

# Implementing Home Automation System Using ZIGBEE IEEE 802.15.4 Standard

Archana Suryavanshi, A. A. Shinde

**Abstract:** *Wireless technology evolution has greatly enhanced automation systems.. The major requirement of this field has been low data rate, extended battery life and secure system.Voice controlled home automation system designed using . Zigbee IEEE 802.15.4 protocol. Home automation system recognizes user commands with help of HM 2007 voice recognitio chip. This system assists disable persons and persons with limitations. System facilitates controlling of all household equipment’s like light and fan with single or multiple user commands.*

**Index Terms:** *Home Automation System, Zigbee, Voice recognition, IEEE 802.15.4,*

## I. INTRODUCTION

The Wireless home automation system is an integrated scheme to enable aged and immobilized humans with an easy way. HAS (Home Automation System) which will be complete operational with voice commands. The scheme is handy and built in a manner which is simple to setup, configure and run. A classic WHAS (wireless home automation system) permits one to control household machines through an integrated device that is wireless. These machines typically are intended to be particularly harmonious with all others and by control unit for maximum industry available products. System core technique is to control electric equipment’s using wireless technology and sensors. VRS (Voice Recognition System) is used to accept commands and connected to a microcontroller. Commands are given through a microphone and processed in HM2007, converted to a binary signal and transmitted to a microcontroller.  $\mu$  Controller processes data and voice instructions both in or out of circuit.

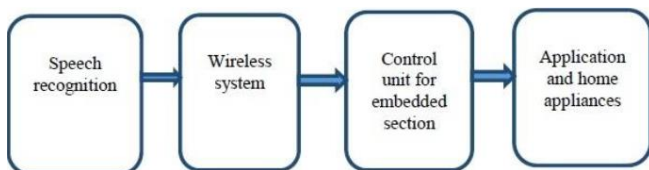


Fig1. Generalized System

The Generalized system architecture of the system is speech recognition, wireless system, control embedded unit, applications in setup.

Manuscript published on 30 June 2016.

\* Correspondence Author (s)

Archana Suryavanshi, Student, College of Engineering, Pune, Bharati Vidyapeeth Deemed University, Pune (Maharashtra). India.

Dr. A. A. Shinde, Professor, College of Engineering, Pune, Bharati Vidyapeeth Deemed University, Pune (Maharashtra). India.

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## II. LITERATURE REVIEW

### A. Survey on Wireless Home Automation System

A systematic survey has been done on 7 first articles for development of problem definition, with articles available and free open accessible with latest to last decade article on automation systems. [1] Author has presented E-Home system with Base System as shown in Fig.I. System is found to be best for every individual class. Zigbee has eliminated the need of wired technology. The overall system with Zigbee protocol provides higher range than Bluetooth and found to be best with security as a major issue. [2] Author has presented wireless home automation system and focuses on voice recognition accuracy. Major advantage of the system is it does not require training for new users and has been tested for three appliances. Extending it to more than 3 appliances and handling them concurrently is work.[3] System with transmitter and receiver model for home automation is presented.[4] System developed achieves a good data rate of 250kbps/sec and found best for transmission.[5] HM2007 software model for automation is presented; the model greatly assists in a better system.[7] Work presents system for automation with ARM LPC2148, system one merit point is control through one touch and helps in an easy-to-use system, but implementation of LPC 2148 is complex and interfacing is a problem.

## III. SYSTEM DESIGN

The system has been designed connecting various components as generalized in Fig 1) base station 2) remote station 3) voice control unit 4) ARM 5) ZIGBEE 6) power supply regulator

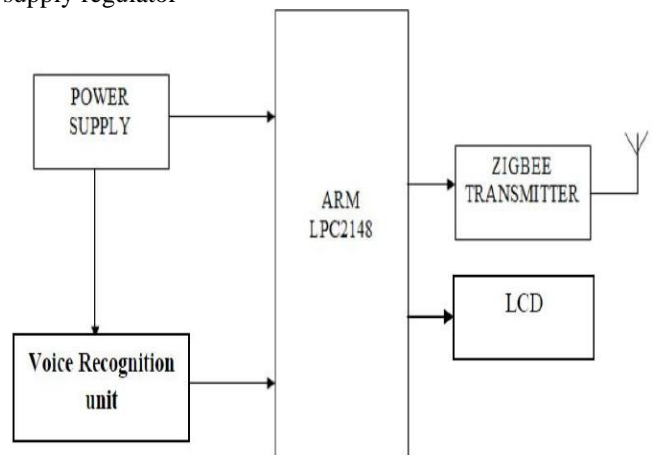


Fig 1. Block Diagram of Transmitter



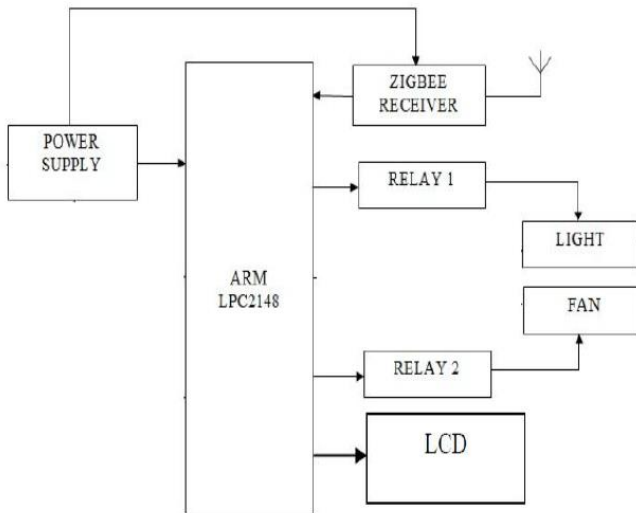


Fig 2: Block Diagram of Receiver

## IV. WORKING

### B. Base Station (BS)

First and most part in system design is Base Station. BS would function with +5V. Voltage would be used as operating voltage for all of circuit elements in BS. Microphone in BS would be gathering up audio in close range. Audio signal from microphone would be input into HM 2007 speech recognition.

### C. Remote Station (RS)

RS Operates in +5v. Microcontroller in RS receives commands through microcontroller using Zigbee protocol and decode them using and update to relay switch. Sensor values are updated on board.

### D. Voice Recognition System(VRS)

Voice recognition scheme is a wholly gathered and informal to practice programmable voice identification circuit. Flexible in sense user can add new-words which are required to be identified. Circuit panel permits user to try with numerous features of voice identification technology. Takes 8 bit information that could be interfaced with several  $\mu$ controller circuits for additional expansion.

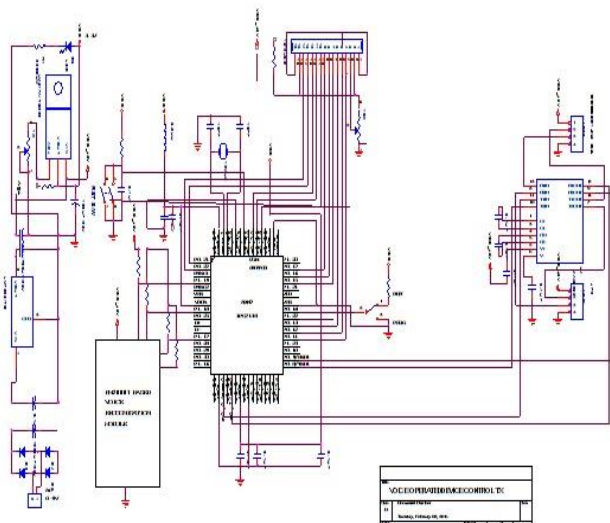


Fig 3: Fig of Circuit Diagram

### E. HM2007

Identification system could be collected of outside microphone, keyboard, 8K SRAM and Another components, collective with a microcontroller, intelligent identification scheme could be manufactured.

### Provisions two control styles:

- 1) Manual mode
- 2) CPU mode.

Also obtainable in 48-pin PDIP. Keypad and digital display are used to interconnect with program and HM2007 chip. keypad is make up of 12 generally open fleeting interaction buttons. 74LS373 8-bit registers attribute 3-state outputs designed precisely for pouring extremely capacitive or comparatively low-resistance load. High-impedance 3-state and amplified extraordinary-logic-close effort deliver these records with competence of being linked straight to and pouring bus shapes in bus-prepared system deprived of necessity for line or pull-up mechanisms.

IC 7448 is BCD to 7-segment shared cathode IC. A microphone is associated straight with pin 15(MICIN) of HM2007 that is visible below. On system voice is educated first and accepted as a command is specified from microphone. Board permits user to try with many aspects of voice identification technology. 8 bit I/O that could be interfaced with any microcontroller for additional development. Some of interfacing requests that can be made are controlling home utilizations robotics actions, Dialogue Helped technologies, Speech to text conversion, and numerous more. Has Non-volatile memory back up and 3V battery on-board that retain voice identification data in memory after power loss.

### F. LPC 2148(ARM)

LPC 2148 controllers are founded on 16-bit/32-bit ARM7TDMI-S CPU with real-stretch simulation and entrenched hint provision that syndicate controller with entrenched high-promptness blaze memory reaching from 32 kb to 512 kb. 128-bit extensive memory line and sole accelerator construction support 32-bit code implementation at supreme clock rate. In case of critical code size submissions, substitute 16-bit Thumb style decreases code by extra 30 % with slight recital drawback. For System Programming -Application Indoctrination via on-chip boot setup software.

### G. ZIGBEE IEEE 802.15.4

Flare-up in wireless equipment has realized emergence of numerous standards particularly in ISM (industrial  $\rightarrow$  scientific  $\rightarrow$  medical) radio ensemble. Need for an extensively putative stock for message amongst instruments in low data amount wireless networks has been felt. As answer to this quandary many enterprises counterfeit an association to generate a ideal standard that will be used worldly for wide applications. ZigBee Association created ZigBee. It has been different from Bluetooth and wifi completely. Above two are developed for large data transfer and complex media formats.

It has been specifically developed for low power devices and secures networking. maxstream has made Zigbee and its Radio and Confirmed as IEEE 802.15.4 Standard. It supports error correct its major focus is sound and reliable wireless communication system development.

## V. RESEARCH RESULTS

### Results of WHAS:

To control household appliances voice commands given to the system through the microphone which are display on LCD and this voice signals are processed in HM2007 and converted into a binary signal and transmits it to the microcontroller. The microcontroller processes the data and the voice commands either to on or off circuit house hold applications.

Result Table 1:

Sr. No.	Command	Result
1.	01	Device 1(Light) : ON
2.	02	Device 1(Light) : OFF
3.	03	Device 2(Fan) : ON
4.	04	Device 2(Fan) : OFF

## VI. CONCLUSION

A successful IEEE 802.15.4 zigbee protocol based WHAS system has been implemented and used in better system development. The system has found to be best and can be used in large scale at college level. The current work has been implemented at electronics department and features to be product which is applicable and useful.

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