

# HOME AUTOMATION THROUGH EMAIL AND BLUETOOTH USING RASPBERRY PI.

<sup>#1</sup>Avinash Tingre , <sup>#2</sup>Shrinivas Pilaji, <sup>#3</sup>Amol Giri

Department of Computer Engineering,  
STES'S SMT. KASHIBAI NAVALE COLLEGE OF ENGINEERING  
VADGAON BK, OFF SINHGAD ROAD, PUNE 411041

<sup>1</sup> [tingre.avinash@gmail.com](mailto:tingre.avinash@gmail.com)

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## ABSTRACT

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## ARTICLE INFO

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In present days, as the innovation enhances step by step, each one appears to mechanize a large portion of the conceivable things to exploit in giving straightforwardness in life, secure and sparing power. Sound intelligence is added to a home automation in view of acoustics for advancement of physically tested individuals as an expansive point of view of the postulation. Home automation as of now by and by will be by exchanging on or off a gadget by means of wired systems. Home automation is something that deals with the control of domestic appliances.

Technology is a never-ending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. This paper presents the design and implementation of a low cost but yet flexible and secure cell phone based home automation system. The design is based on a stand-alone Raspberry Pi board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the cell phone and the Raspberry Pi board is wireless. This system is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core. Password protection is being used to only allow authorized users from accessing the appliances at home. Python is used as the main programming language which is default, provided by Raspberry Pi.

## I. INTRODUCTION

With the embedded Bluetooth technology, digital devices form a network in which the appliances and devices can communicate with each other. Today, home automation is one of the major applications of Bluetooth technology. Operating over unlicensed, globally available frequency of 2.4GHz, it can link digital devices within a range of 10m to 100m at the speed of up to 3Mbps depending on the Bluetooth device class. With this capability of Bluetooth, we propose a home automation system based on Bluetooth technology.

As we can see, there are many physically disabled people who cannot move from place to place, in order to control the appliances. It is not easy for them to switch the appliances on and off time to time. Also, there are people with short height, they face many problems in handling the appliances by sitting at one place. Hence, we decided to build a home automation system through which persons can control the appliances by using Bluetooth application on their smartphone.

The system developed during the course of this research consists of a Host Controller (HC) implemented on a Personal Computer (PC), and a microcontroller based temperature-sensor/fan-controller, that is able to communicate with the host through the Bluetooth link. The system is based on Home Automation Protocol (HAP), developed by the authors in order to facilitate the master-slave communication in a home automation network. This protocol ensures a prioritized, interlocked exchange of data. It also supports dynamic addition and removal of devices on the network. A user interface on the PC offers device registration, control as well as diagnostic utilities. Bluetooth development kit from Ericsson was used for the development. A microcontroller was used as a device controller for client modules.

Innovation is breeding heterogeneity and complexity that frustrates even technically-savvy users attempts to improve day-to-day life by implementing functionality that uses these devices in combination. For instance, it is impossible for most users to view video captured by their security camera

## II. LITERATURE SURVEY

on their smartphone when they are not at home. Heterogeneity across devices and across homes also makes it difficult to develop applications that solve these problems in a way that work across a range of homes. To simplify the management of technology and to simplify the development of applications in the home, we are developing an "operating system" for the home. HomeOS provides a centralized, holistic control of devices in the home. It provides to user's intuitive controls to manage their devices. It provided to developer's high-level abstractions to orchestrate the devices in the home. HomeOS is coupled with a Home Store through which users can easily add obtain applications that are compatible with devices in their homes and obtain any additional devices that are needed to enable desired applications. We conducted studies to both understand the difficulties that people face today in managing modern technologies in the home and understand how they would like to manage and secure them in an ideal world. Based on these findings, we have developed a research prototype of HomeOS. Our current prototype includes support for a range of devices (e.g., switches, cameras, TVs) and applications. Experimental results show that it is easy for developers to write applications and for non-technical users to manage their home networks with HomeOS

### **III. Problem Statement**

Bluetooth Controlled Home Automation is a very useful for the adults and physically disabled persons, who are not able to do various activities efficiently when they are at home and need one's assistant to perform those tasks. we are trying to implement the same on a more user friendly and bigger scale. The home automation system is intended to control all lights and electrical appliances in a home or office using Bluetooth commands.

### **IV. Goals and Objectives**

Create low cost and flexible Bluetooth controlled home automation and entertainment system.

To create a machine capable of understanding Bluetooth commands and act accordingly.

### **V. Statement of Scope**

A run of the mill remote home automation framework permits one to control house hold machines from a brought together control unit which is remote. These apparatuses more often than not need to be exceptionally intended to be good with each other and with the control unit for most economically accessible home automation frameworks. The venture shows a framework that can be coordinated as a solitary convenient unit and permits one to remotely control lights, fans, ventilation systems, TV, and so forth., and kill on or any machine that is connected to a divider outlet. The general framework is controlled from a cell phone application. This sends the voice summons in parallel succession to microcontroller. This is finished by utilizing a Bluetooth module. The microcontroller unit takes choice and play out the required choice.

**VI. Project Estimates**

- The sequential phases in Waterfall model are:
- Requirement Gathering and analysis: All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification doc.
- System Design: The requirement specifications from first phase are studied in this phase and system design is prepared. System Design helps in specifying hardware and system requirements and also helps in defining overall system architecture.
- Implementation: With inputs from system design, the system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality which is referred to as Unit Testing.
- Integration and Testing: All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.
- Deployment of system: Once the functional and non-functional testing is done, the product is deployed in the customer environment or released into the market.
- Maintenance: There are some issues which come up in the client environment. To fix those issues patches are released. Also, to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment.

Major Tasks in the Project stages are:

- Task 1: GUI, GUI Testing.
  - Task 2: Database Connectivity, Hardware implementation.
  - Task 3: Algorithm Implementation.
  - Task 4: Validation, Testing.
  - Task 5: Deployment.
- Task network

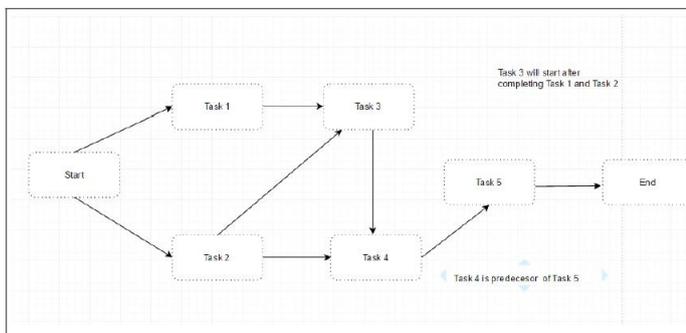
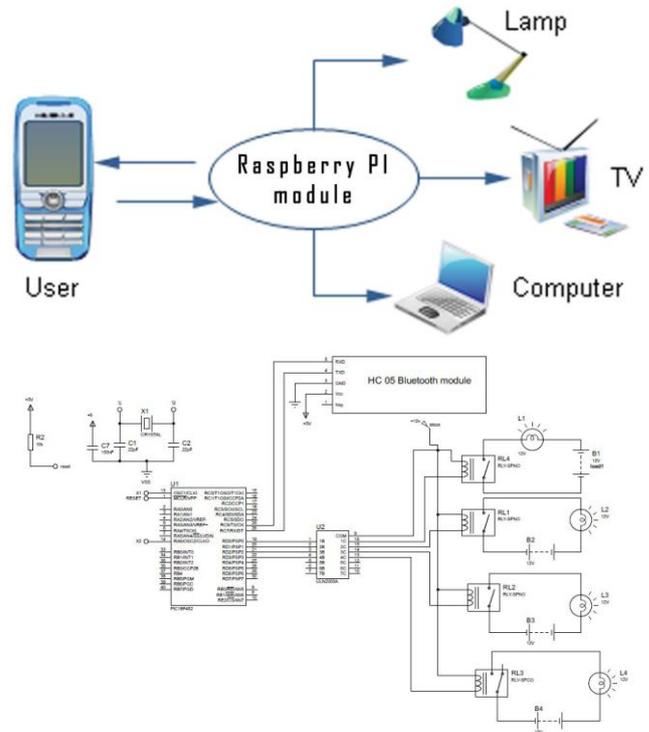


Figure 5.1: Task network

**VII. Architectural Design**

A system architecture or systems architecture is the conceptual model that defines the structure, behaviour, and

more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviours of the system. A system architecture can comprise system components, the expand systems developed, that will work together to implement the overall system. There have been efforts to formalize languages to describe system architecture, collectively these are called architecture description languages.



**VIII. Methodologies/Algorithm Details**

Algorithm 1/Pseudo Code

- Step 1: Start
- Step 2: Open Android app
- Step 3: Issue desired command
- Step 4: Analyse the command by Bluetooth device
- Step 5: If command is not correct go to (11)
- Step 6: Else go to (7)
- Step 7: Control the hardware
- Step 8: Display the output on LED display
- Step 9: Send the appliance status to the user's email
- Step 10: Go to (12)
- Step 11: Error in command
- Step 12: Stop

### IX. Conclusion

The objective of this proposal was to develop a home automation system based on Bluetooth wireless technology. The result is the HAP, which allows the user to monitor and control different appliances connected over a Bluetooth network in home environment. The system has been demonstrated to be functioning by developing a room temperature control system. The nature of this project is such that it provides a great scope for further developments. In this system, the error detection and correction facility is only handled at the Bluetooth level. Similar facility can be developed at the application level. Also, some security measures to avoid interference of neighbouring home automation systems can also be incorporated into the application.

The system is secured for access from any user or intruder. The users are expected to acquire pairing password for the HC-05 and the cell phone to access the home appliances. This adds a protection from unauthorized users. This system can be used as a test bed for any appliances that requires on-off switching applications without any internet connection. The full functionality of the home automation system was tested and the wireless communication between the cell phone and Raspberry Pi was found to be limited to <50m in a concreted building and maximum of 100m range was reported to be applicable in an open range.

### X. REFERENCES

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