

# Image Processing based Electronics Appliances Switching System

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**Abstract :** In the proposed approach we will use the image processing based concept wherein we are using the symbols of electronics appliances which are sensed by the web camera and then sensed images will be compared with the inbuilt database images present in the system. The system will generate the output which will transfer the image level signal into an electrical signal to the respective electronics device and related equipment will be switched on. By scanning the respective image the corresponding electronics device will be switched on. The system is useful in home applications wherein many types of equipment can be on at a same time or off at the same time. In the proposed conclusive remark the system will be useful in the home and in the hotels. The proposed system is kind of Home automation system where we are using image processing concept to switch the electronic appliances by using image of electronic device logos.

**Keywords:** Image processing, Raspberry pi, Image recognition, Digital Signal Processing, Home Automation System, Internet of things (IoT), Bluetooth

## I. INTRODUCTION

Electronics Appliances Switching System (Home automation system) is growing rapidly, they are used to provide comfort, convenience, quality of life and security for residents. Nowadays, most home automation systems are used to provide ease to elderly and disabled people and they reduce the human labour in the production of services and goods [1-2]. In our proposed approach we are using image processing and image recognition concept to switch the electronic appliances.

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them.

Image recognition is the process of identifying and detecting an object or a feature in a digital image or video. This concept is used in many applications like systems for factory automation, toll booth monitoring, and security surveillance.

In our approach we will be using Raspberry pi that automates electronics appliances and allows user to control them easily through the web camera. The web camera will sense the image and then sensed images will be compared with the inbuilt database images present in the system. The system will generate the output which will transfer the image level signal into an electrical signal to the respective electronics device and related equipment will be switched on. It will work by scanning the respective image the corresponding electronics device will be switched on. This paper describes the implementation and working principles of Image Processing based Electronics Appliances Switching system.

In the proposed system we will use following hardware

- II. ARM11 Raspberry pi
- III. USB Web Camera
- IV. Regulated Power Supply
- V. Electromagnetic Relays to control Electronics Devices
- VI. Relay Driver
- VII. Rectifier
- VIII. Lamps, LED, Fan

## II. METHODOLOGIES

Image Processing based Electronic appliances switching system using Raspberry pi and USB Web Camera technology is secured and low cost. The hardware architecture of Image Processing based electronic appliances switching system consists of ARM11 Raspberry pi, USB Web Camera, Regulated Power Supply, Electromagnetic Relays to control Electronics Devices, Relay Driver, Rectifier, Lamps, LED, Fan. Electronic appliances switching system work by taking image logo of electronic device as an input and comparing that image logo with the inbuilt database if that image matches than the cross ponding electronic device will be on, and it will done by Image recognition algorithm.

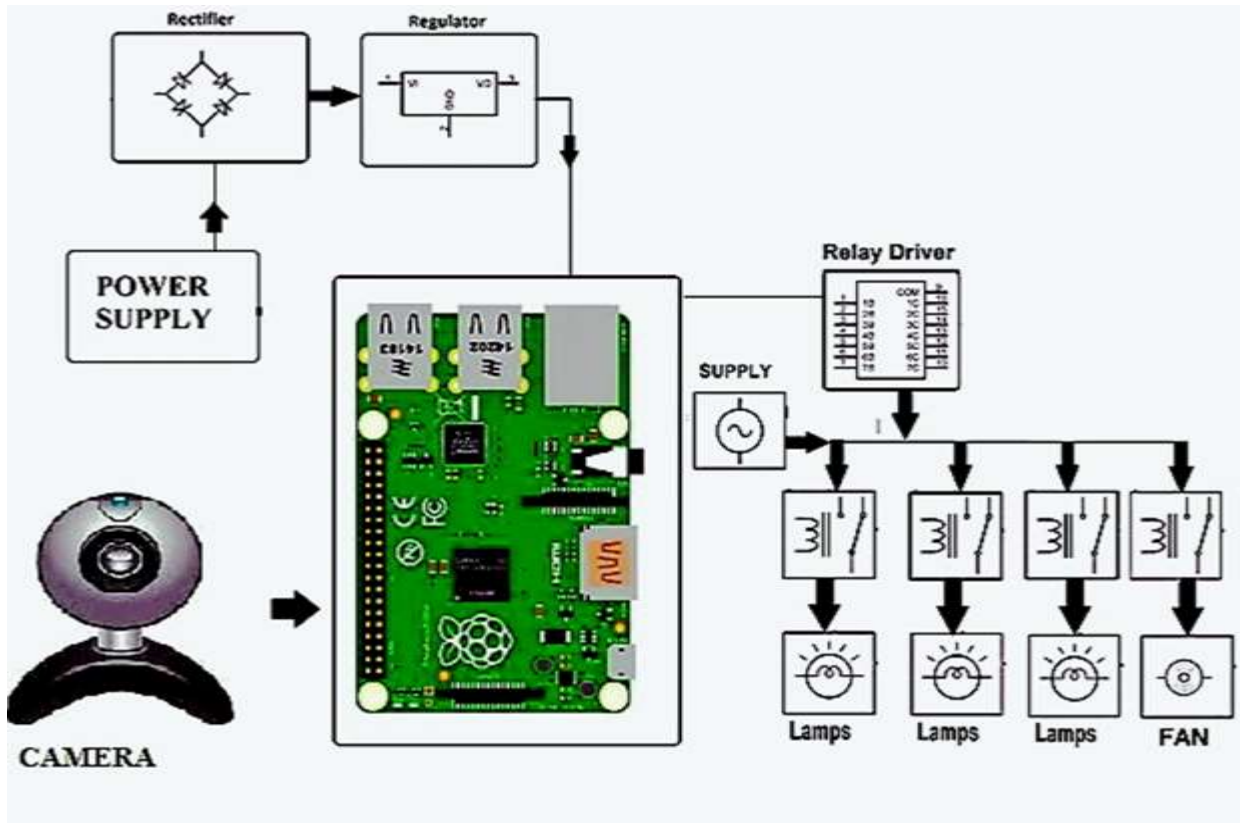


Fig 1: Block Diagram

## III. RELATED WORK

Several attempts have already been made to make Electronic appliances switching system by using Bluetooth and Internet of things (IoT) based Electronic appliances switching system. Various approaches have been used in various research papers.

### A) Internet of things (IoT) based Electronic appliances switching system:

Rajeev Piyare presented a home control and monitoring system based on the internet of things (IoT) technology [3]. It's designed and implemented by using embedded micro web server, controlling devices, smartphone and a software application. The architecture of system consists of three parts: home environment, home gateway and remote environment. Fig.2 illustrates the architecture of this system.

Remote environment allows the authorized users to remotely control and monitor the home appliances using a smartphone, which supports Wi-Fi, 3G or 4G and android application. Home environment contains the hardware interface module and home gateway. The function of home gateway is to provide the data translation service between internet, router and Arduino Ethernet server. [5]

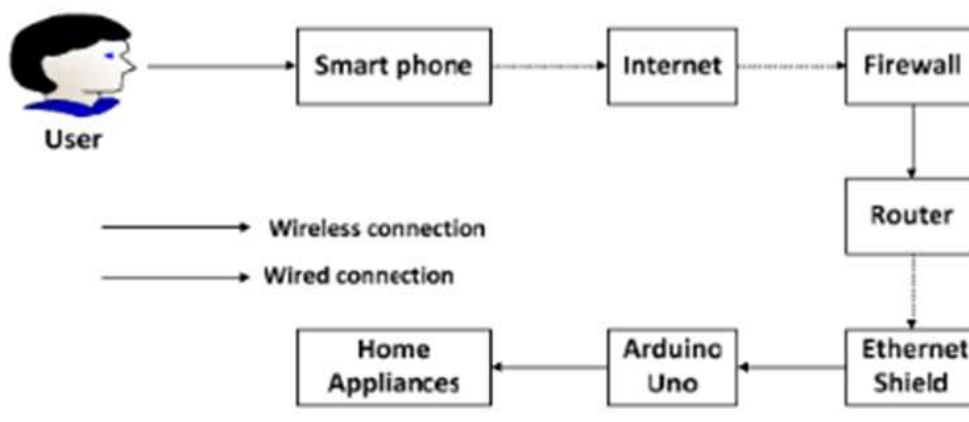


Fig 2. Internet of things (IoT) based Electronic appliances switching system

B) Electronic appliances switching system by using Bluetooth:

Electronic appliances switching system by using smartphone, Arduino board and Bluetooth technology are secured and low cost. A Bluetooth based Electronic appliances switching system by R.Piyare and M.Tazil [4]. The hardware architecture of this system consists of the Arduino BT board and a cell phone, the communication between Arduino BT board and cell phone is wirelessly using Bluetooth technology. The Arduino BT board has a range of 10 to 100 meters, 3 Mbps data rate and 2.4 GHz bandwidth. In this system home appliances are connected to the Arduino BT board via relay. The cell phone uses a software application which allows the user to control the home appliances. Moreover, this system used password protection to make system secure and allow only authorized user. It has the advantage to easily fit into an existing homes and automated system. The main drawback of system is that it is limited to control the home appliances within the Bluetooth range. Fig. 3 illustrates the block diagram of Bluetooth based Electronic appliances switching system.

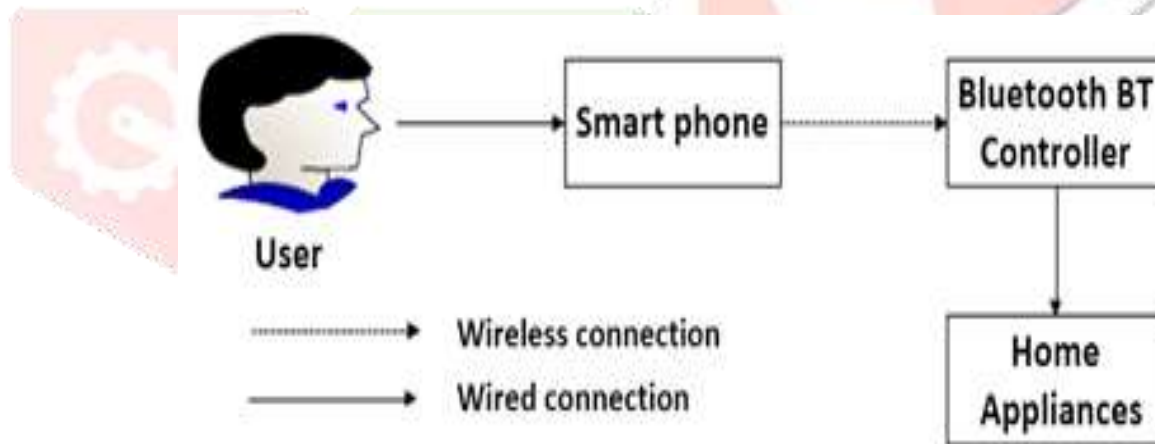


Fig 3. block diagram of Bluetooth based Electronic appliances switching system

Table 1. Comparison of Different Electronic Appliances Switching System

System	Cost	Speed	Real time
Bluetooth	Low	Good	Yes
Internet of things (IoT)	High	Good	yes
Image Processing based Electronic appliances switching system	Moderate	High	yes

#### IV. WORKING PRINCIPLE

1. Proposed System having the facility to attached 10 equipment's at the same time which contains the web camera.
2. When a person is interested to switch on any electronic device he will scan the image of that device through web camera and then that image will compared with inbuilt database.
3. As the database is matched with the outside image pressed then the system will transfer the signal to the device and device will be in on position.
4. To switch off the device from on position to off position again it will scan the image and then signal will pass to the device and it will be off.

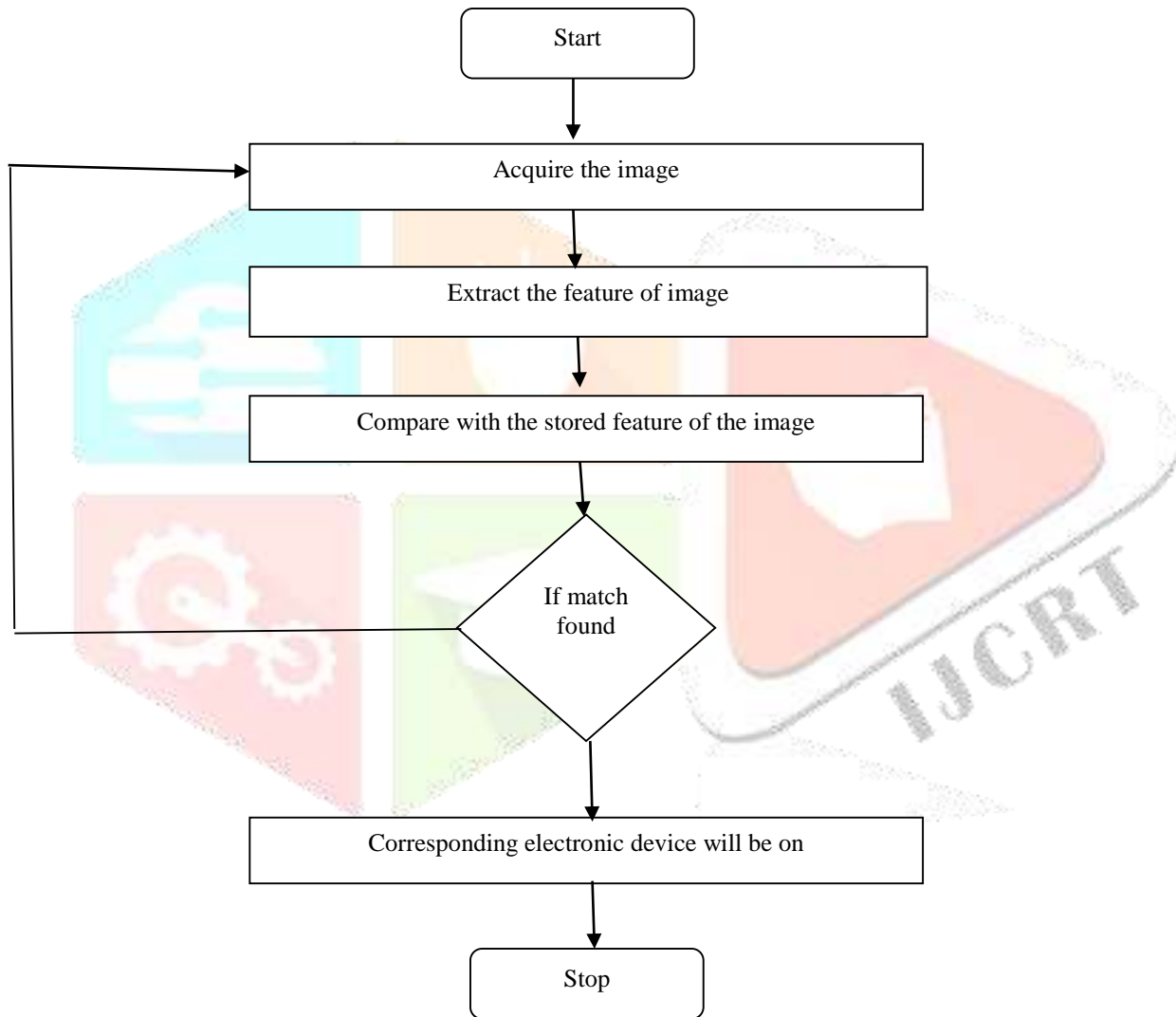


Fig 4: Flow Chart of working of Image Processing based Electronic appliances switching system

## V. CONCLUSION

In this paper different home automation systems surveyed and their pros and cons are discussed. Image Processing based Electronics Appliances Switching System is a flexible, high speed and low cost system. Bluetooth based Electronic appliances switching system is a flexible and low cost, such system can only work in the short range of Bluetooth wireless network. Internet of things based Electronic appliances switching system can only work in the presence of internet. The rapid growth of IoT devices brings concerns and benefits.

The future of home automation system requires to make homes smarter and more convenient. In addition, future work would be implementation of above discussed home automation systems on a large scale, such as factories, industries and offices.

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