**Emergency Room Tracker**

**USE CASE :**

* The emergency room capacity tracking system works by using sensors, buttons, LEDs, and a display to help both patients and hospital staff manage room occupancy efficiently. When a patient enters the room, a proximity sensor detects their presence and automatically increases the room's capacity count. At the same time, a buzzer emits a sound to alert the staff that the count has been updated. The LCD screen then displays the new capacity and provides an estimated wait time based on a pre-set average wait time per patient. For example, if the average wait time is set to 5 minutes, and there are 3 patients in the room, the screen will show a 15-minute estimated wait. However, if there is only one patient, the wait time remains at zero since they would be attended to immediately.
* To give a clear visual indication of the room's status, the system uses three LEDs. A green LED lights up when the room is at low capacity, meaning there is still plenty of space available. A yellow LED turns on when the room reaches medium capacity, indicating that the room is starting to fill up. When the room is at full capacity, a red LED lights up, signaling that no more patients should enter until space becomes available. This helps both patients and staff quickly understand the room’s status without needing to check the display constantly.
* If a patient leaves, a staff member can manually decrease the capacity count by pressing a button, which updates the LCD screen and adjusts the estimated wait time accordingly. If the staff needs to reset the count entirely, they can press a reset button to set the capacity back to zero, at which point the green LED turns on to indicate that the room is empty and ready for new patients.
* This system improves the efficiency of emergency room operations by providing real-time capacity tracking, reducing uncertainty for patients, and ensuring staff can manage room occupancy effectively. By integrating both hardware and software components, the system offers a streamlined way to enhance patient experience and optimize hospital workflow.

**Narrative of the State Diagram:**

**1. Idle State (State 0):**

* The system starts in the Idle state, where it is waiting for an event to occur.

2. **Motion Detected → Transition to Capacity Calculation (State 1):**

* When a proximity sensor is tripped (e.g., a patient entering the room), the system transitions from Idle to CapacityLevel.
* Calculates patient threshold.
* The display show numbers of the current room capacity.

**3. Manual Adjustment Using Buttons (B1 & B2 Pressed):**

* B1 Pressed: Decreases the patient count manually (e.g., if a patient leaves).
* B2 Pressed: Resets the patient count to zero if there is no patient and every morning it resets the counter again to zero.

**4. Capacity Status Indications:**

* The system evaluates the number of patients in the room and determines the appropriate warning level:
* CapacityLow: If the patient count is below a certain threshold, the system turns on a GREEN LED and triggers a buzzer beep.
* CapacityMedium: If the threshold is reached but not full, the system turns on a YELLOW LED and triggers a buzzer beep.
* CapacityHigh: If the room is at full capacity, the system turns on a RED LED and triggers a buzzer beep to alert staff.