

ADVANCE HOME AUTOMATION USING FPGA CONTROLLER

Sweatha K N¹, Poornima M², Vinutha M H³

Dept of ECE MVJCE, Bangalore^{1,2,3}

Abstract-Technology advancements have made the implementation of embedded systems within home appliances. This increased the capabilities and features. There is demand for smart home automation through mobile phones. Bluetooth modules are cost effective and flexible so it is one of the best choices for smart home automation. This paper presents a novel technology where the user controls the devices through mobiles. Implementation is done using FPGA (Field Programmable Gate Array) as a controller to which the devices are directly interfaced. Control to the devices is communicated to the FPGA from the mobile phone using speech recognition technique.

Keywords-Home automation, Speech recognition, Bluetooth, pic microcontroller, FPGA

1. INTRODUCTION

The home automation improves the lifestyle of the control of the home devices. As the devices are filling the home, the home appliances are filling the homes to improve the comfort to the user. Here we are using FPGA as controller to control the devices connected to it. We monitor the devices wirelessly by using the Bluetooth. We are using the android mobile for speech recognition. We are using the FPGA other than the micro controller because we can connect many devices which can be monitored and the FPGA can be used as a controller or a processor. The devices connected to the FPGA are the dc motor, stepper motor and a led. With the help of dc motor we are constructing a robot and controlling the navigation of robot with the help of the android mobile.

2. BACKGROUND WORK

The advancement of technology has increased the usage of the electronic devices in homes. The wireless technology is most popular technology to control the devices from distances.

In [2] the authors introduce the idea of using Bluetooth as a cable replacement for home automation. However, no implementation details are given. An automation system based on Bluetooth was developed in [3]. It consists of a remote and a mobile host controller that communicates with several devices representing the home appliances. A similar solution was presented in [4], where a Bluetooth multihop mesh topology was used to relay sensor node information to a mobile phone or a personal computer [4].

The author in [5] uses the pic microcontroller to control the sensors through the SMS having password. The GSM module system uses mobile network and is battery powered which makes home automation system safer from internet hacks.

In their work in [6] the authors have used the Zigbee technology and the routing algorithm. The routing algorithm is used to deduce the optimal path. Monitoring system is built using GPRS network.

In their work in [7] the authors have used the GSM Network, Internet and speech recognition. The GSM and internet are used for remote monitoring and speech recognition is used within the house. The advantage of GSM is that the communication between the home and the user is its wide range which makes the whole system online and it is high secured so that information cannot be monitored by an eavesdropper. The communication between the home appliances is carried out by RF communication protocol which has an advantage of installation and maintenance. In their work in [8] the authors have used the cloud computing technique so that the user can control and monitor the device real time from anywhere through the internet. It reduces the setup and maintenance cost by eliminating the need for specialized gateway and web server. In their work in [9] the authors have used the Zigbee technology and web service to remotely control the devices. It is a specification suite of networking, security and application software layers using small, low power, low data rate communication technology for personal area network.

3. IMPLEMENTATION OF HOME AUTOMATION SYSTEM

A block diagram of the implemented system is shown in Figure 1. It consists of an android mobile phone having a Bluetooth interface, a Bluetooth module, a pic microcontroller, a central FPGA controller, that communicates via the RS-232 protocol to the Bluetooth interface, and a number of devices which are connected to the central controller. The implemented system connects the robot, bulb and a motor device to the

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