Remote Access Terminal using GSM Enabled Embedded based home appliances

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ABSTRACT-

This paper presents the implementation of a low cost microcontroller for remote monitoring and controlling the home appliances with home security systems. In today's world with the advancement of technology, ways are being found to make life more comfortable and safe. The main aim behind remote monitoring is to keep a track of the current status of appliances It improves the value of our lives by automating various electrical appliances or instruments. This paper describes GSM (Global System Messaging) based secured device control system using App Inventor for Android mobile phones. App Inventor is a latest visual programming platform for developing mobile applications for Android-based smart phones. The Android Mobile Phone Platform becomes more and more popular among software developers, because of its powerful capabilities and open architecture. It is a fantastic platform for the real world interface control, as it offers an ample of resources and already incorporates a lot of sensors. No need to write programming codes to develop apps in the App Inventor, instead it provides visual design interface as the way the apps looks and use blocks of interlocking components to control the app's behavior. The App Inventor aims to make programming enjoyable and accessible to novices.

I. INTRODUCTION

The App Inventor for Android is a new visual programming platform to create mobile applications (apps) for Android- based smart phones [1]. It was developed at Google Labs by a team led by MIT's Hal Abelson. It was released to the general public in July, after being available in alpha and beta versions to a group of invited developers. To develop apps in the App Inventor you do not need to write code. Instead of you have to design visual way of the app's looks and use blocks of interlocking components to control the app's behaviour. In this respect the App Inventor is comparable to Scratch (http://scratch.mit.edu) and Alice (http://www.alice.org). Like these languages, the App Inventor aims to make programming enjoyable and accessible to novices. It has gained the difference, and perhaps an important reason for the attention, is that the App Inventor lets you create apps for smart phones. As given the popularity and ubiquity of mobile phones among today's young generation of students, the App Inventor seems to hold great potential for attracting a new generation of students to computing and computational thinking [2]. This paper presents GSM based Device Control System mobile application developed using the App Inventor for Android smart phones targeting its vast market which will be beneficial

for the masses. According to the International Data Corporation (IDC) Worldwide Quarterly Mobile Phone Tracker, Android has maintained its leadership position on highest peak in global market share [3]. The Global System for Mobile Communication (GSM) network is almost everywhere.

The preface of the Global System for Mobile Communication (GSM) and mainly the use of cellular phones got the novelty of distance communication at remote location. Paper makes use of this ability for remote control of instruments and appliances; take a look at this example, a person on a drive within his car all of a sudden memorizes that he left the Cooler, ON actually it should be OFF. The usual circumstance is to drive back and switch OFF. But with the Android mobile phone in the hand equipped with GHAS (GSM Home Automation System) Application, one looks on how the same could be used to result control at any point, anywhere and time without worrying geographical locations.

II. RELATED WORK

There are many definitions of home automation available in the literature. The Paper [4] considers the problems with the implementation of home automation systems. Furthermore the possible solutions are devised through various network technologies. Several issues affecting home automation systems such as lack of robustness, compatibility issue and acceptability among the old and disabled people are discussed.

 [5] Present a design and implementation of SMS based control for monitoring systems. The paper has three modules involving sensing unit for monitoring the complex applications. A microcontroller works as processing unit and a communication module that uses GPRS modem or cell phone via serial port RS-232. The SMS is used for status reporting such as power failure. The Paper [6] explores primary health-care management for the rural population. A solution proposes the use of the mobile web-technologies providing the PHC services to the rural population. The system involves the use of SMS and cell phone technology for information management, transactional exchange and personal communication. [7] Propose remote monitoring through mobile phone involving the use of spoken commands. The spoken commands are generated and sent in the form of text SMS to the control system and then the microcontroller on the basis of SMS takes a decision of a particular task. [8] Focuses on the controlling of home appliances remotely and providing security when the user is away from the place. The system is SMS based and uses wireless technology to revolutionize the standards of living. This system provides ideal solution to the problems faced by home owners in daily life. The system is wireless therefore more adaptable and cost-effective. The HACS system provides security against intrusion as well as automates various home appliances using SMS. The system uses GSM technology thus providing ubiquitous access to the system for security and automated appliance control. [9] Describes how to manage and control home appliances using mobile phone, people can use this system to do things in their home from a far place before they reach home. To control an appliance the user sends a command in form of SMS from his/her mobile phone to a computer which is connected to the appliance, once the message is received the computer   will send the command to a microcontroller for controlling the appliance appropriately. [10] Propose the system uses ARM as a central microcontroller and it allows remote control of different appliances through SMS

messages.

III. SYSTEM ARCHITECTURE

The Bluetooth and Wi-Fi based Home Automation System (HAS) is developed using various mobile programming language and cross mobile platform like Windows [11], Java Me [12], Android [13], MoSync [14] App Inventor [15] and , web based using RWD technology [16] respectively during the course of research and now the GSM based Home Automation System Application program using Visual programming Language 'App Inventor' is exercised for Android based smart phones, and an 8 bit microcontroller based relay driver circuit with GSM Modem, which is able to communicate with the Home Appliances over GSM Network.
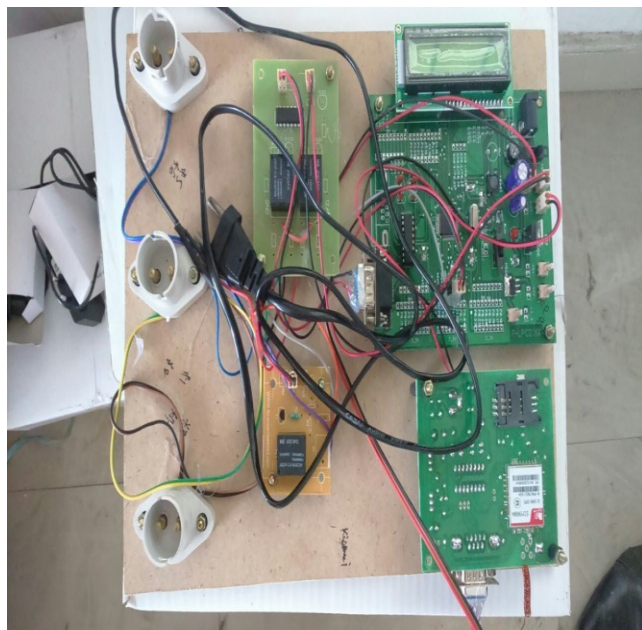
The system is based on serial data transmission using SMS over GSM Network in order to facilitate the appliances control in a global network environment. Present system ensures a secured exchange of data on GSM communication. A user interface (UI) on the Android enabled mobile phone offers system connection and control utilities. ULN 2803

relay driver [17] and Serial 900 type GSM Modem [18] from as well as Arduino IDE [19] for compiling C Language Code and burning HEX file into microcontroller was used for the development. An ARM   [20] is used as an embedded relay controller.

IV. DEVELOPMENT PLATFORMS

This section describes the technologies used for developing the Android based mobile phone application for Home Appliance Control in GSM Network environment which are: App Inventor, Arduino and GSM. Android is a platform developing and deploying android based applications on mobile devices supporting it. GSM has its own benchmark as a wireless communication technology for permanent and itinerant devices. Combining the power of SMS service, the best known and used wireless technology for mobile communication provide a facility to create Android based mobile applications using the GSM Wireless Technology

C. GSM

GSM (Global System for Mobile Communications, originally Groupe Spécial Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. It is the de facto global standard for mobile communications with over 90% market share, and is available in over 219 countries and territories. The GSM standard was developed as a replacement for first generation (1G) analog cellular networks, and originally described a digital, circuit-switched network optimized for full duplex voice telephony. This was expanded over time to include data communications, first by circuit-switched transport, then packet data

transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS). Subsequently, the 3GPP developed third generation (3G) UMTS standards followed by fourth generation (4G) LTE Advanced standards, which are not part of the ETSI GSM standard. [26]

Result

This section shows the implementation result of Real-Time Remote Monitoring and Control system. The Port-l pins of the Microcontroller unit are connected to light, fan and Air Conditioner through the relay circuit. The user can monitor the status of light, fan, and Air Conditioner to switch ON/OFF the appliances through the user login page, which is password protected. The temperature sensor (DS1820) is interfaced to the SPI port of microcontroller. The Microcontroller unit will check the room temperature continuously. If the temperature is more than the desired range (28°C), then the GSM/GPRS modem, which is already interfaced to RS232 port of the Microcontroller, sends the message automatically to the user mobile phone. The client is able to activate the cooling system (Air Conditioner) by sending AT command through its mobile phone. Here SPllEthernet gateway is implemented to get the sensor data (temperature) through web server after user login and client is able to activate the cooling system (Air Conditioner) through this webpage.

CONCLUSION

Home automation represent a potential research area, and their significance is growing rapidly because in rise of community demand. This paper represents a general overview of smart home projects that are arranged according to their intended services. The monitor and automatic control of equipment through LAN or Internet is forming a trend in automation field. An existing monitor system can be connected with Internet by sophisticated embedded processor to extend its function. Replacing PC with low-cost single chip processor can make administrators to get parameters of different remote sensor and send control information to field equipments at any time through Internet.

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