iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 2 **Issue:** IV **Month of publication:** April 2014

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

ISSN: 2321-9653

INTERNATIONAL JOURNAL FOR RESEARCH IN APPLIED SCIENCE AND ENGINEERING TECHNOLOGY (IJRASET)

Implementation of Smart Gateway For Automation of Home Devices and Appliances

Vinay V. Kale[1], Akshay S. Godge[2], Pradeep A. Pandey[3], Rohan B. Kawade [4], Prof. Arindam Dasgupta[5]

[1,2,3,4,5]Department of Information Technology, Amrutvahini College of Engineering, Sangamner, Maharashtra, India.

Abstract: In the "Internet of Things" concept, the physical world can be integrated with computer networks and applications. The Embedded computers as well as visual markers on everyday or objects allow the information about them to be accessible in the digital world. This integration is, however, based upon competing standards and requires custom solutions, and therefore requires extensive time and technical expertise. Based on the success of Web mashup applications, we have proposed a similar approach for integrating the real-world devices to the Web, so they can be allowed to be easily combined with other virtual and physical resources. The Proposed System presents a low cost and flexible home control and monitoring system using an embedded Web server, with IP connectivity for accessing and controlling devices and appliances remotely using a Web based application. The proposed system does not require a dedicated server PC with respect to similar systems and offers a novel communication protocol to monitor and control the home environment with more than just the switching functionality.

Keywords: IoT, Gateway, device automation.

IJRASET: ISSN: 2321-9653

I. INTRODUCTION

Consider a Scenario where you or your colleague needs an urgent data on your device which is stored somewhere on cloud or on yours another device. And all you have is just a Bluetooth in current device and no direct connection to the Internet. How you are going to get access of needed information or send data to such device?.One can do it by sending needed data to any connected device like laptop or desktop device having Internet connection and then manually forward it to the desired device. But What if there is no one to do all these work? Is there any method to do it automatically? The answer to this question is a simple. By implementing IoT- Internet Of Things.
In the Internet of Things" vision, the physical world becomes integrable with computer networks. Embedded computers or visual markers on everyday objects allow things and information about them to be accessible in the digital world. However, this integration is based on competing standards and requires custom solutions, thus requires extensive time and technical expertise [1].

The Internet of Things (IoTs) can be described as connecting everyday objects like smart-phones, Internet TVs, sensors and actuators to the Internet where the devices are intelligently linked together enabling new forms of communication between things and people, and between things themselves. Now anyone, from anytime and anywhere can have connectivity for anything and it is expected that these connections will extend and create an entirely advanced dynamic network of IoTs. IoTs technology can also be applied to create a new concept and wide development space for smart homes to provide intelligence, comfort and to improve the quality of life[2]. The Basic Concepts include:

A. Smart Gateway:

ISSN: 2321-9653

Gateways are generally the devices, used for connecting two different networks. The characteristic feature of the gateway is it can work on all the seven layers of OSI model. Thus a gateway can be implemented as a mediator between two networks working on different protocols. A protocol translation/mapping gateway interconnects networks with different network protocol technologies by performing the required protocol conversions. A smart gateway is intended to not only do a protocol conversion required in this project but also the Web Mashup in order to increase its accessibility for the end user.

B. Web Mashup

A Mashup, in web development, is a web page, or web application, that uses content from more than one source to create a single new service displayed in a single graphical interface. The main characteristics of a mashup are assimilation, visualization, and aggregation. It is necessary to make the existing data more useful, for personal and professional use. Here the word Mashup is used to mainly focus on the integration of software(Web site for controlling and signaling) and hardware(Bluetooth in the devices) communication to be take place through the gateway in intended system.

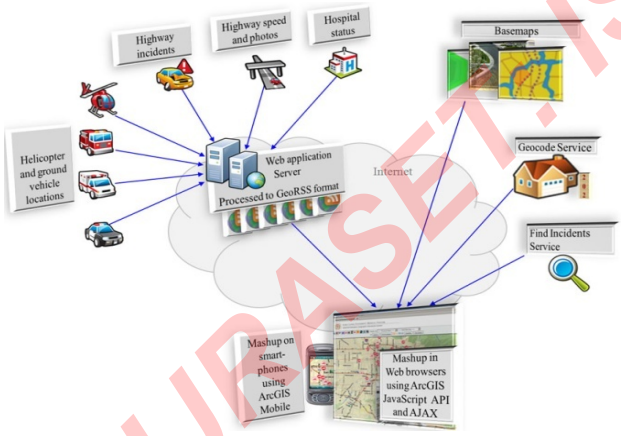


Fig. 1 Concept of Mashup

Above diagram gives us the idea what Mashup exactly is and what importance it has got in the proposed concept.

II. METHODOLOGY

Home automation or smart homes (also known as domotic) can be described as introduction of technology within the home environment to provide convenience, comfort, security and energy efficiency to its occupants. In order to address the mentioned issues of flexibility and functionality in the Existing Systems, we plan and design a novel, standalone, flexible and low cost home controlling and monitoring system using Web services. The system consists of a Web-site, hardware interface modules and bluetooth enabled devices. It consists of a gateway which will be communicating with the devices using a Bluetooth communication protocol and transfer this information to the server and ultimately to the end user whenever It is requested. Moreover the system will also enable the user to control the electricity flow and energy consumption of the devices, Which will in turn help user to operate devices remotely and Provide user options like total energy consumption, available resources and management of those resources. In this paper we describe the way to implement low cost home controlling and device monitoring system remotely. The Architectural diagram can be seen as follows:

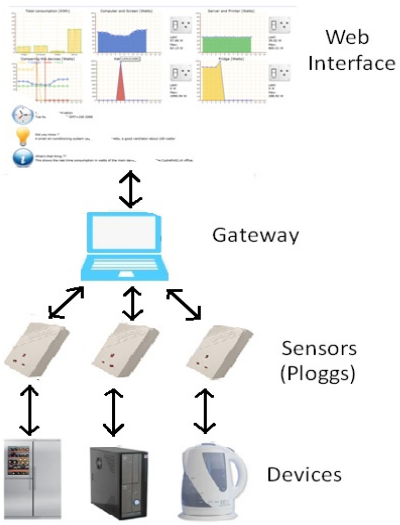


Fig. 2 System Architecture

IJRASET: ISSN: 2321-9653

The architecture of the conceptual system consists of:

Website

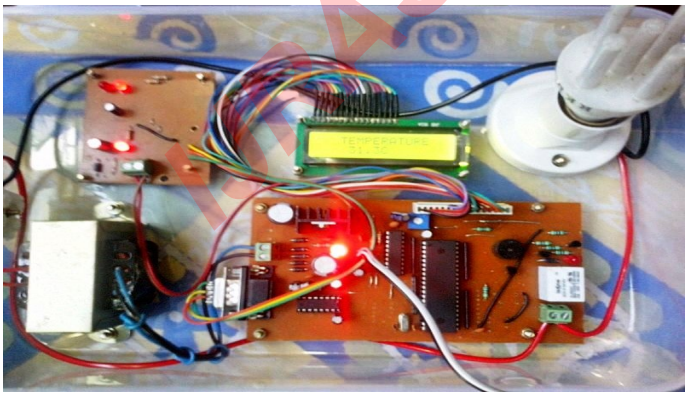
The Website is the Graphical interface which will be handled by the User. It ll provide the authentication and authorization. TheWebsite will display and command switching ON/OFF of the electronic devices and also show the status of Energy Consumption. It will also handle the File Transfer Management and display the active Bluetooth enabled devices in the nearby area of the Gateway.

Smart Gateway

The Smart Gateway will act as an Interface between Website or the User and the Bluetooth enabled electronic devices. The main task of the Smart Gateways is mainly to discover the Bluetooth enabled devices, transfer the status to Website. The Smart Gateway will mainly be used to switch ON/OFF the devices. The Gateway, thus will covert the protocols of Website to Bluetooth enabled devices and vice-versa.

Sensors or Ploggs

The Sensors or ploggs is an electronic circuit which will be embedded with the home devices and appliances. It consists of Bluetooth sensor, to accept the readings or commands from the gateway as well as for deploying the device status and information back to the gateway.



It also includes a microcontroller, which is programmed for controlling the relay. Relay is a circuit which controls energy supply to the devices and appliances.

III. IMPLEMENTATION

The user will access the website and command the gateway to display the active Bluetooth devices in the particular area. User will the list of active devices on the GUI the user will then select the device which is to be handled (Switched ON/OFF). The gateway will also forward the status of devices and energy consumption by the devices to the website which will be displayed to the user. If the user has to transfer the file to a remote device or over a long distance then he will select the appropriate file that is to be sent. Then he will search for the device to which the file is to be sent. If the device is active then it will send that file to the device. The file is then transferred from the website to the gateway via internet then at the gateway protocol conversion will take place. As the file will be transferred using HTTP protocol and the Bluetooth cannot understand HTTP, so conversion is necessary for successfully transferring the file. HTTP protocol will be converted Bluetooth supported protocol such as L2CAP, RFCOMM, and OBEX etc. The user will get an popup message for paring the two devices and acknowledgement.

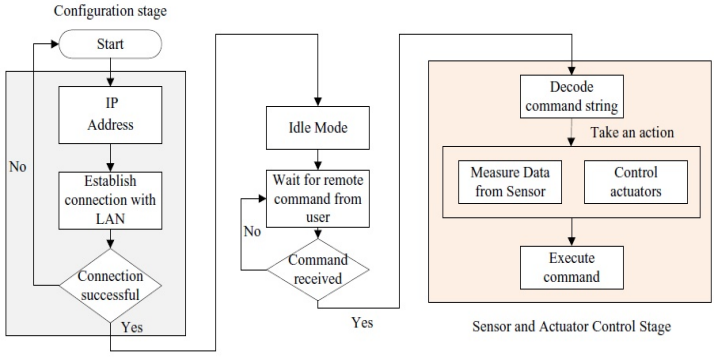


Fig. 1 Workflow of the Gateway

IJRASET: ISSN: 2321-9653

Once the devices are paired then file transfer will start. On completion the user will get an indication or message.

Firstly the user will access the website there he will register himself if he is a new user. Else he will directly login in into his account. There he will get the overall view of the system. From there he can manage all the electronic devices connected to the Bluetooth enabled ploggs. The options that user will be able to see on the website are as follow:

Device Discovery

Gateway will be device, which will be embedded with the Bluetooth. It will use the bluetooth technology for communication between the Devices. For this devices are needed to be paired and stored on the gateway. This list of connected device will be forwarded to the end user. Devices within the range of Bluetooth will be automatically get connected and paired with the gateway for easy communication. Gateway will continuously refresh the list for active Bluetooth devices.Once the pairing process is completed and device gets connected to the gateway, then desired file or message can be sent to the device from remote place.

Device Control

The Devices will be managed by the gateway. Gateway will, infact, manage an electronic circuit, and will send device management commands to the circuit. The Device will be embedded with circuit that consists of a Bluetooth signal reader and a controller. The signal reader will read the commands from the gateway and interpret it to the microcontroller.The controller then work accordingly and will manage the relay with which the electronic devices is embedded, thus controlling the energy supply to the device. So user can directly select a desired device and dispose a command using GUI at the Website, which will be sent to the gateway and the device will be managed accordingly. User will be also able to get the access to multiple devices collectively.

File Management

Gateway will store the list of connected device and also previously connected devices. Among these devices user will be able to send the controlling signals which the device can understand and perform necessary action.

IV. BENEFITS AND CHALLENGES

The IoT-Internet of Things is a revolutionary domain and research area for the purpose of device automation as well as connecting the objects or devices to each other. It provides the basis for concepts of home device controlling as well as monitoring with greater flexibility and efficiency. The benefits as well as challenges of the proposed system are discussed below:

BENEFITS

Avoiding wastage of Energy

It is the main motive behind this project. As the system provides the control over the connected devices so user can operate them when they are not required automatically. The user can manage the devices with the help of GUI provided to him, which is embedded with the gateway and in turn, with the device.

Reduces Human Intervention

As the system provides the user with flexibility to operate the devices or transfer the files from remote areas it saves much of human efforts. Lot of human efforts are also saved using this system as it can be operated using internet any physically challenged or sick person can also operate devices like fans, lights etc.

Increase in Efficiency

Efficiency of the devices can be improved as well by connecting them to the gateway and making them smart. As the energy consumption of the device will be displayed, the user can manage the usage of the device, thus, increasing the efficiency of home devices. As internet can be accessed via any mobile device no need to carry laptop or desktop everywhere so you can access/control devices even when you are travelling.

Easy Access

IJRASET: ISSN: 2321-9653

System provides a User-friendly GUI which will facilitate the user with the list of the connected devices, their energy consumption and the access or control to manage those devices.

CHALLENGES

Connection Availability

In order to manage the devices from the Webssite, Internet access is necessary. Devices will be communicating with the gateway which needs to be connected to internet all the time so as to provide uninterrupted service and send updated information.

CONCLUSION

In closing, this paper has presented a cost effective and flexible home control and device monitoring system consisting of Website making use of Smart Gateway, for accessing and controlling the devices remotely, based upon the concept of IoT- Internet of Things.

AKNOWLEDGEMENT

The authors acknowledge with valuable contributions from different reviews, different searches and useful discussions.

REFERENCES

[1] Dominique Guinard, Vlad Trifa, Institute for Pervasive Computing, Towards the Web of Things: Web Mashups for Embedded Devices, vol 3.

[2] Rajeev Piyare and Seong Ro Lee, SERSC, Smart Home-Control and Monitoring System Using Smart Phone, Vol-24,2013.

[3] Dr. Louis Coetzee, Laurie Butgereit, Andrew Smith, CSIR Meraka Institue, Handle System Integration as an Enabler in an Internet of Things Smart Environment, 2012.

[4] Ming Yan and Hao Shi, International Journal of Wireless Mobile Networks (IJWMN), SMART LIVING USING BLUETOOTH-BASED ANDROID SMARTPHONE, vol. 5, no.5, (2013).

[5] I. Demirkol, C. Ersoy, F. Alagoz, IEEE Communication Magazine 44, MAC protocols for wireless sensor networks: A survey, vol-20,(2006).

[6] H.S. Ning, Z.O. Wang, IEEE Communication Letters,Future Internet of Things Architecture: Like Mankind Neural System or Social Organization Framework?,vol-15 2011.

[7] R.K. Rana, C.T. Chou, S.S. Kanhere, N. Bulusu, W. Hu, ACM Request Permissions,Earphone: an end-to-end participatory urban noise mapping system, in, 2010.

[8] DU Chunquan, ZHU Shunbing, Research on urban public safety emergency management early warning system based on technologies for the internet of things. International Symposium on Safety Science and Technology, ELSEVIER, 2012.

[9] O.Akribopoulos, D.Amaxilatis, V.Georgitzikis, M.Logaras, V.Keramidas, Making P-Space Smart: Integrating IoT technologies in a Multi-office environment, Computer Technology Institute & Press.

[10] I. Demirkol, C. Ersoy, F. Alagoz, IEEE Communication Magazine 44, MAC protocols for wireless sensor networks: A survey, vol-20,(2006).

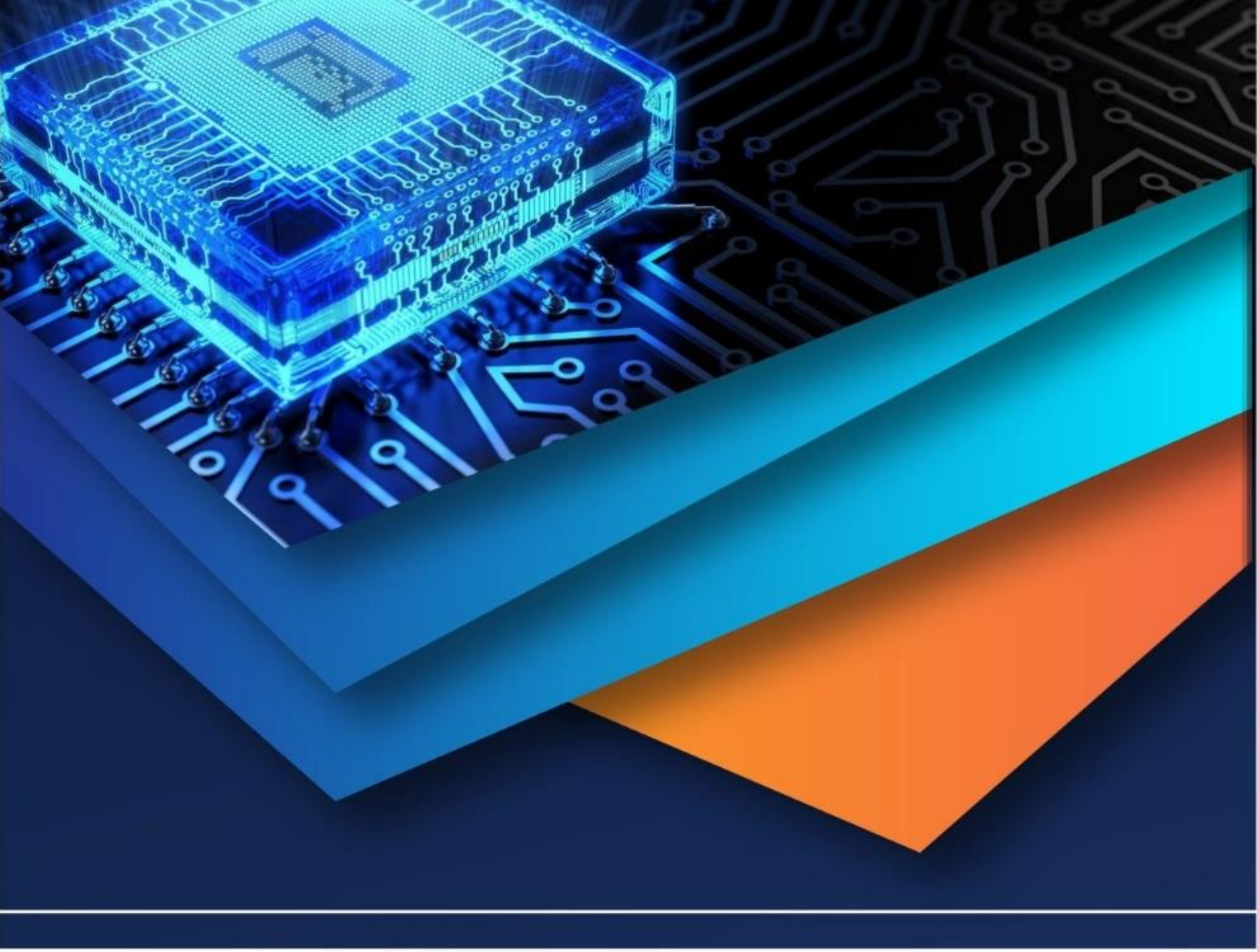
[11] pankaj Bhatt,Technology Review #2000-3, Bluetooth Technology, 2000.

[12] Piyare, R., Tazil, M, In Consumer Electronics (ISCE), Bluetooth based home automation system using cell phone., 2011.

[13] C. Vecchiola, R.N. Calheiros, D. Karunamoorthy, R. Buyya, Future Generation Computer Systems, Deadline-driven provisioning of resources for scientific applications in hybrid clouds with Aneka,2012.

[14] Perumal, T., Sulaiman, M.H., Sharif, K.Y., Leong, C.Y, International Journal of Smart Home,Development of an embedded smart home management scheme, vol. 7,2013.

IJRASET: ISSN: 2321-9653



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)