Team 18: Walking Stick for the Visually Impaired

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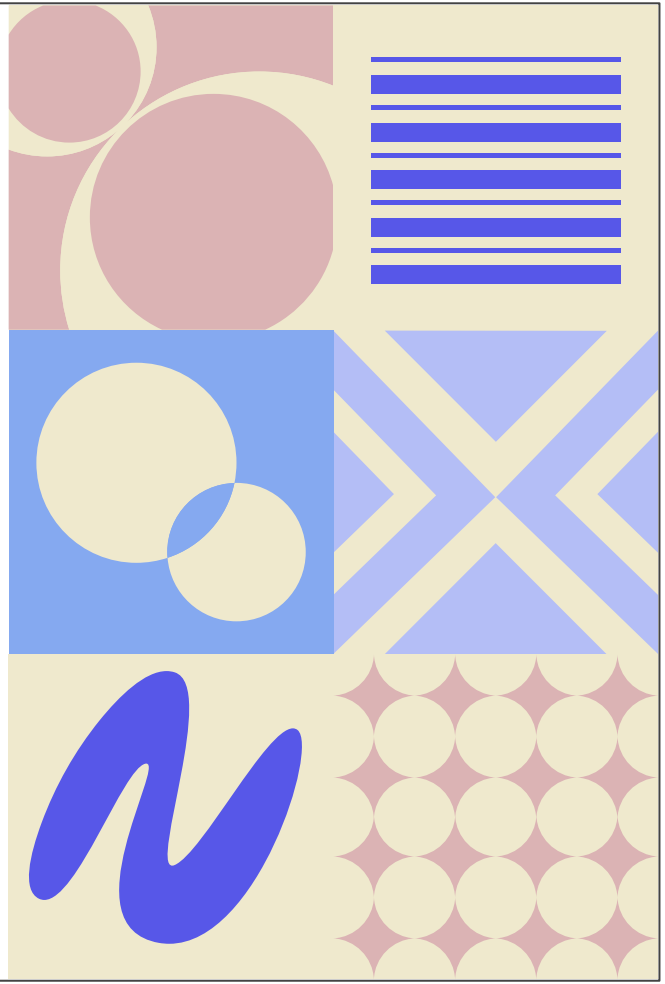

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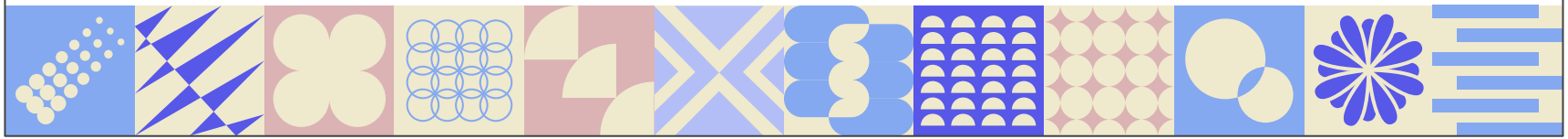
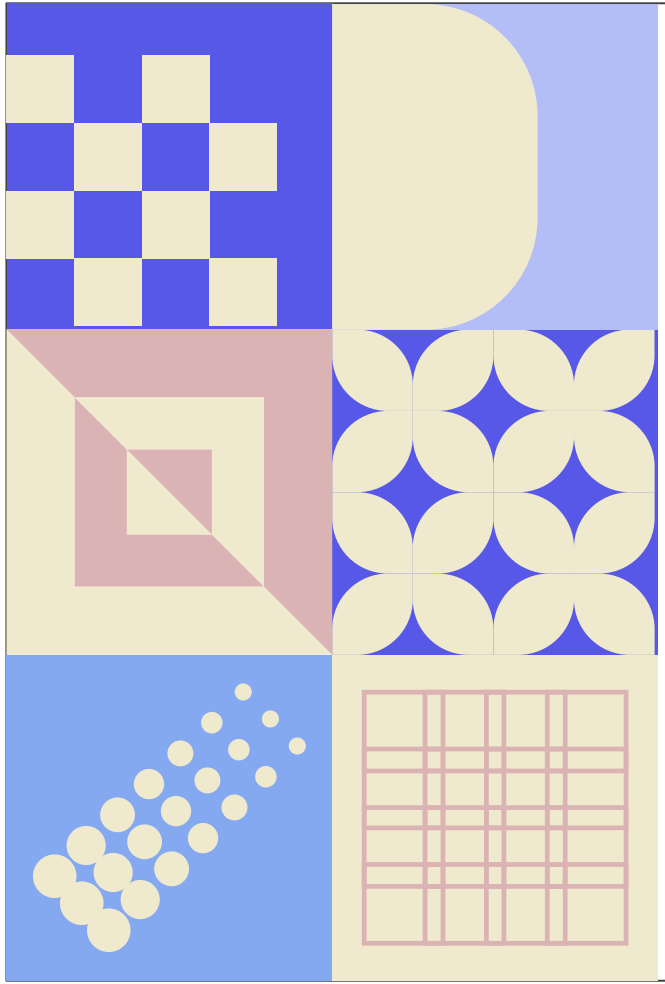


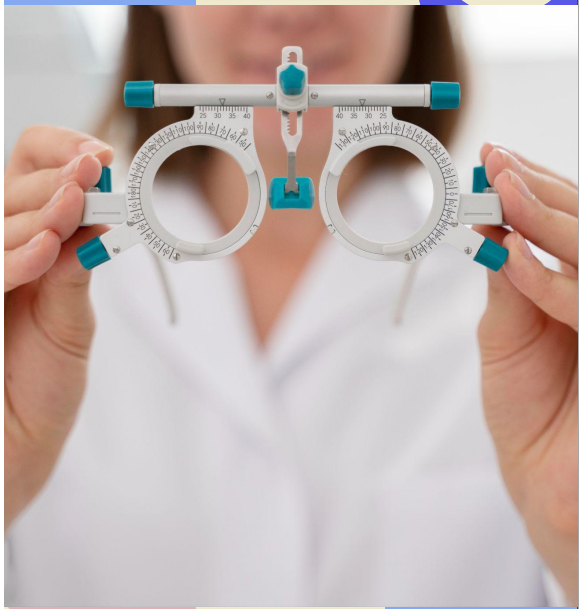


01

Project Overview

Introduction

- Objective: Assist visually impaired users with obstacle detection and emergency communication using IoT technologies
- Key Features: Ultrasonic sensors, buzzer alerts, GPS tracking, GSM/SMS emergency alerts, cloud data logging



System Components

Ultrasonic Sensors

(HC-SR04) for obstacle detection

Neo-6M

GPS Module for real-time location

SOS

Push Button to trigger emergency alerts

Buzzer

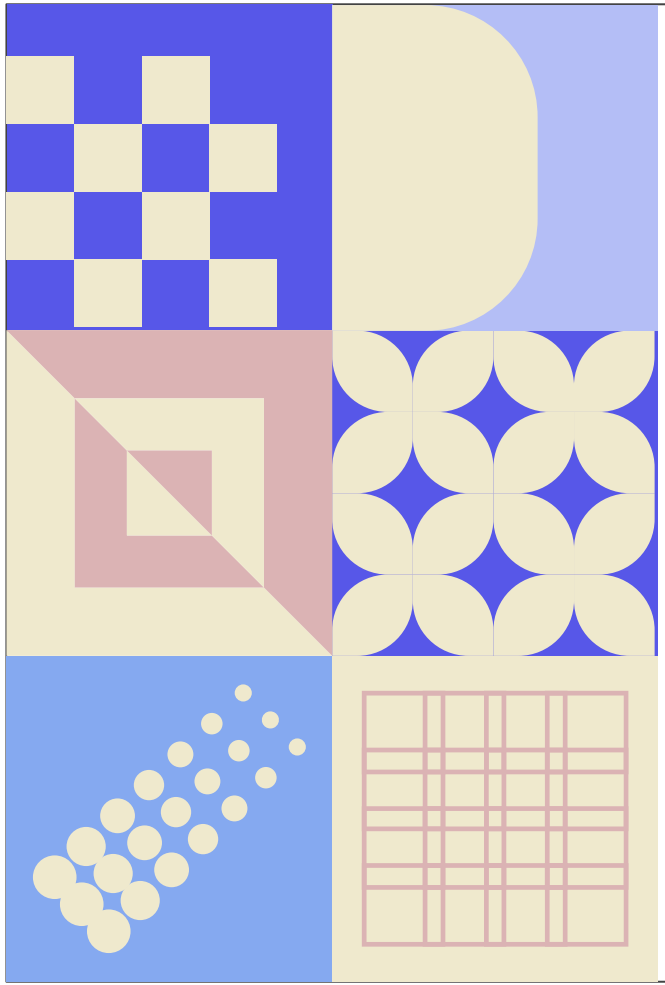
Digital Passive Buzzer for audio alerts

ESP32

Microcontroller as the central controller

ThingSpeak

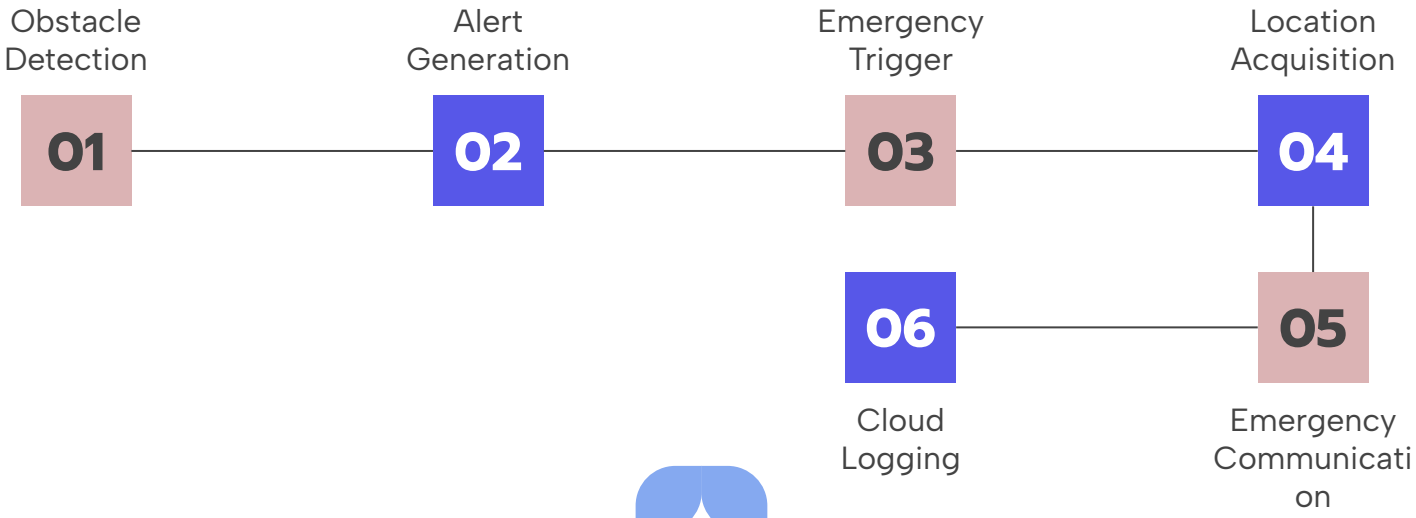
Cloud for data logging and visualization



02

Workflow

Detailed Workflow

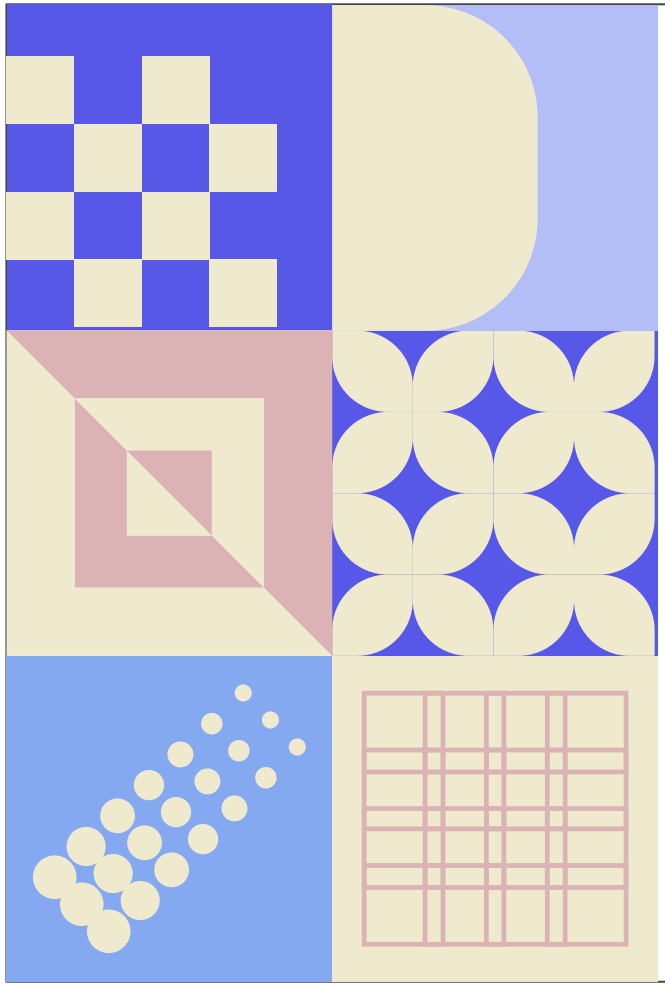


Control Flow

- **Ultrasonic Sensors:** Emit 40 kHz sound waves, measure echo time to detect obstacles within 100 cm
- **Buzzer Patterns:** Long beep (left), medium beep (right), fast beep (both sides)
- **ESP32 Microcontroller:** Runs two loops-one for sensor processing and buzzer control, another for emergency communication
- **SOS Button Press:** Activates GPS and GSM modules, sends SMS, triggers cloud notifications (Twilio and Pushbullet)

Cloud and Communication Integration

- ESP32 connects to WiFi for internet access
- Twilio API makes automated voice calls during emergencies
- Pushbullet API sends push notifications to caregivers
- ThingSpeak visualizes GPS and SOS data over time

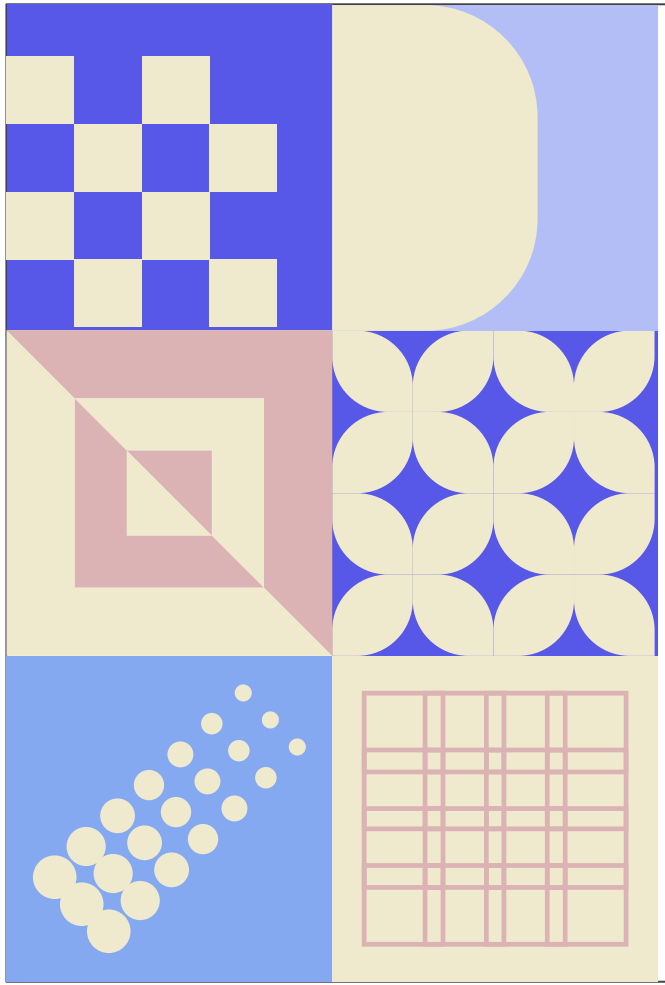


03

Challenges

Risk factors and complications

CHALLENGES	SOLUTIONS
Sensor Instability	Averaged multiple readings to reduce false alarms
GPS Signal Delay	Waited for valid coordinates before sending alerts
WiFi Connectivity	Implemented reconnection logic for reliable cloud communication
Hardware Constraints	Used compact modules and efficient wiring
Power Supply	External rechargeable Li-ion batteries for stable operation



04

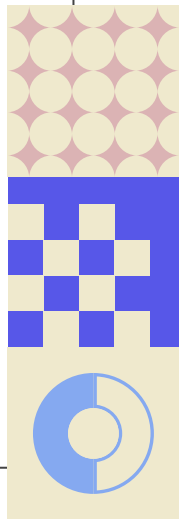
Lessons Learned

Lessons Learned

- Real-world testing is critical for reliability
- Simplifying hardware by using APIs (Twilio) reduces complexity
- User-centric design ensures ease of use and effectiveness
- Proper timing and delay management improves system stability

Real life impact

- Helps visually impaired users navigate safely with real-time obstacle alerts.
- SOS button sends GPS location instantly to caregivers for quick emergency help.
- Keeps caregivers informed via automated calls and notifications.
- Enables remote monitoring through cloud data logging.
- Empowers users with greater independence and confidence in daily mobility.



Thanks!