Abstract

Now a day, home automation is becoming more Popular and more advantageous. In this project we have implemented home automation and control using raspberry pi3 by IoT. The raspberry pi is a single board computer and which is Prominent. It has been pooled with three different concepts which is merely for home appliances control and security purpose. Internet of things is a idea that aims to expand the qualities of regular internet connectivity, remote control, sharing of data which does not push for any physical interaction. The main hardware for this system contain: raspberry pi3,DC motor, smoke sensor, wireless transceiver,relay modules. It is programmed by using python that is inherited with raspberry.

Keywords: Home automation, raspberry pi3, fire sensor, security, python

I. INTRODUCTION

The internet of things (IoT) is the network of physical objects–devices, vehicles, buildings and other items embedded with electronics, software, sensors and network connectivity that enable these objects to collect and exchange data. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of, cyber physical system which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities.

British entrepreneur Kevin Ashton first coined the term in1999 while working at Auto-ID Labs (originally called Auto ID centers, referring to a global network of objects connected to radio frequency detection, or RFID). Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine (M2M) communications and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is expected to usher in automation in nearly all fields, while also enabling advanced applications like a smart grid, and expanding to the areas such as smart cities.

"Things," in the IoT sense, can refer to wide variety of devices such as health monitoring implants biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring or field operation devices that assist fire fighters in search and rescue operations. Legal scholars suggest looking at "Things" as an "inextricable mixture of hardware, software, data and service". These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. Current market examples include smart thermostat systems and washer/dryers that use Wi-Fi for remote monitoring. As well as the expansion of Internet-connected automation into a plethora of new application areas, IoT is also expected to generate large amounts of data from diverse locations, and the consequent necessity for quick aggregation of the data, and an increase in the need to index, store, and process such data more effectively. IOT is one of the platforms of today’s Smart City, and Smart Energy Management Systems.

II. SYSTEM ANALYSIS

A. Existing System

The existing system for this project is follows

- The system including hardware, Software, mobile communications and cloud computing makes the integration of complex architectural structures.
Those systems are used technologies like GSM, GPS to provide security and also to control the problems over there.

- In controlling the door system it has been implemented by using features like digital password system, finger print system and also recognition of authorized person.
- In home automation, process has been takes place by remote access functions and through World Wide Web.
- Home monitoring system has been evolved through usage of surveillance camera.
- Usually fire sensing system has been implemented in large scale industries rather than using in home, it has been controlled by ignition technique to manage convection.

**B. Proposed system**

The main objective of this project is to simplify everything within home and life. A home automation system can be controlled with home computers, iPads, iPhones, and smart phones. In this project it has been implemented by combining three concepts which will be efficient for using home as a smart IoT makes much more reliable to use, which uses application to access from certain place. It overcomes the existing system instead of using remote, finger print etc…so it eliminates the disadvantages of those systems.

**III. SYSTEM OVERVIEW**

The vision of this system is to provide an efficient internet based system to control day to day home appliances and also for their security purpose. The system offers users an easy & effective means of controlling anywhere from remote location without being physically present at home. Hence it uses internet to access various home appliances, which is difference between a Smart Home and an automated home.

Various types of home automation systems have emerged to offer network control. The development of mobile phone based home automation systems that integrate mobile technology into home automation. By using smart devices which sense physical occurrences then translate them into a stream of information, security, convenience and energy savings. With the advancement of wireless technologies such as Wi-Fi, cloud networks in the recent days, wireless systems are used every day and everywhere. Hence it uses mobile app for controlling the various home appliances. Smart technologies by introducing smart door, which can be accessed only by authorized person by using mobile application, which would improve the security of smart home. In addition to this, gas from cylinder can be detected by using smoke sensor, and then automatically the buzzer will indicate the user. The scope of the work is to develop a monitoring system by using Raspberry Pi which acts as an interface between user and the devices.

**A. Raspberry Pi:**

The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity and peripheral-device support. The Broad cam BCM2835 SoC used in the first generation Raspberry Pi is somewhat equivalent to the chip used in first generation Smartphone. There are a wide variety of Technology platforms or protocols on which a smart home can be built. Home automation or smart home is the residential extension of building automation and involves the control and automation of lighting, heating, ventilation, air conditioning (HVAC), and security, as well as home appliances such as washer/dryers, ovens or refrigerators that use Wi-Fi for remote monitoring.
B. Web Protocol:

They are different types of IOT (internet of things) protocols. In this web protocols we choose MQTT (Message Queue Telemetry Transport) protocol. For implementing MQTT protocol we use mosquito broker or Node.js. So in this project we used Node.js. Targets device data collection as its name states, its main purpose is telemetry, or remote monitoring. Its goal is to collect data from many devices and transport that data to the IT infrastructure. It targets large networks of small devices that need to be monitored or controlled from the cloud. MQTT makes little attempt to enable device-to-device transfer, nor to “fan out” the data to many recipients. Since it has a clear, compelling single application, MQTT is simple, offering few control options. It also doesn’t need to be particularly fast. In this context, “real time” is typically measured in seconds. A hub-and-spoke architecture is natural for MQTT. All the devices connect to a data concentrator server, like IBM’s new Message Sight appliance. You don’t want to lose data, so the protocol works on top of TCP, which provides a simple, reliable stream. Since the IT infrastructure uses the data, the entire system is designed to easily transport data into enterprise technologies like Active MQ and enterprise service buses (ESBs). MQTT enables applications like monitoring a huge oil pipeline for leaks or vandalism. Those thousands of sensors must be concentrated into a single location for analysis. When the system finds a problem, it can take action to correct that problem. Other applications for MQTT include power usage monitoring, lighting control, and even intelligent gardening. They share a need for collecting data from many sources and making it available to the IT infrastructure.

C. Configuration of Raspberry PI to Devices

Fig. 1: System Overall Block Diagram

1) Smart Door

Today, contribution towards IoT devices and security issues at the international level is increasing rapidly. It locks and unlocks the door just by tapping a single click on application. The door can always be unlocked manually if a connected smart phone isn’t available and the ideal purpose of the work is, if the door is not locked in First floor or in any other floor, the use from ground floor they can open the door or unlock the door from mobile phone which makes a person to reduce its energy or save time. The major components of this smart door are raspberry pi, DC motor, dc driver board and Wi-Fi (IEEE 802.11b/g/n) standard protocol for wireless communication which combines and forms an activity. The working of smart door system can be explained by below block diagram (figure 1.1).
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2) Smoke Detection
Smoke detector is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control panel as part of a fire system, while household smoke detectors, also known as smoke alarms. Detect Gas Leakage such petroleum based gaseous substance that can be detected using MQ 7 Sensor. Produce a sound alarm upon gas leak and stop the alarm once gas leak is under control. Driver IC (mcp3008) is used which converts analog to digital connected to raspberry pi device.

3) Control of Home Appliances
The purpose of hardware interface unit is all the electronic home appliances are connected to the raspberry pi board which is connected to the Wi-Fi by using Wi-Fi module. All the electronic appliances are operated and controlled through our smartphone or computer or tablet. Raspberry PI 3 is interfaced with either PC or Mobile Phone by Using Web Protocol. Raspberry PI is connected to Electronic Switching System. By Using Electronic switching System we control various electrical devices like Fan, Tube light etc.,

IV. CONCLUSION

Home automation is not a new industry anymore, but it is still an emerging industry in developing countries. The huge potential market leads many electronics corporation into home automation. When compared with smart phone’s history, we can find that home automation has very big chance in the future. Even five years ago, there were not so many people who owned a smart phone. It didn't have unified industry standards also. But nowadays almost everyone has a smart phone or have used a smart phone, and Android system IOS system is becoming the standard. This project shows the many types of applications for implementing home automation and the applications are not limited to those discussed in this paper. The technology used could be implemented in a wide variety of applications that require the use of sensors and appliances. This project successfully designed a system that communicates with a mobile device such as a Smartphone or laptop via Raspberry Pi to control a door sensors and a light switches and a camera to stream live video, but has many possible applications that could benefit from this work.

V. FUTURE WORK

If the price of home automation is decreased or the practical applicability increased, there will be more people willing to buy it. So it means the production ability and technology level should improve more and more. Then it will become as popular as smart phone in the future.

VI. APPLICATIONS

- Pi in the sky: This board is a GPS receiver, radio transmitter designed for tracking high altitude balloon flights.
- Live bots: Live bots is scheme that allows users to control many robots based on Raspberry Pi over the internet.
- Lap pi: The scheme features a laptop assembled from scratch which is based on the Raspberry pi board.
REFERENCES


