

# **MORSE CODE BASED HOME AUTOMATION FOR DEAF-BLIND**

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# OBJECTIVE

- Enable effective communication and appliance control for deaf-blind individuals using Morse code.
- Utilize a tactile push-button to input Morse code signals.
- Process and convert Morse input into control commands via an ESP32 microcontroller.
- Wirelessly transmit commands using ESP-NOW protocol to another ESP32 that controls home appliances (e.g., lights, fans).
- Provide two-way feedback through vibrations or buzzer tones to confirm successful operations.
- Ensure the solution is Cost-effective ,Wireless,User-friendly,Accessible for users with sensory impairments

# EXISTING SYSTEM

Feature	Description	Accessibility for Deaf-Blind Users
Voice-Based Control	Operates through voice commands and responses	Not usable (requires hearing)
App-Based Interaction	Requires visual input and screen navigation	Not suitable (requires sight)
Visual Feedback Only	No haptic or tactile confirmation mechanisms	Inaccessible
Lack of Inclusive Design	Not designed for users with dual sensory loss	Poor accessibility

# EXISTING SYSTEM

## 1. Gboard's Morse Code Keyboard (by Google) :

Google's Gboard keyboard includes a Morse code input option, allowing users to type using dot (.) and dash (-) taps. It integrates with accessibility services like TalkBack, offering auditory feedback to assist blind users during typing.

## 2. Samsung Good Vibes :

Specially designed for the deafblind community, this app enables two-way communication by converting text or voice to vibrations and vice versa. Users can input messages using screen taps in Morse code, with responses received as vibration patterns.

## 3. Senseamp (Android App) :

Senseamp is an Android application that translates text into Morse code through vibration patterns. It features a simple interface with adjustable vibration speeds and even supports converting entire books into Morse code vibrations for the user to feel.

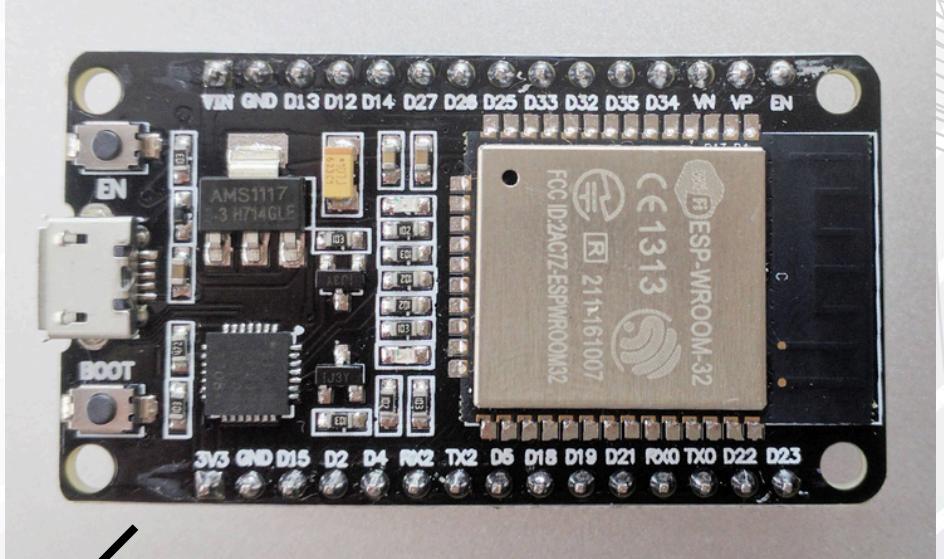
# PROPOSED SYSTEM

The proposed system introduces an inclusive, wireless home automation solution specifically designed for deaf-blind individuals. It utilizes a tactile push-button to capture Morse code input, allowing users to communicate commands such as turning lights or fans on and off. An ESP32 microcontroller processes the Morse signals, decodes them into readable commands, and transmits them wirelessly to another ESP32 using the ESP-NOW protocol. The receiver unit controls the connected appliances—such as LEDs representing lights and a relay module for fan operation. To ensure usability for sensory-impaired users, the system provides feedback through a buzzer or vibration motor, confirming the successful execution of commands. This approach promotes independent living by offering a low-cost, accessible, and intuitive smart control system.

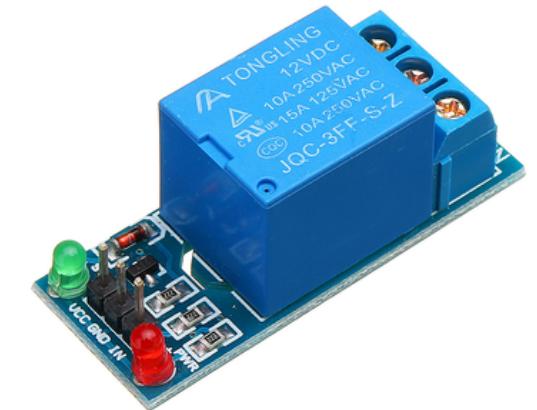
# KEY FEATURES

-  **Accessibility-Centered:** Designed specifically for deaf-blind users using tactile Morse code input.
-  **Simple Input Mechanism:** Uses a single tactile push-button for entering Morse code, avoiding complex interfaces.
-  **Wireless Communication:** Employs ESP-NOW protocol for fast, low-power, device-to-device data transmission.
-  **Smart Appliance Control:** Operates light (via LED) and fan (via relay module) based on decoded Morse commands.
-  **Real-Time Feedback:** Provides haptic feedback (buzzer/vibration) to confirm successful command execution.
-  **Low-Cost & Scalable:** Built using affordable, easily available components with potential for expanding to more devices.

# HARDWARE COMPONENTS

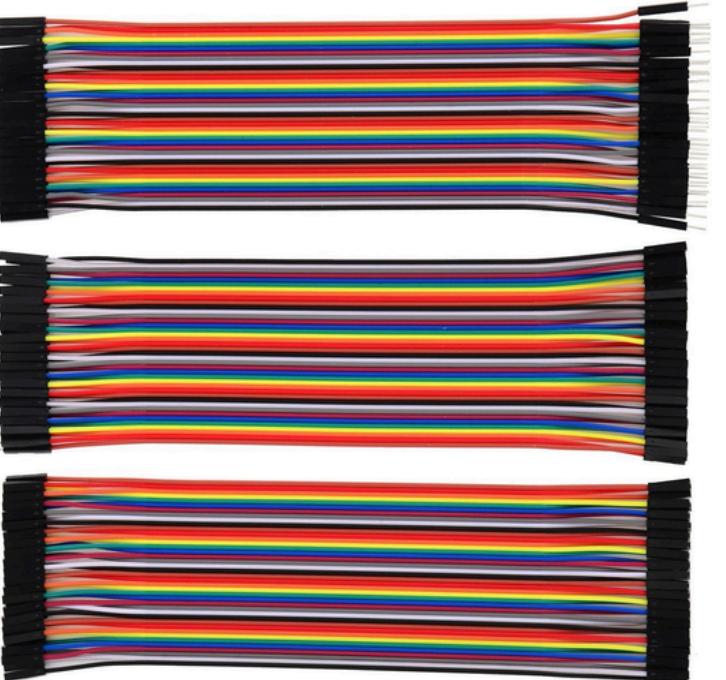
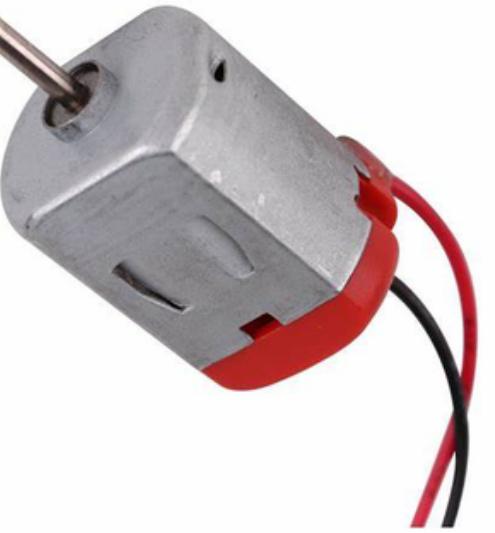


COMPONENT	PURPOSE
ESP 32	Main microcontroller to process Morse input and send commands wirelessly
Tactile Button	Used for Morse code input via short (.) and long (-) presses
Relay Module	Acts as a switch to turn fan or other high-power devices ON/OFF
LED	Simulates a light to show ON/OFF control in the prototype



# HARDWARE COMPONENTS

COMPONENT	PURPOSE
DC Motor	Simulates or controls a fan in the prototype
9V Battery Clip	Connects a 9V battery to power the ESP32 and motor/fan
Jumper Wires	Used to make electrical connections between components on the breadboard



# DESIGN METHODOLOGY

## PURPOSE & REQUIREMENTS SPECIFICATION

**Purpose:** Enable home automation control (lights, fan) for deaf-blind users using Morse code.

### Functional Requirements:

Accept Morse code via tactile button

Decode and transmit command wirelessly using ESP-NOW

Control appliances using ESP32 and relay/DC motor

Provide tactile/audio feedback via buzzer/vibration

### Non-functional Requirements:

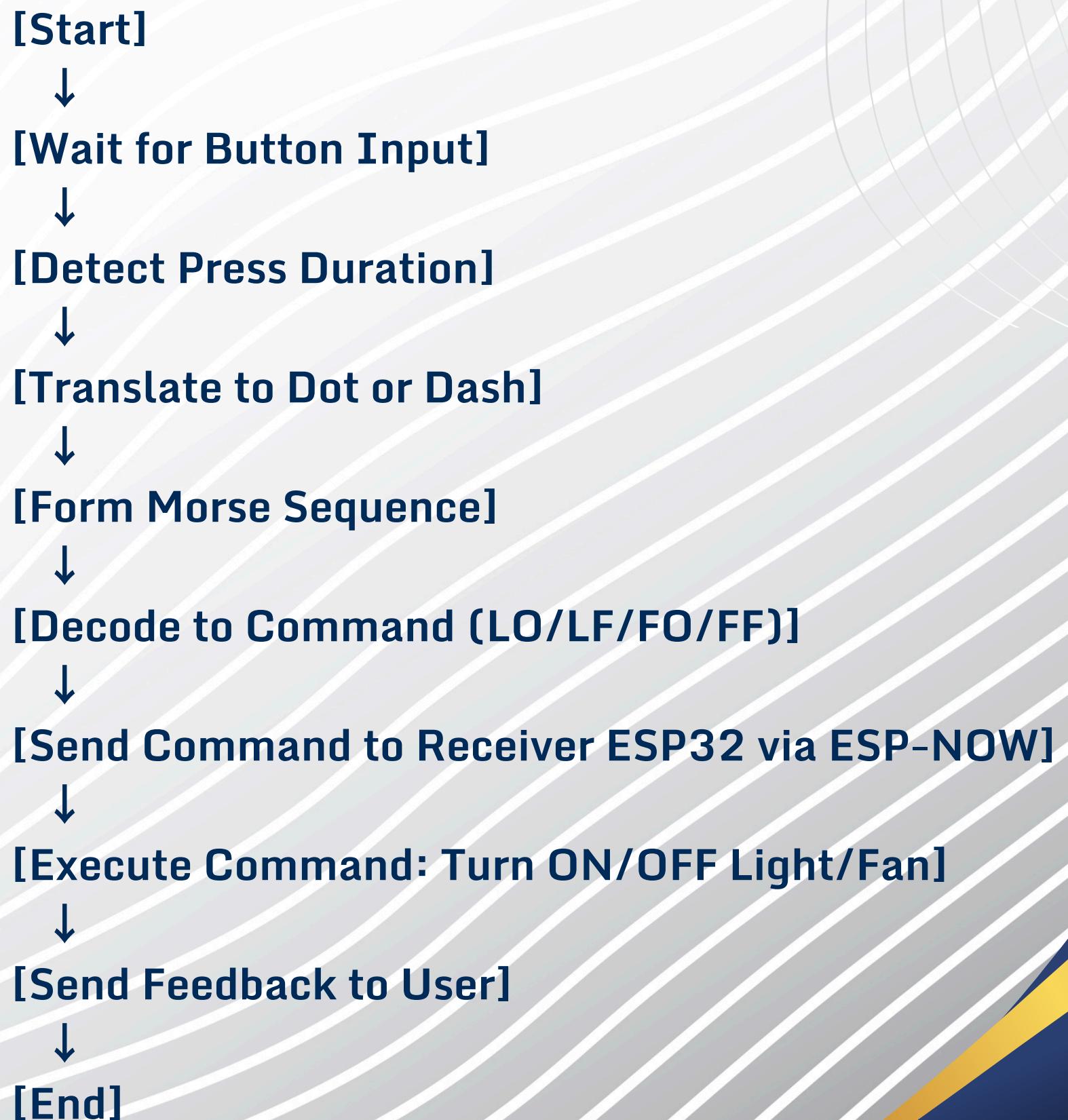
Wireless, user-friendly, accessible

Compact device housing all components

# PROCESS SPECIFICATION

## Flow of system operation:

1. User inputs Morse code via push button
2. ESP32 reads input and decodes it into command (e.g., “LO” or “LF” or “FO” or “FF”)
3. Command is transmitted via ESP-NOW (2 way communication)
  1. Receiver ESP32 performs action (turns light/fan ON/OFF)
  2. Sends feedback to transmitter
  3. Transmitter buzzes/vibrates to confirm action



# DOMAIN MODEL SPECIFICATION

## Entities:

- User (Deaf-blind person)
- Morse Input Device
- ESP32 Sender
- ESP32 Receiver
- Actuator Devices (LED, Fan)
- Feedback Components (Buzzer/Vibrator)

# INFORMATION MODEL SPECIFICATION

## Data types:

- **Input: Morse code (., -)**
- **Commands: LO, LF, FO, FF**
- **Output signals: digital HIGH/LOW for LED/fan**
- **Feedback: encoded vibration/buzzer tone**
- **Communication: ESP-NOW protocol**

# SERVICE SPECIFICATIONS

## Defined services:

- Morse code decoding
- Command validation and execution
- Wireless data transmission (ESP-NOW)
- Appliance control (relay interface)
- Feedback signaling

# FUNCTIONAL VIEW SPECIFICATION

- **Input: Tactile button**
- **Processing: ESP32 MCU logic for decoding and wireless transmission**
- **Output: Digital signal to appliances, feedback module**
- **Data Flow: Button → ESP32 (decode) → ESP32 (receiver) → Device → Feedback**

# OPERATIONAL VIEW SPECIFICATION

## Environment:

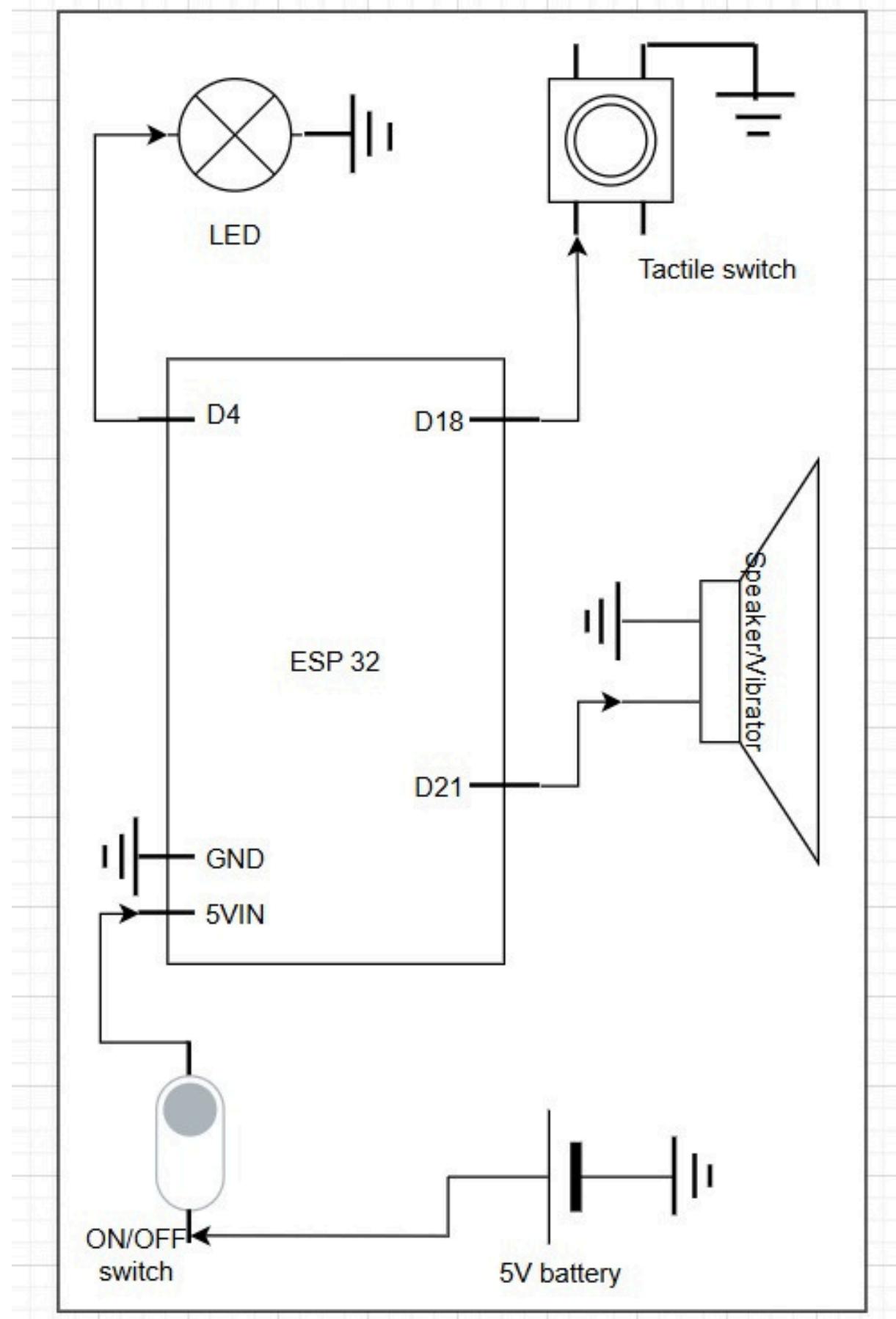
- Indoor setup
- Powered by 5V battery
- Works offline
- Range ~10-20 meters (ESP-NOW)

# DEVICE & COMPONENT INTEGRATION

## Key components:

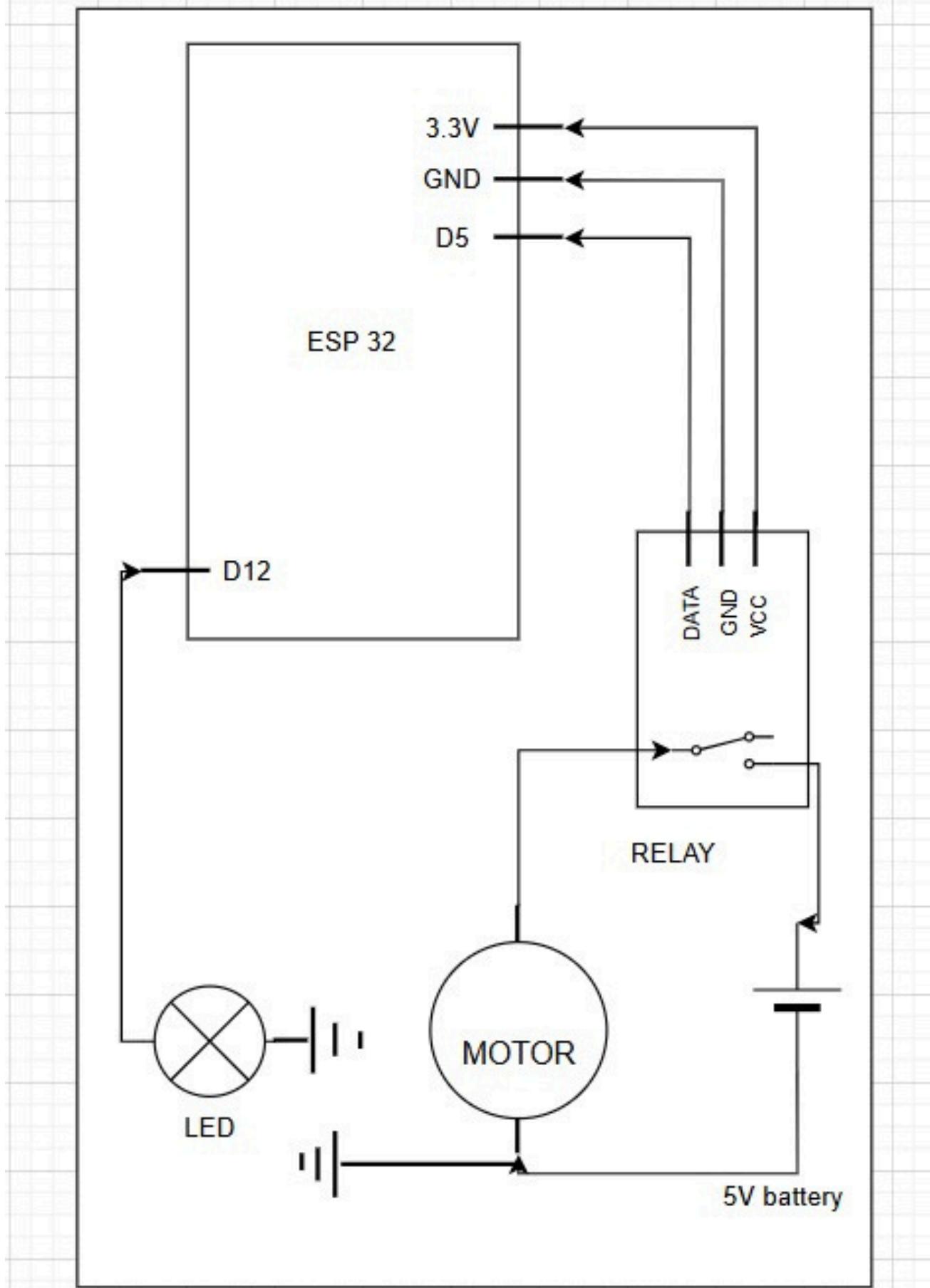
- **ESP32 x2 (sender & receiver)**
- **Tactile Push button**
- **Relay Module (Fan control)**
- **LED x2 (Light simulation, command status confirmation)**
- **DC Motor ( Fan simulation)**
- **9V Battery with clip**
- **Speaker/Buzzer**
- **Jumper wires**

PORABLE CONTROLLER



TACTILE DEVICE

HOME APPLIANCE



## APPLICATION DEVELOPMENT

- **Embedded C/C++ with Arduino IDE**
- **ESP-NOW for communication(2- way communication)**
- **Serial Monitor for debugging**
- **Optional: Android app for future extension (visual UI for caregiver)**

# THANK YOU