

Android Based Smart Home Automation System

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ABSTRACT

We propose a mobile and internet based Smart Home system that consists of a mobile phone with android capabilities, an internet based application, and a home server. The home appliances are controlled by the Arduino which receives commands from the server computer, which operates according to the commands received from the mobile application via the wireless network or the internet. In our proposed system the home server is built upon a Wi-Fi technology which receives commands from the client and the command is processed via Arduino, which allows a user to control and monitor any parameters related to the home by using any Android capable smart phone or via the internet.

Keywords: Home Automation, Arduino UNO, Wi-Fi, Motion sensor, Smart Phone.

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I. INTRODUCTION

Home automation has an important role in today's human life and it improves the quality of people's life by facilitating a comfortable and safe environment. In international markets Internet based home automation systems is one of the most popular system. This paper presents a low-cost internet based Smart Home System, which uses wifi technology for communication and an Android based application for control of home appliances. With the help of Smart home system the user can supervise household appliances remotely and realize real-time monitoring of home security status through mobile phone. Users can exchange information with home appliances and can monitor and control equipment to perform their command remotely. This system uses android smart phone to monitor and control the various house parameters given its advantages over using a dedicated pc. Wifi technology is used as the network infrastructure for communicating between the different parts as there are advantages of high reliability, easy configurability, system extendibility and good adaptability. The home appliances are connected to the basic I/O ports of the embedded system board and their status is continuously updated to the server. Authentication techniques are implemented so that only authorized user can access home appliances. The core component of the system is an ARM Microcontroller. Android is open source software and provides access to lots of useful libraries and tools. The

application and system is completely user friendly. Any smart phone user can easily run the application in his/her mobile without any prior training. The designed system has the option for adding more relays to get control over more appliances if he/she wants. So altogether the system is a modern smart home system which can give us the experience of smart living. The system updates the household data to the remote server, allowing the user to control the household devices easily and remotely.

With the continuous growth of mobile devices in its popularity and functionality the demand for advanced ubiquitous mobile applications in people's daily lives is continuously increasing. Utilizing web services is the most open and interoperable way of providing remote service access or enabling applications to communicate with each other. An attractive market for home automation and networking is represented by busy families and individuals with physical limitations. IoTs can be described as connecting everyday objects like smart phones, internet televisions, sensors and actuators to the internet where the devices are intelligently linked together to enable new forms of communication amongst people and themselves [1]. The significant advancement of IoTs over the last couple of years has created a new dimension to the world of information and communication technologies. The advancement is leading to anyone, anytime, anywhere (AAA) connectivity for things

with the expectation being that this extend and create an entirely advanced dynamic network of IoTs. The IoTs technology can be used for creating new concepts and wide development space for smart homes in order to provide intelligence, comfort and improved quality of life. Smart home is a very promising area, which has various benefits such as providing increased comfort, greater safety and security, a more rational use of energy and other resources thus contributing to a significant savings. This research application domain is very important and will increase in future as it also offers powerful means for helping and supporting special needs of the elderly and people with disabilities [2], for monitoring the environment [3] and for control. There are a number of factors that needs to be considered when designing a smart home system. The system should be affordable, scalable so that new devices can be easily integrated into the system, and it should be user friendly [4].

II. SYSTEM OVERVIEW

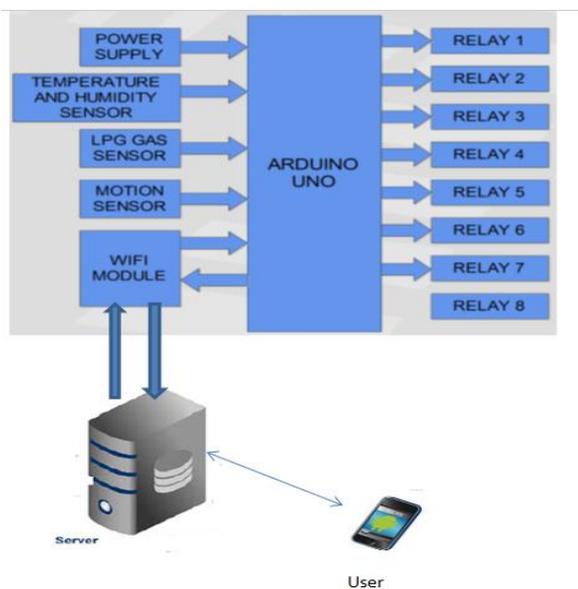


Fig 1. System architecture

The proposed design of Smart home is using the Wi-Fi as the connecting media to interact with the database. As shown smart phone when connected to internet through the Wi-Fi than all the basic home appliances can be controlled. The proposed Smart home system has the capabilities to control the following components in users home and monitor the following :

- ▶ ARDUINO UNO board
- ▶ Wi-Fi Module
- ▶ Temperature And Humidity Sensor
- ▶ Motion Sensor
- ▶ LPG Sensor
- ▶ Android Base Smart Mobile Phone

Web Server

Web Server stores customer records, and Serves the other components in the system. It manages the communication

between the device and mobile smart device, and the communication across device and web site. It is used to aid the two way communication among home device and webserver, and also between the mobile device and web server.

Android Supported Smart Mobiles

Android Supported Smart Mobiles does the working of sending request to web server for changing /checking current status of the device.

Hardware

Hardware consists of ARDUINO which provides the connectivity to devices in the home. And also provide connectivity to different sensors established in the homes Motion Sensor, LPG gas Sensor, Temperature Sensor etc. Through which devices are controlled.

LPG Gas Sensor

They are used in gas leakage sensing equipment's in family and industry, are suitable for detecting of LPG, ISO-butane, propane, LNG, escape the noise of alcohol and cooking gases and cigarette smoke.

Motion Sensor

The PIR sensor itself has two slots in it, each slot is made of a special solid that is sensitive to IR. The lens used here is not really doing much and so we see that the two slots can 'see' outpost some distance (basically the sensitivity of the sensor). When the sensor is idle, both slots outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a positive differential change between the two halves. When the earnest body leaves the sensing area, the inverse happens, whereby the sensor generates negative differential change. These change pulses are what is detected.

III. WORKING

User consists of Android supported smart phone, which needs to login to the web server .Then Web server checks authentication by checking the Username and Password. User Sends request to web server for checking and updating status of home appliances. Then server checks the status of home appliances with the help of ARDUINO which connects to the Wi-Fi module for providing connection to the ARDUINO. ARDUINO has connectivity to the MQ6 Gas Sensor, PIR Motion Sensor, DHT11 Temperature and Humidity Sensor, which does their working as described in (3.2.3).ARDUINO checks the status of home appliances via digital communication when user sends a query for checking status of appliance and output is 1, then status of device is ON, if output is 0, then status of device is OFF. Via digital communication ARDUINO checks status of particular device and does appropriate action. For example, Suppose, User wants to OFF the fan via android supported smart phone, then it first sends a request to the web server .Web server has a connection with ARDUINO through Wi-Module. ARDUINO checks the exiting status of fan through digital communication if ARDUINO gets output 0, means fan is OFF, no need to take any action. But if ARDUINO gets status of fan ON then user needs to change it with the help of web server and ARDUINO.ARDUINO connected to the electronic appliances with the help of relays. Through which it's easy to check and update status of electronic device. With the help of sensors particular condition observed and change the device status accordingly. For example, when there is gas leakage then it buzzes an alarm and then particular action to prevent gas

leakage is taken. With the help of temperature sensor room temperature is maintained. If temperature goes high, then it gives Pop-Up Notification on Android based smart phone and then appropriate action will be taken through smartphone.

IV. RESULTS

System should work properly based on semantic distance based algorithm for home automation and controls the home appliances according to given instructions through android device .according to digital communication system should work properly like ON or OFF home appliances.

V. CONCLUSION

This paper proposes a low cost, secure auto-configurable, remotely controlled solution. The approach discussed in the paper is novel and has achieved the target to control home appliances remotely using the WiFi technology to connect system parts, satisfying user needs and requirements. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

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