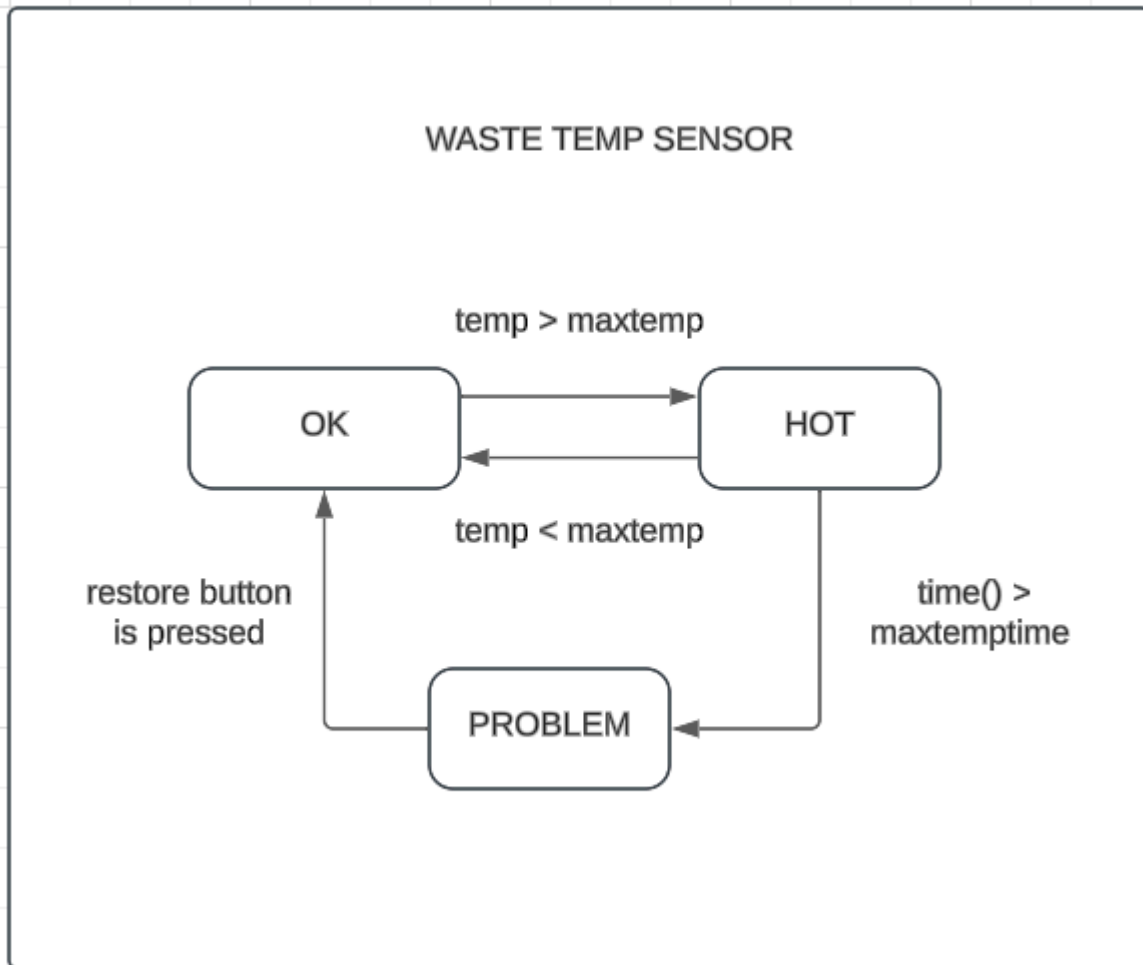
# SMART WASTE DISPOSAL SYSTEM

## Finite State Machines:



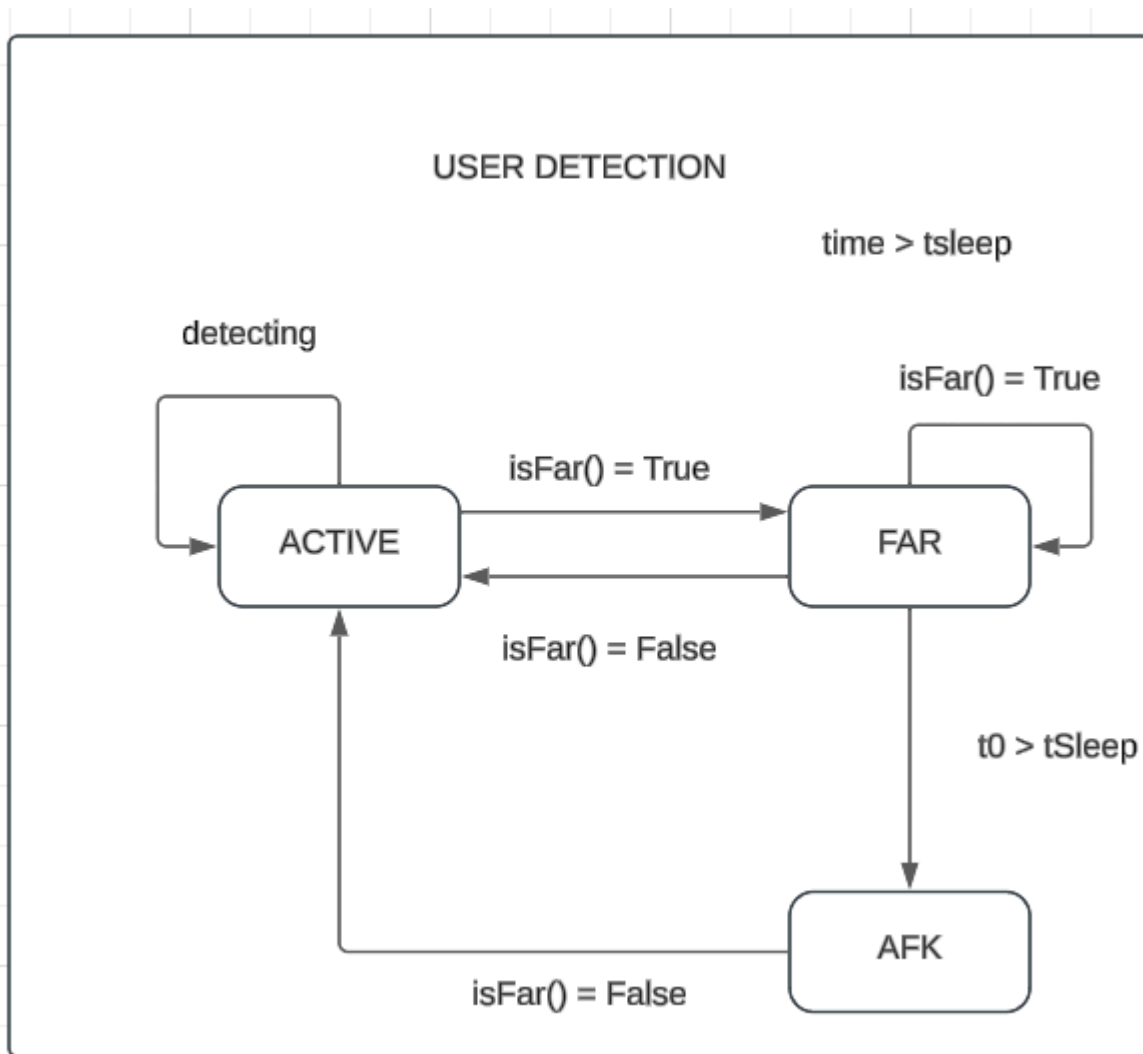
The waste sensor operates between two states: FULL and NOT FULL.

- **NOT FULL State:** This is the initial state where the waste container is not full. In this state the system can perform an action to add waste or transitions to **FULL** when the sensor detects that the container is full.
- **FULL State:** When the waste container is full, the system transitions to this state. The state remains unchanged until the "Empty" button is pressed, signaling that the container has been emptied. This action transitions the system back to the **NOT FULL** state.



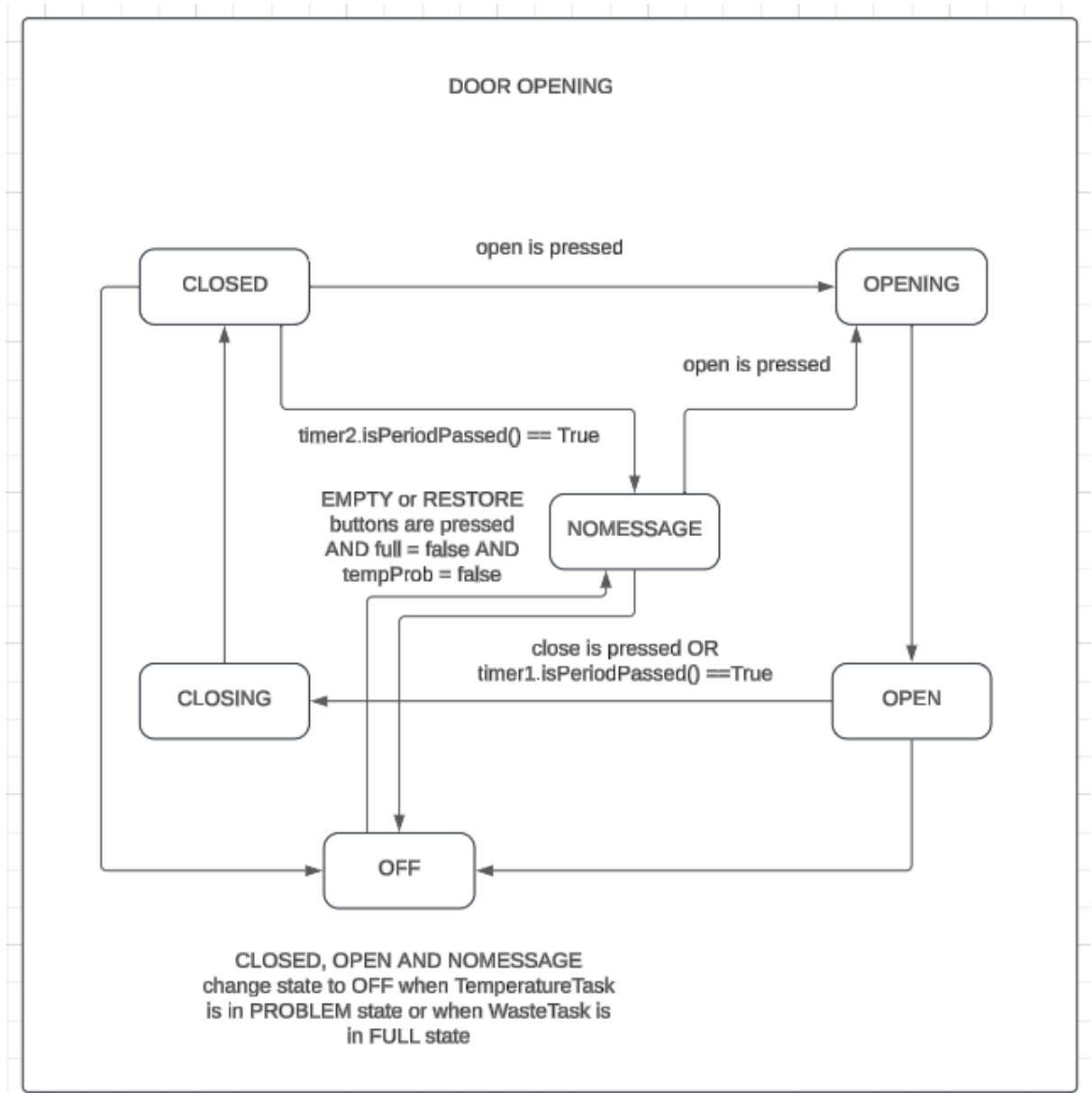
The temperature sensor has three states: OK, HOT, and PROBLEM, determined by the temperature levels and elapsed time.

- **OK State:** This is the default state where the temperature is within acceptable limits (`temp < maxtemp`). If the temperature exceeds the maximum threshold (`temp > maxtemp`), the system transitions to the **HOT** state.
- **HOT State:** In this state, the temperature has exceeded the maximum threshold. The system transitions back to **OK** when the temperature drops below the maximum threshold (`temp < maxtemp`) and to **PROBLEM** if the high temperature persists beyond a specified maximum time limit (`time() > maxtemptime`).
- **PROBLEM State:** This state indicates a critical condition due to prolonged high temperature. The system remains in this state until manual intervention occurs. an operator pressing the "Restore" button transitions the system back to the **OK** state.



The user detection transitions between three states: **ACTIVE**, **FAR**, and **AFK**, based on the user's proximity and activity duration.

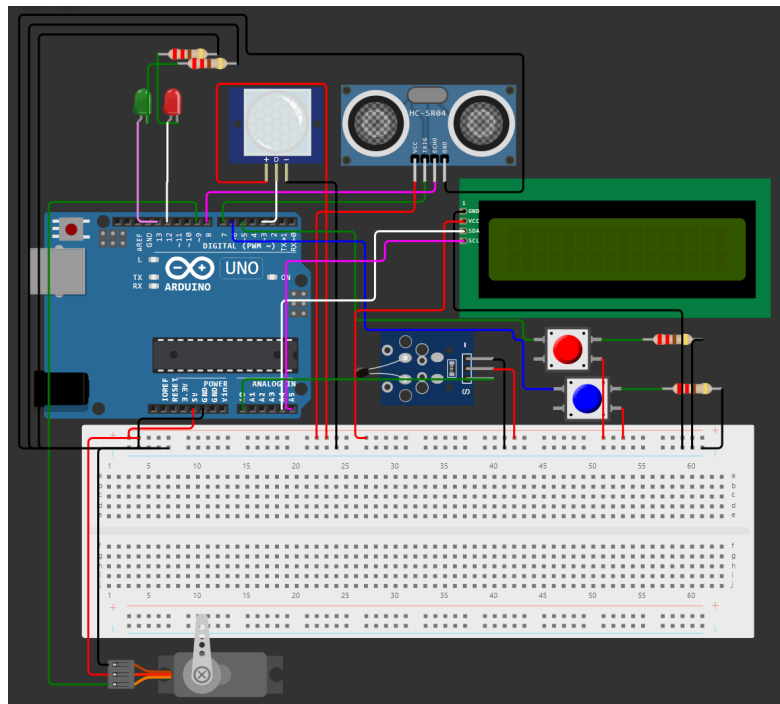
- **ACTIVE State:** The system begins in this state, actively detecting user presence, if the user moves away ( $\text{isFar}() = \text{True}$ ), the system transitions to the **FAR** state, if the user remains close ( $\text{isFar}() = \text{False}$ ), the system stays in the **ACTIVE** state.
- **FAR State:** This state represents that the user is detected as far from the system, if the user returns close ( $\text{isFar}() = \text{False}$ ), the system transitions back to **ACTIVE**, if the user remains far away and the elapsed time exceeds a threshold ( $\text{time} > \text{tsleep}$ ), the system transitions to the **AFK** state.
- **AFK State:** This state indicates the user has been inactive for too long, if the user returns close ( $\text{isFar}() = \text{False}$ ), the system transitions back to **ACTIVE**.



The door opening system operates through the following states:

- **CLOSED**: The door is fully closed. It transitions to **OPENING** when the "open" button is pressed.
- **OFF**: if a problem arises in the temperature or waste management subsystems.
- **NOMESSAGE**: when specific conditions are met, such as pressing the "EMPTY" or "RESTORE" buttons.

- **OPENING**: The door is in the process of opening. It transitions to **OPEN** once the opening process is complete or when a timer condition (`timer1.isPeriodPassed()`) is met.
- **OPEN**: The door is fully open. It transitions to **CLOSING** when the "close" button is pressed or a timer condition is met, **OFF** under fault conditions (e.g., temperature issues or waste system full)
- **CLOSING**: The door is in the process of closing. It transitions to **CLOSED** when the closing process is complete or another timer condition is met or to **OFF** if a problem arises.
- **NOMESSAGE**: An intermediate state used for error recovery or maintenance operations. It transitions to **OPEN** under standard operation or timer conditions or to **OFF** when the system detects specific fault conditions.
- **OFF**: A non-operational state where the system is shut down due to critical issues like temperature problems or waste overflow. It serves as the terminal state for any failure scenario.



*Project breadboard schema*

