System Functional Requirements: Tilt Detection & Status Controller

1. System Overview

The system is a dual-state device designed to monitor physical orientation. It features a generic "Standby" mode and an "Active" mode where it provides visual feedback based on the device's physical alignment (tilt). The system can be controlled physically via a button or remotely via terminal commands.

2. System States

The system operates in one of two mutually exclusive states:

- **IDLE State (Standby):** The system is powered but not processing sensor data.
- **RUNNING State (Active):** The system is actively monitoring orientation sensors and updating indicators.

Default State: Upon power-up or reset, the system must initialize in the **IDLE** state.

3. User Inputs (Control Logic)

The user can change the system state using two methods. Both methods must function simultaneously.

3.1. Physical Control (Push Button)

- **Action:** Pressing the user button.
- **Behavior:** The button acts as a **toggle**.
    - If the system is IDLE, pressing the button switches it to RUNNING.
    - If the system is RUNNING, pressing the button switches it to IDLE.

3.2. Remote Control (Command Terminal)

- **Action:** Sending single-character commands via the communication port.
- **Command '1':** Forces the system into the **RUNNING** state.
- **Command '0':** Forces the system into the **IDLE** state.

- **Invalid Commands:** Any character other than '0' or '1' must be ignored as a state change request, and an error message ("Wrong Command") must be sent back to the user.

4. System Outputs & Behavior

4.1. Status Indicator (Red LED)

This indicator shows the current operating mode of the system.

- **In IDLE Mode:** The Red indicator must **blink** (turn ON and OFF repeatedly) to indicate the system is alive but waiting.
- **In RUNNING Mode:** The Red indicator must remain **Solid ON**.

4.2. Orientation Indicators (Green, Orange, Blue LEDs)

These indicators are active **only** when the system is in the **RUNNING** state. They respond to the device's alignment with gravity (1g).

- **X-Axis Alignment (Green Indicator):**
  - Turns **ON** if the X-axis is aligned with gravity (reading between 0.9g and 1.0g).
  - Turns **OFF** if the X-axis is tilted away.
- **Y-Axis Alignment (Orange Indicator):**
  - Turns **ON** if the Y-axis is aligned with gravity (reading between 0.9g and 1.0g).
  - Turns **OFF** if the Y-axis is tilted away.
- **Z-Axis Alignment (Blue Indicator):**
  - Turns **ON** if the Z-axis is aligned with gravity (reading between 0.9g and 1.0g).
  - Turns **OFF** if the Z-axis is tilted away.

4.3. System Feedback (Terminal Output)

The system must provide text feedback to the connected terminal to confirm state transitions:

- When a button is pressed print: ***“Button Pressed!”***
- Print live accelerometer values.
- When entering IDLE, print: ***"IDLE"*** (or similar confirmation).
- When entering RUNNING, print: ***"RUNNING"*** (or similar confirmation).
- Upon receiving an unknown input, print: ***"Wrong Command!"***