

# Voice Controlled Smart Home System

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*Abstract- This paper presents the design and implementation of an offline voice-controlled home automation system using the VC-02 speech recognition module and Arduino Uno microcontroller. The system enables users to control electrical appliances such as a fan and light using predefined voice commands without the need for internet connectivity. The proposed solution focuses on low-cost implementation, ease of use, and reliability. The VC-02 module processes voice commands locally and sends corresponding signals to the microcontroller, which in turn controls relay modules to operate the appliances. The system is particularly useful in environments where internet access is limited or unavailable. The design ensures user safety and energy efficiency while providing a simple and scalable home automation solution.*

*Index Terms-Arduino, Home Automation, Offline Voice Control, Relay Module, VC-02*

## I. INTRODUCTION

This paper presents a stepwise implementation of an offline voice-controlled system for home appliances using embedded systems. With the advancement in automation and smart technologies, voice-controlled systems are gaining popularity. However, most existing solutions rely on cloud-based services which require continuous internet connectivity.

The proposed system eliminates the dependency on internet by using an offline speech recognition module (VC-02). It allows users to control devices like fans and lights through simple voice commands. This system is cost-effective and suitable for small-scale home automation.

The main objective of this project is to develop a reliable and efficient voice-controlled system that can operate in real-time without external dependencies.

## II. IDENTIFY, RESEARCH AND COLLECT IDEA

The initial step involves identifying the feasibility and requirements of an offline voice control system. The following approaches were used:

- 1) Studied existing voice-controlled systems and their limitations.
- 2) Analyzed offline speech recognition modules like VC-02.
- 3) Explored Arduino-based automation projects.
- 4) Understood electrical safety and relay switching mechanisms.

## III. WRITE DOWN YOUR STUDIES AND FINDINGS

### A. System Implementation

In this approach, the VC-02 module is trained with predefined commands such as “Fan ON”, “Fan OFF”, “Light ON”, and “Light OFF”. The module processes voice input and sends corresponding command IDs to the Arduino Uno via serial communication.

The Arduino interprets these commands and activates the appropriate relay channels. Each relay acts as a switch to control an appliance. A 2-channel relay module is used to control both fan and light independently.

### B. Hardware Integration

The hardware setup includes Arduino Uno, VC-02 module, relay module, and power supply. The relay module is connected to AC appliances while Arduino provides control signals.

The system was tested initially with low-power devices such as LED bulbs and table fans before connecting to real household appliances. This ensured safety and reliability.

#### IV. GET PEER REVIEWED

The designed system was tested and reviewed by peers to evaluate its performance. Feedback was collected regarding command accuracy, response time, and ease of use.

#### V. IMPROVEMENT AS PER REVIEWER COMMENTS

Based on feedback, improvements were made to enhance system performance:

- Optimized command training for better recognition accuracy
- Improved wiring and insulation for safety
- Reduced noise interference by placing microphone strategically

#### VI. CONCLUSION

The proposed offline voice-controlled system successfully demonstrates the control of fan and light using voice commands without internet dependency. The system is cost-effective, easy to implement, and scalable for additional appliances.

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#### REFERENCES

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