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IOT SMART HOME AUTOMATION

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Abstract: With the new era of the Internet of Things and Cloud Computing, the improvement of human's living standards have not only escalated but also gave rise to a new emerging need – Smart Homes. Smart home is not a new concept, but with the availability of major resources such as computation and connectivity to Internet, becoming cheaper, it laid the path for IoT based Smart Home system to become the future touchstone of our home life. Traditionally, smart home not only gives users a safe, healthy and comfortable living environment, but also allows users to remotely monitor their home state and control home appliances. However, these smart home systems, including home gateways, wireless sensor network devices and the home networking equipment require constant work, which not only cause a waste of energy, but can negatively affect the overall performance. We need to save energy and reduce the cost of smart home, there is a pressing need for a new type of levelheaded home controller system. This paper presents a new type of intelligent home control system, harnessing the smartness of Android Phone to manipulate the smartness of the home IoT device. This implementation focuses on making the life of individuals, senior citizens and persons who require less monitoring and more controlling of their smart home.

Keywords: Internet of Things, Smart Home, Android, Smart phone, Arduino.

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INTRODUCTION

With the outgrowth of Internet of Things, some new technologies, such as Smart Planet, Intelligent Transportation and Smart Bank are being developed. Every aspect of our life is becoming more and more intelligent. Internet of Things, which is an application concept, expands the traditional network to more broad areas and constantly produces amazing applications. The project is aimed to develop a solution using cheap resources of computation to achieve this smart home automation terminology. IoT Smart Home Automation System, is not a simple extension of traditional smart home automation system but a better replacement in few aspects. The project is an environment in which IoT – Internet of Things and Android &/or a Web application are interlinked in such a fashion that the whole system in simple to understand, easy and cheap to implement and moreover provides an openness approach for further development and adoption. The IoT Smart Home Automation system model makes use of Arduino, which is an existing open source hardware and software platform; an Android app, which is also an existing open source OS platform, popular on mostly on mobile phones; by bridging the gap between these two components to communicate with each other our goal is achieved. Extending Arduino's capability by introducing the Ethernet shield (extension board) will help to establish the connectivity between the Arduino and Internet, while adding a relay array will make existing not to smart home appliances connect with Arduino, which is connected to Internet, i.e. home appliances will be connected to Internet, thus making them the "thing" of IoT. Moreover, with the help of Ethernet shield hooked on to Arduino, it is possible to make it listen to simple web request, and with controlled CGI programming, this can result in making Arduino a web server which not only can provide a web application to control the connected device but it can also listen and reply to request made by either an Android app or any device connected to Internet and capable of running modern web browser. The Android app will not be able to make simple request of current status but can send new program or schedules over-the-air making the whole system smarter. This system is majorly aimed for independent individuals, senior citizens and individuals who needs more control rather than monitoring.

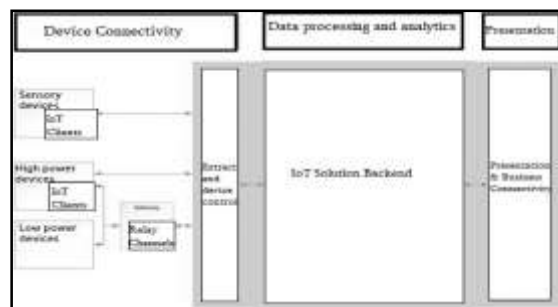The whole system relation can be represented in the following manner

Fig.1.1 Process of Smart Home Automation

The Presentation and business connectivity part consist of the front end i.e. the end with actually interacts with the user. The device connectivity section consist of the back end as the sensor device and home appliances controlled by the relay array. The whole concept of working of smart home automation will be controlled from here. The data processing and analysis section, which forms the microcontroller or the Arduino system; will act as backbone to the all processing we request to operate our smart home and other home appliances. The idea of IoT is especially valuable for persons with disabilities, as IoT technologies can support human activities at larger scale like building or society, as the devices can mutually cooperate to act as a total system [8].

I.   LITERATURE REVIEW

Sr. No	References	Evaluation Approach
1.	Moser, Kenneth, Jesse Harder, and Simon GM Koo. "Internet of Things in home automation and energy efficient smart home technologies." Systems, Man and Cybernetics (SMC), 2014 IEEE International Conference on. IEEE, 2014.	The paper explores the history and implementation of the Internet of Things and how it can be used in home automation.
2.	Partynski, Dan, and Simon GM Koo. "Integration of smart sensor networks into Internet of Things: Challenges and applications." Green Computing and Communications (GreenCom), 2013 IEEE and Internet of Things (iThings /CPSCom), IEEE International Conference on and IEEE Cyber, Physical and Social Computing. IEEE, 2013.	Interest in using large, dynamically distributed wireless sensor networks (WSN) in a variety of areas has increase with the advancement of sensing technology and the increasing computational power of processors.
3.	Yashiro, Takeshi, et al. "An Internet of Things (IoT) architecture for embedded appliances." Humanitarian Technology Conference (R10-HTC), 2013 IEEE Region 10. IEEE, 2013.	Combining the constrained application protocol with the ubiquitous ID architecture for common embedded systems, like usual consumer appliances.
4.	Bian, Jiali, Dengke Fan, and Junming Zhang. "The new intelligent home control system based on the dynamic and intelligent gateway." Broadband Network and Multimedia Technology (IC-BNMT), 2011 4th IEEE International Conference on. IEEE, 2011.	A web platform that integrates monitoring and management capabilities for a large number of home automation sensors.

Table. 2. 1 Literature Review

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II. METHODOLOGY

We are proposing here to control the home appliances through an Android application, which can be access by any Android device. With the emergence of Android Phone, the configuration of mobile terminals is becoming more and more

powerful [10]. This project demonstrates the application of simple HTTP communication protocol to interact with the web application has an interface to the AVR architecture based microcontroller, to control and monitor various electrical home appliances.
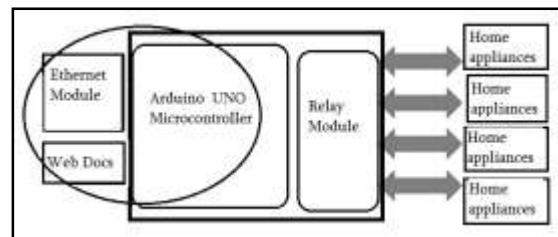

Fig.3.1 Architecture of IoT based Home Automation

The above figure tries to explain the relationship between the various parts of the system and what kind of role the combination of components play in the system. The microcontroller and relay will act as the simple home controller module. The combination of Ethernet module with the web docs and microcontroller will act as web server, which will also provide web service to make it possible for the Android app to communicate with the system. The combination of these two will result into IoT Smart Home Automation. The home appliances will be controlled through this web server and the simple home controller module. The not so smart home appliances like light bulb, fan and other appliance connected to power socket will be accessed remotely. The most efficient thing of Internet of Things is that it gives access to devices, which are remotely present.

Our proposed methodology not only deals with outline the connection of making not so smart existing devices connect to network to be controlled remotely to make it smart, but harnessing the smartness of both the ends. Though making the system on top of the open source Arduino architecture results in a cheaper and easy to implement system, using Android app to automate makes it truly smarter. The Android app communicate with simple HTTP protocol with the web service on the IoT Smart Home Automation System which makes it simpler to communicate and makes it no greater than dedicated API, but this simpler approach is due to the limited computational and storage memory with the microcontroller. Even if restricted by one end, the smartness of other end i.e. the Android app opens another window of limitless opportunity. Features of Android app like scheduling, database storage, location awareness makes it an ideal automation.

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Any individual with the app can set schedule to turn any connected device to IoT Smart Home Automation System - ON or OFF. In case of senior citizens who can't move around the house much can control the system through a smartphone, and can even set schedules, alarms. Souls who are concerned as regard to security can supervise the state of their devices at home and control them remotely, E.g. Scheduling light bulbs ON at dusk and turning them OFF at dawn while away can create a false presence at ward off buglers.

III.   FUTURE SCOPE

The IoT Smart Home Automation System is based on open technologies and resources which are cheaply available, this not only opens a wide window for future expandability but also provides the easy to implement the same system in different fields. The design of the system is also flexible and failsafe if mobile based Android devices are allowed to employ, as the webserver are providing the easy control over home appliances. The code can be enhanced overtime to take input from other sensors and broadcast live data, or store that data on cloud for future insights and research. Fields such as agriculture and hospitality requires such systems for remote and automation control, this same system with little tweaks on connected devices can serve the very purpose.

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