ANDROID MOBILE BASED HOME AUTOMATION USING BLUETOOTH

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ABSTRACT: This Project presents the overall design of Home Automation System (HAS) with low cost and wireless remote control. This system is designed to assist and provide support in order to fulfill the needs of elderly and disabled in home. Also, the smart home concept in the system improves the standard living at home. The main control system implements wireless Bluetooth technology to provide remote access from PC/laptop or smart phone. The design remains the existing electrical switches and provides more safety control on the switches with low voltage activating method. The switches status is synchronized in all the control system whereby every user interface indicates the real time existing switches status. The system intended to control electrical appliances and devices in house with relatively low cost design, user friendly interface and ease of installation. Due to the advancement of wireless technology, there are several different of connections are introduced such as GSM, WIFI, ZIGBEE, and Bluetooth. Each of the connection has their own unique specifications and applications. Among the four popular wireless connections that often implemented in HAS project, Bluetooth is being chosen with its suitable capability. Bluetooth with globally available frequencies of 2400Hz is able to provide connectivity up to 100 meters at speed of up to 3Mbps depending on the Bluetooth device class.

Bluetooth wireless connection enabled the system communicates with graphical user interface (GUI) on PC/laptop or smart phone without cable. The target home appliances are controlled by the system Main Control Board. In order improve the standard living in home, this system provides three different types of physical control methods to the Main Control Board. The first physical control method is by pressing on the modified Low Voltage Activating Switches. The conventional high voltages switches will be replaced by the modified 5 Volt push buttons as the activating switches. The low voltage switch eliminates the risk of dangerous electrical shock by wet hand. The second and third control methods are performed as wireless remote control to the appliances. The second control method is by clicking on Window GUI on PC/laptop by using mouse or touch pad. The system is directly installed beside the conventional electrical switches on the wall. The Bluetooth wireless connection enabled the system communicates with graphical user interface (GUI) on PC/laptop or smart phone without cable. The target home appliances are controlled by the system Main Control Board. In order improve the standard living in home, this system provides three different types of physical control methods to the Main Control Board. The first physical control method is by pressing on the modified Low Voltage Activating Switches. The conventional high voltages switches will be replaced by the modified 5 Volt push buttons as the activating switches. The low voltage switch eliminates the risk of dangerous electrical shock by wet hand. The second and third control methods are performed as wireless remote control to the appliances. The second control method is by clicking on Window GUI on PC/laptop by using mouse or touch pad. This method provides facility to the computer user to control the home appliances without walk to the switches on the wall. Third control method is done by Android GUI installed in Smart Phone. The user can easily touch on the screen of the phone to control the home appliances. This portable method is able to assist the disabled people who have problem with locomotion difficulty.

Keywords: GUI, GSM, WI-FI, ZIGBEE
I. INTRODUCTION:

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The system is directly installed beside the conventional electrical switches on the wall. The Bluetooth wireless connection enabled the system communicates with the Main Control Board. In order to improve the standard living in home, this system provides three different types of physical control methods to the Main Control Board. The first physical control method is by pressing on the modified Low Voltage Activating Switches. The conventional high voltages switches will be replaced by the modified 5 Volt push buttons as the activating switches. The low voltage switch eliminates the risk of dangerous electrical shock by wet hand. The second and third control methods are performed as wireless remote control to the appliances. The second control method is by clicking on Window GUI on PC/laptop by using mouse or touch pad.

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2. Embedded Systems: An embedded system is a computer system designed to perform one or a few dedicated functions often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general-purpose computer, such as a personal computer (PC), is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common use today.

Embedded systems are controlled by one or more main processing cores that are typically either microcontrollers or digital signal processors (DSP). The key characteristic, however, is being dedicated to handle a particular task, which may require very powerful processors.

For example, air traffic control systems may usefully be viewed as embedded, even though they involve mainframe computers and dedicated regional and national networks between airports and radar sites. (Each radar probably includes one or more embedded systems of its own.)

Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale. In general, "embedded system" is not a strictly definable term, as most systems have some element of extensibility or programmability. For example, handheld computers share some elements with embedded systems such as the operating systems and microprocessors which power them, but they allow different applications to be loaded and peripherals to be connected. Moreover, even systems which don't expose programmability as a primary feature generally need to support software updates. On a continuum from "general purpose" to "embedded", large application systems will have subcomponents at most points even if the system as a whole is "designed to perform one or a few dedicated functions", and is thus appropriate to call "embedded".

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The above schematic diagram of Android Mobile Based Home Automation Using Bluetooth explains the interfacing section of each component with micro controller. Crystal oscillator connected to 13th and 14th pins of micro controller and regulated power supply is also connected to micro controller and LED’s also connected to micro controller through resistors.

1. This project demonstrates a simple home automation system which contains a remote mobile host controller and several client modules (home appliances).

2. The client module communicate with the host controller through a wireless device such as a Bluetooth enabled mobile phone, in this case, an android based Smart phone.

3.3 The Major blocks:

1. Microcontroller (AT89S52).
2. Regulated power supply (RPS).
3. Android.
4. LED indicator.
5. LCD Display.
6. Relay.

3.4 Architecture:

![Fig.2. Architecture of AT89S52 microcontroller](image)
4. SOFTWARE DESCRIPTION:

This project is implemented using following software’s:
- Express PCB – for designing circuit
- Keil Compiler - for compilation part
- Proteus 7 (Embedded C) – for simulation part

4.1 Express PCB: Breadboards are great for prototyping equipment as it allows great flexibility to modify a design when needed; however the final product of a project, ideally should have a neat PCB, few cables, and survive a shake test. Not only is a proper PCB neater but it is also more durable as there are no cables which can yank loose. Express PCB is a software tool to design PCBs specifically for manufacture by the company Express PCB (no other PCB maker accepts Express PCB files). It is very easy to use, but it does have several limitations. It can be likened to more of a toy then a professional CAD program. It has a poor part library (which we can work around) It cannot import or export files in different formats It cannot be used to make prepare boards for DIY production Express PCB has been used to design many PCBs (some layered and with surface-mount parts. Print out PCB patterns and use the toner transfer method with an Etch Resistant Pen to make boards. However, Express PCB does not have a nice print layout. Here is the procedure to design in Express PCB and clean up the patterns so they print nicely.

4.2 Keil Compiler:

Go to Project – Open Project and browse for Hello in Ch03_00 in Pont and open it.
Now we need to check the oscillator frequency:

Go to project – Options for Target ‘Target1’

Make sure that the oscillator frequency is 12MHz.

Running the Simulation

Having successfully built the target, we are now ready to start the debug session and run the simulator. First start a debug session.

Build the target as illustrated in the figure below.
The flashing LED we will view will be connected to Port 1. We therefore want to observe the activity on this port.

To ensure that the port activity is visible, we need to start the ‘periodic window update’ flag.

While the simulation is running, view the performance analyzer to check the delay durations.
Go to Debug – Performance Analyzer and click on it

Double click on DELAY_LOOP_Wait in Function Symbols:

and click Define button
4.3 Proteus: Proteus is software which accepts only hex files. Once the machine code is converted into hex code, that hex code has to be dumped into the microcontroller and this is done by the Proteus. Proteus is a programmer which itself contains a microcontroller and this is done by the Proteus. Proteus is a programmer which itself contains a microcontroller in it other than the one which is to be programmed. This microcontroller has a program in it written in such a way that it accepts the hex file from the pic compiler and dumps this hex file into the microcontroller which is to be programmed. As the Proteus programmer requires power supply to be operated, this power supply is given from the power supply circuit designed and connected to the microcontroller in progenus. The program which is to be dumped into the microcontroller is edited in progenus and is compiled and executed to check any errors and hence after the successful compilation of the program the program is dumped in to the microcontroller using a dumper.

5. Conclusion: This project can be further developed by integrating it with the internet to monitor your home while sitting in a remote area. By doing this, one can keep an eye on his or her home through an internet connected to the user’s mobile phone or PC or laptop. The Bluetooth client was successfully tested on a mobile phones thus proving its portability and wide compatibility.

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