**Task B - Single Button Press Detection System**

**Smart Single-Button Control System with Press-Type Detection**

**Introduction**

This project implements an intelligent button press detection system using ESP32 microcontroller. The system distinguishes between short and long button presses to trigger different functions, providing both visual and audio feedback with real-time OLED display updates.

**Project Objectives**

- Implement single button with dual-function detection

- Differentiate between short press and long press actions

- Provide visual feedback through LED

- Provide audio feedback through buzzer

- Display real-time status on OLED screen

- Create intuitive user interaction system

**Hardware Components Used**

**Microcontroller**

- ESP32 Development Board - Main processing unit

**Input Components**

- Push Button - Single multi-function button

**Output Components**

- LED - Visual indicator

- Buzzer - Audio feedback

- OLED Display (SSD1306) - 128x64 pixel status display

**Supporting Components**

- 220Ω Resistor - Current limiting for LED

- Breadboard - Circuit prototyping

- Jumper Wires - Electrical connections

**System Functionality**

**Button Press Detection**

- Short Press (less than 1.5 seconds): Toggles LED state

- Long Press (more than 1.5 seconds): Activates buzzer tone

**Response Actions**

**Short Press Action**

- Toggles LED between ON and OFF states

- OLED displays: "Short Press - LED Toggled"

- No audio feedback

**Long Press Action**

- Activates buzzer for audible feedback

- OLED displays: "Long Press - Buzzer On"

- LED state remains unchanged

**User Interface**

**OLED Display Messages**

- Ready State: "System Ready - Press Button"

- Short Press: "Short Press - LED Toggled"

- Long Press: "Long Press - Buzzer On"

- Current LED Status: "LED: ON" or "LED: OFF"

**User Interaction Guide**

1. Quick Press and Release: Toggles LED

2. Press and Hold: Activates Buzzer

3. System provides immediate visual and audio feedback

4. OLED updates in real-time for all actions

**Applications**

- Smart home device controls

- Industrial control panels

- Accessibility interfaces

- Educational input detection systems

- Prototype user interface testing

**Technical Specifications**

- Microcontroller: ESP32

- Display: SSD1306 OLED (128x64)

- Input: Single push button

- Output: LED, Buzzer, OLED

- Input Voltage: 3.3V

- Communication: I2C for OLED

**Conclusion**

This project successfully demonstrates advanced button press detection capabilities in an embedded system. The implementation provides reliable differentiation between short and long presses, multiple feedback mechanisms, and clear user interface through OLED display