

Internet of Things based Controlling of Appliances using GSM/GPRS Enabled Embedded Server for Remote Access

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Abstract— The internet has initially started as the “Internet Of Computers”, a global network enabling services that now include the World Wide Web(WWW), File Transfer Protocol and others allowing computers and hence users to communicate with each other and exchange information. There are several definitions for the Internet of Things (IOT) that explain what are the main functionalities of it and what we should expect from when connecting “Things” with each other and with the internet. Internet of Things (IoT) is an ideal emerging technology to influence the internet and communication technologies. Simply “Internet of Things” connects living and non living things through internet. The main aim of this project to enable the users to control and monitor smart devices through internet. In this an interface between users and smart home by using GSM and internet technologies, or simply creating GSM based wireless communication from the web server into the smart home.

Key words: GSM/GPRS Enabled Embedded Server, Internet of Things based Controlling

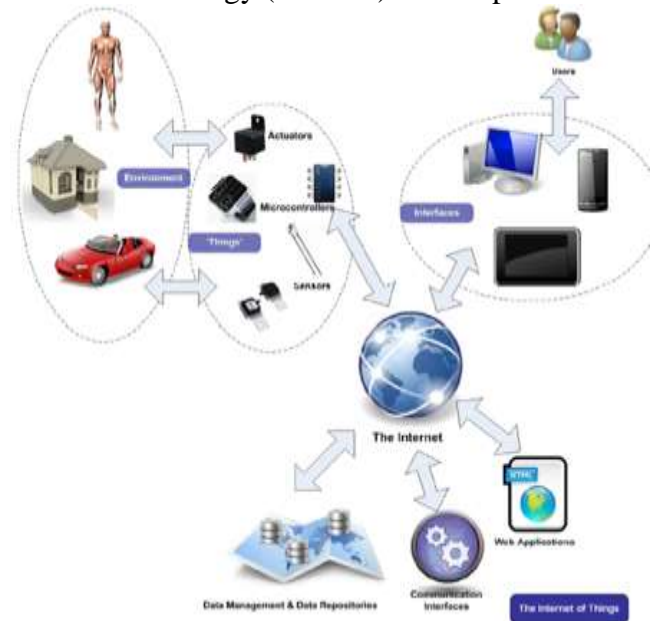


Fig. 1: An Illustration of the Internet of Things. “Things” consisting of various sensors and actuators interact with environment and the internet allowing users to manage them and their data over various interfaces.

I. INTRODUCTION

Every day the modern people expect new device and new technology to simplify their day to day life. In the 2000s Internet connectivity became the norm for many applications and today is expected as part of many enterprise, industrial and consumer products to provide access to information. However, these devices are still primarily things on the Internet that require more human interaction and monitoring through apps and interfaces. The Internet of Things is a new era of intelligence computing and it’s providing a privilege to communicate around the world. The objective of IoT is Anything, Anyone, Anytime, Anyplace, Any service and Any network.

Now let us briefly discuss the main concept and essential components that are mostly used in order to describe the world of internet of things.

When we are referring to “Things”, we talk about devices and everyday objects, from small ones (like wrist watches and medical sensors) to really big ones (like robots, cars and buildings).All such contain devices that interact with users by generating and retrieving information about and from their environment (see fig1).They also contain hardware that allows them to control outputs(like relay switches etc). No Matter what definition of Internet Of Things you may find, the main concept behind every IoT technology and implementation is the same: devices are integrated with the virtual world of internet and interact with it by tracking, sensing, and monitoring objects and their environment.

A. Objective of IOT in this project:

This paper propose a novel architecture of IoT enabled smart home which is control and monitor smart devices through GSM and Internet Technologies. Normally the smart homes will be conscious about what happens inside a building, mainly impacting three aspects:

- Resource usage
- Security and
- Comfort

The architecture designs are imposed on these three functionalities. The user can check or control the status of any resources or enable/disable security options of the smart home.

In this project IOT is the brain of the whole architecture and controls the embedded module and web server. At very short period of time the IoT agent reads the user data from the web server, create a SMS command and it will be sent to remote embedded system module through GSM-SMS. This command will be received by GSM receiving module which is connected with embedded system placed in a remote home. The home appliances and other devices are directly connected and controlled by this embedded system module. The GSM module is inbuilt with IoT agent and embedded system module. After executing the commands the acknowledgement will be sent to user.

B. Overview of Internet of Things (IOT):

What makes IOT devices different than ordinary sensor devices is basically the ability to communicate directly or

indirectly to the internet. So what are the main reasons a device would that be and what kind of features would it have? Firstly, sensors generate a lot of data that needs somehow to be managed. Usually embedded memory is quite limited so people utilize alternative solutions like storing data on memory cards, or in computers in cases sensors are connected directly with them. Since sensors can be integrated to devices with further networking capabilities, why not to store the information online? By this we can solve the problem of limited storage and at the same time we can access the data anywhere, anytime using appropriate web applications. Fig 2 illustrates the main features of 'Things' and their interconnection with internet services.

In this digital world, the people also want to communicate with all non-living things through internet such as home appliances. The people already have a lot of technologies to interact with living things but IoT enables to communicate with non-living things with comfort manner.

According to the IoT architecture the components are further classified into three functional units (Fig.3).

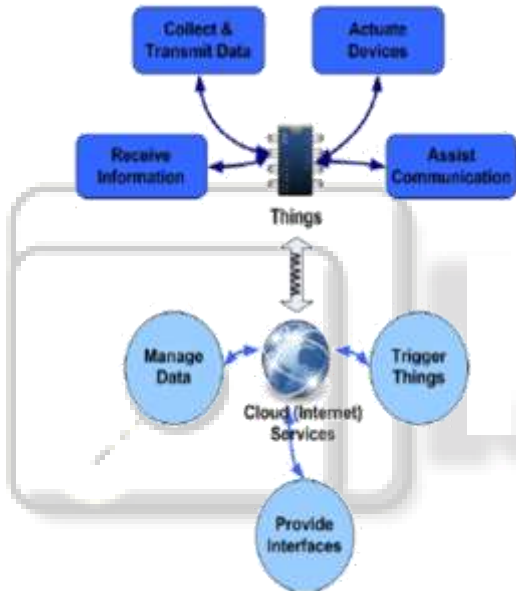


Fig. 2: An illustration of internet of things

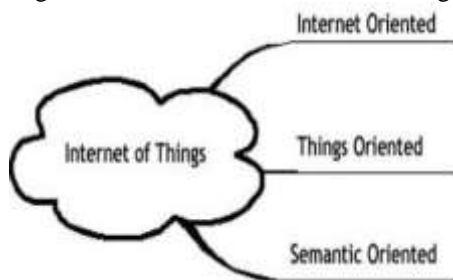


Fig 3: functional classification of IoT

In this

- 1) Internet Oriented: Internet oriented represents internet and its technologies and it acts as middleware between user and intelligent things.
- 2) Things Oriented: "Things Oriented" is known as "Intelligent Things" which represents sensors and actuators which is respond it to stimuli from the environment in a consistent manner.
- 3) Semantic Oriented: "Semantic Oriented" is known as "Intelligent Process" which represents knowledge based and decision making processes.

C. Applications of Internet of Things (IOT):

There are many applications of IoT as it can play a vital role in many areas. All the applications are comprised in many smarter 'Things' such as sensors, actuators, microcontrollers etc. There are three major categories of IoT applications:

- Society,
- Environment
- Industry.

In Industry, all IoT Activities are involving in financial or in commercial transactions among companies, organizations and other entities such that Manufacturing, logistics, Service Sector, Banking, Financial Governmental Authorities etc

In Environment applications based on the activities regarding the protection, monitoring and development of all natural resources such as Agriculture & breeding, recycling, environmental management services, energy management, etc.

Lastly, in the whole society the "Thing" may be related to devices within public spaces or devices for Ambient Assisted Living, etc. For example Agriculture & breeding, recycling, environmental management services, energy management, smart home, smart city, smart office etc.

D. Prototype and working:

The prototype model of this project is shown in fig 4.

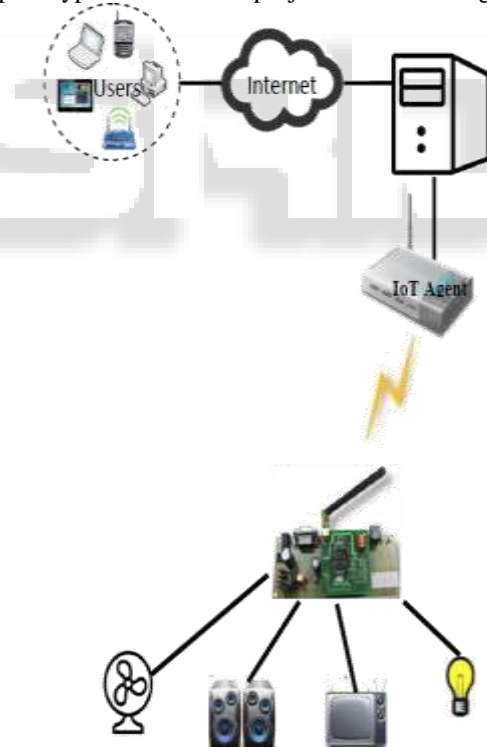


Fig. 4: IoT based smart home

1) Web Users

The web users are common people, this architecture provides them to know the status of the home devices and control (ON or OFF) the devices. The user can send the commands through any web enabled devices like PC, Tablet, iPOD, smart phones or any WAP enabled devices.

2) Web server

Web server might be a Tomcat, Apache, IIS etc. and it must have internal database. The user data kept in the centralized

database and it will read by IoT agent through COM or DCOM, API or any other ODBC.

3) *IoT Agent*

The IoT is the software and hardware unit which continuously monitors Web server and GSM module for incoming SMS from smart home. The special SMS has unique structure which is constructed by microcontroller of embedded unit. Once the NEW_MESSAGE_RECEIVED event generated by GSM module the IoT Agent reads newly arrived SMS and check it whether special SMS or not. If it so, it parse and extract the data.

II. CONCLUSION

This paper presents IoT based smart home controlling using GSM and web interface. Prototype operates for data gathering and transmission using GSM-SMS. Prototype is capable of monitoring and controlling the devices in the deployed environment. This has faster rate, no data loss, low cost, flexibility, etc.

In future this architecture will be extend to implement with video streaming of home activities using GSM-MMS and RTMP protocol and improve the security of data transmission process.

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