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Section: BSCS 5th A

Task 2 -Documentation

1. Introduction

This project demonstrates how to use a single push button with an ESP32 board to control an LED and a buzzer, while displaying feedback messages on an OLED screen. It differentiates between short and long button presses, allowing the user to toggle the LED or activate a buzzer. The OLED display shows the current status of the system in real-time.

2. Hardware Components

The project requires the following components:

- ESP32 Development Board
- Push Button
- LED with resistor
- Buzzer
- OLED Display (SSD1306, I2C)
- Jumper wires and breadboard

3. Pin Mapping

Component	ESP32 Pin	Type	Description
Push Button	GPIO 32	Input (Pull-up)	Detects short or long presses
LED	GPIO 16	Output	Turns ON/OFF on short press
Buzzer	GPIO 17	Output (PWM)	Activates on long press
OLED SDA	GPIO 21	I2C Data	Data line for OLED communication

OLED SCL	GPIO 22	I2C Clock	Clock line for OLED communication
OLED VCC	3.3V	Power	Supplies power to OLED
OLED GND	GND	Ground	Common ground for all components

4. Working Principle

The button is connected with an internal pull-up resistor, meaning its normal state is HIGH. When pressed, it goes LOW. The code measures how long the button is pressed to decide between short and long actions.

- Short Press: Toggles the LED ON or OFF and displays 'LED ON' or 'LED OFF' on the OLED.
- Long Press (more than 1.5 seconds): Activates the buzzer while the button is held, and shows 'BUZZER' on the OLED.

When released, it stops the buzzer and displays 'Stopped'.

5. Required Libraries

- Adafruit GFX Library
- Adafruit SSD1306 Library

These can be installed from Arduino IDE Library Manager.

6. OLED Display Configuration

The OLED uses I2C communication with address 0x3C. SDA and SCL pins are connected to GPIO 21 and 22 respectively. The screen displays system states such as 'Ready', 'LED ON', 'LED OFF', 'BUZZER', and 'Stopped'.

7. Example Serial Monitor Output

Ready

Button pressed - waiting for release

LED turned ON

Button pressed - waiting for release

Long press activated - BUZZER ON

Long press stopped

8. Wiring Diagram (Text View)

ESP32 OLED LED BUZZER BUTTON

----- ---- --- ----- -----

3.3V ---> VCC

GND ---> GND ----- GND ----- GND ----- GND

21 ---> SDA

22 ---> SCL

16 ---> + (LED through resistor)

17 ---> + (Buzzer)

32 ---> One side of Button

GND ---> Other side of Button