E-GATEWAY: A SMART HOME AUTOMATION SYSTEM

L. K. HEMA[*], AKHIL MENON, ABHILASH V. VISHNU and LUBAB ABDUL NASSER

Department of Electronics and Communication Engineering, Aarupadai Veedu Institute of Technology, CHENNAI (T.N.) INDIA

ABSTRACT

The home automation system plays an important role in maintaining living standards and provide secure and flexible environment. The aim of this project is to design a home automation system which makes operating of Electrical appliances in home through android application. The home automation system allows controlling of home appliances by using voice commands by recognizing the input speech. The speech recognition is done by Support Vector Machine. The home automation system is implemented wirelessly using General packet radio service (GPRS) technology. The electrical appliances such as fan, light switches, light sensors, current sensors are integrated in a system which then connected to microcontroller which act as a within the home to control and perform the user commands. The home automation system improves the living standards and also helps the elderly people. The home automation system implemented wirelessly using GPRS technology, is able to control electrical appliances without limiting the range.

Key words: MEMS Accelerometer, NFC medication, ARM processor.

INTRODUCTION

As technology is advancing the home automation system are also getting smarter. Modern houses are mostly shifting from switches to centralized control system, which involves wirelessly controlled switches. Real time based Remote control home automation system provides an easier solution with Android application technology. Android is a software stack for mobile devices that includes an operating system, middleware and key applications[1-3]. Android application act as transmitter, which sends ON/OFF commands to the receiver where loads are connected. By operating the specified remote switch on the transmitter, the loads can be turned ON/OFF remotely through wireless technology[4,5].

_____

[*]Author for correspondence; E-mail: hemjith2005@gmail.com

Proposed system architecture & working

Camera equipped smart calling bell

When a visitor presses the calling bell button, the system would announce that information on the home owner android smart phone and simultaneously a digital camera on the door will take a snapshot of the person in front of it and stores it in a memory card for future reviews[6].

Camera based security breach alert

When security mode is ON, the system would constantly scan the area within the field of view of the camera and if it finds any intrusion, it immediately sends an alert SMS to the owner's mobile phone and as well as take a snapshot of the intruder and save it in memory card.

Light and fan control

The system allows the user to turn the light, fan and other home appliance ON or OFF using a voice command from his android smart phone if the user is available within home. When the user is out of home, he could simply send the same command using SMS from any GSM phone.

Fire alert

A fire sensor monitor the temperature of the home and if it crosses a certain threshold, the system would interpret this as fire occurred and alerts the place using alarm buzzer and send SMS to the user mobile phone as well as to the fire station.

Window break alert

MEMS based motion sensor is used to monitor window movements and if it detects a forceful entry such as a window smash action the system immediately triggers alarm buzzer and sends SMS to the user mobile phone.

PC/Laptop based USB data logger

The system acts as a USB device when connected to a PC/Laptop. The user could use this connection to transfer the stored data such as the visitor/intruder snapshots to their PC/Laptop and to be saved there[7].

Hardware specifications

Power supply

A power supply provides a constant output regardless of voltage variations. "Fixed" three-terminal linear regulators are commonly available to generate fixed voltages of plus 3 V, and plus or minus 5 V, 9 V, 12 V, or 15 V when the load is less than about 7 amperes.

ARM cortex mo

The ARM Cortex™-M3 processor is the industry-leading 32-bit processor for highly deterministic real-time applications including microcontrollers, automotive body systems, industrial control systems and wireless networking and sensors.
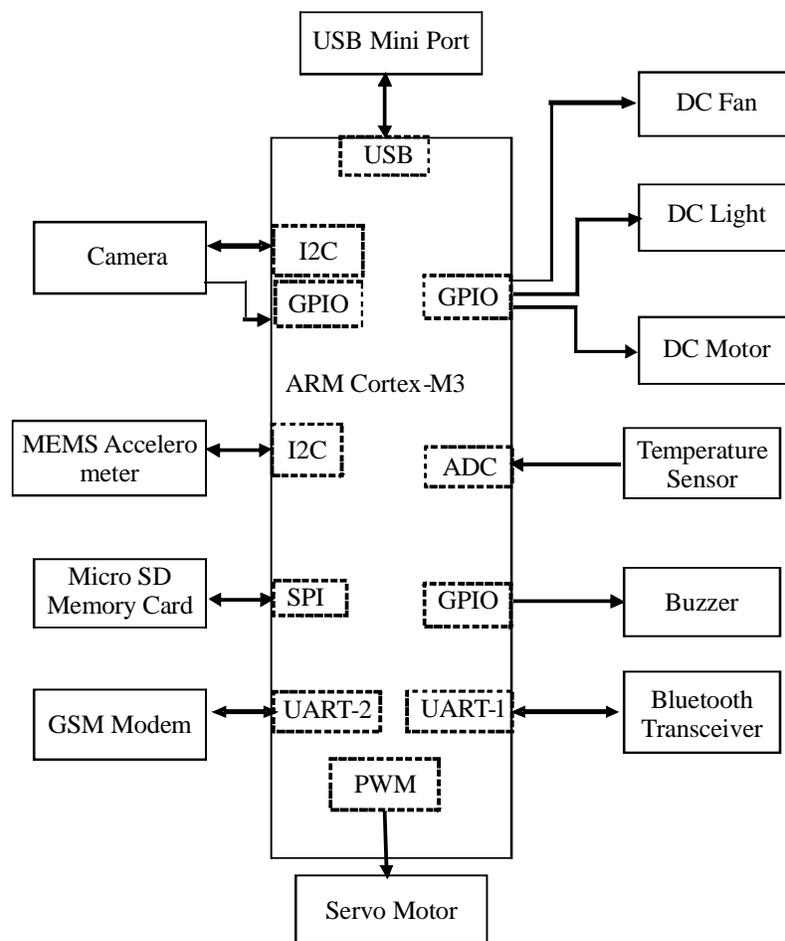
Fig. 1: Block diagram of E-Gateway

Serial peripheral interface

Serial Peripheral Interface is a simple interface which enables to communicate microcontroller and peripheral chips or intercommunicate between two or more microcontrollers. SPI Bus uses synchronous protocol, where transmitting and receiving is guided by clock signal generated by master microcontroller.

I^2 C Protocol

I²C is a multi-master serial computer bus invented by Philips that is used to attach low-speed peripherals to a motherboard, embedded system, or cell phone.

MEMS Accelerometer

An accelerometer is a device for measuring acceleration and gravity induced reaction forces. The LIS302DL is an ultra compact low-power three axes linear accelerometer. It includes a sensing element and an IC interface able to provide the measured acceleration to the external world through I2C/SPI serial interface.
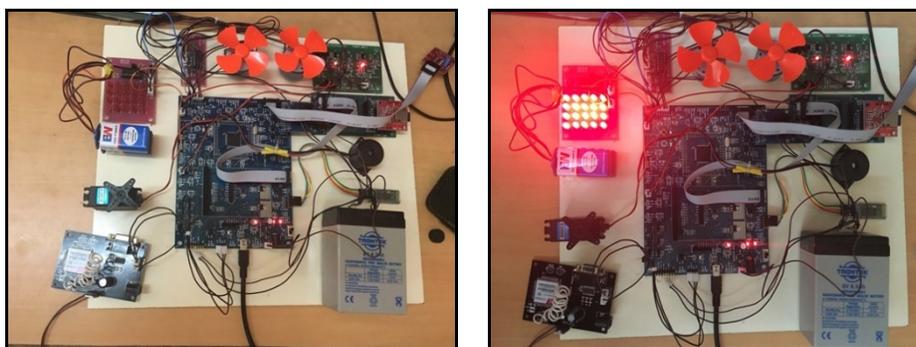
RESULTS AND DISCUSSION

Fig. 2: Hardware circuitry of E-Gateway

CONCLUSION

The Intelligent Home System is a voice controlled home automation system which controls home appliances using android application over a wireless network. Voice controlling enables users a sense of comfort as no direct operation with the home automation system is required. The Android based home app communicates with the micro web-server via internet using the web service. Any android supported device can be used to install the smart home app, and control and monitor the smart home environment. A low cost smart

home system has been developed in which all processing is handled by the microcontroller. The proposed system reduces the wiring by using wireless networks.

REFERENCES

1.   J. Potts and S. Sukittanon, Exploiting Bluetooth on Android Mobile Devices for Home Security Applications, in Southeast on, Proceedings of IEEE Orlando, FL (2012).

2.   C. Chiu-Chiao, H. C. Yuan, W. Shiau-Chin and L. Cheng-Min, Bluetooth-Based Android Interactive Applications for Smart Living, in 2nd International Conference on Innovations in Bioinspired Computing and Applications (IBICA 2011), 309-312 (2011).

3.   Fleury, M. Vacher and N. Noury, SVM-Based Multimodal Classification of Activities of Daily Living in Health Smart Homes: Sensors, Algorithms, First Experimental Results, IEEE Trans. Inf. Technol. Biomed., **14(2)**, 274-283 (2010).

4.   Yang Li, Ji Maorang, Gao Zhenru, Zhang Weiping and Guo Tao, Design of Home Automation System Based on Zig Bee Wireless Sensor Network, ICISE (2009).

5.   M. Patil, A. Bedare and V. Pacharne, The Design and Implementation of Voice Controlled Wireless Intelligent Home Automation System Based on ZigBee, Int. J. Adv. Res. Comp. Sci. Software Engg., **3(4)**, 307-310 (2013).

6.   Javale, M. Mohsin, S. Nandanwar and M. Shingate, Home Automation and Security System Using Android ADK, IJECCT, **3**, 382-385 (2013).

7.   R. A. Ramlee, M. H. Leong, R. S. S. Singh, M. M. Ismail, M. A. Othman, H. A. Sulaiman et al., Bluetooth Remote Home Automation System Using Android Application, The Int. J. Engg. Sci., **2**, 149-153 (2013).