HOME AUTOMATION SYSTEM

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Abstract— In the Home Automation Project, a smart home solution is provided to create a wireless interface to communicate with electrical appliances in the home environment. Electrical and Electronic appliances are controlled by means of a website hosted using an Arduino microcontroller and Ethernet Shield. This creates a uniform interface which can be accessed locally or remotely using smart phones, laptops or any internet web browser capable devices. An HTML5, AJAX, JavaScript and CSS3 based website is utilized for this project. Pyroelectric Infrared (PIR) sensors are calibrated according to the dimensions. If the presence of humans is detected, based on preset conditions, certain electrical appliances will switch ON or OFF. If not, all non-essential electronics (lights, fans, ACs) will switch OFF automatically after a buffer period. Also, Infrared (IR) signal frequencies from remotes belonging to TVs and ACs will be mapped and recreated using an IR LED transmitter which will be interfaced with an Arduino and be used to control the corresponding devices based on commands received from the control website. The Arduino used will be connected to the mains using a power relay.

Keywords— Home Automation, PIR, Power Relay, Arduino, LED, Ethernet Shield.

INTRODUCTION

Home automation, or the idea of smart homes, is the controlling and monitoring of home appliances in a unified system. These include lighting, heating, and even home electronics. Home automation is closely related to (industrial) building automation where lighting, climate control (HVAC: Heating, Ventilation, and Air Conditioning), and security systems are integrated for central and/or automated control. Building automation often focuses on the automation of large commercial buildings. In contrast, home automation focuses more on comfort and entertainment, but both HVAC and security can be (and often are) part of a smart home. Introduction Home automation, or the idea of smart homes, is the controlling and monitoring of home appliances in a unified system. These include lighting, heating, and even home electronics. Home automation is closely related to (industrial) building automation where lighting, climate control (HVAC: Heating, Ventilation, and Air Conditioning), and security systems are integrated for central and/or automated control. Building automation often focuses on the automation of large commercial buildings. In contrast, home automation focuses more on comfort and entertainment, but both HVAC and security can be (and often are) part of a smart home.

Proposed System:

Interface:

The Home Automation system will be controlled using a web site hosted on the internet using Arduino, a Wi-Fi Shield and its libraries. Users can securely login over the internet to control different appliances like Lights, Fans, TVs and Air Conditioners. There are two sections of code involved:

1. The Arduino sketch
2. The .html Webpage

The Arduino sketch sets up the network and handles the communications. It involves setting up the website, receiving commands over the internet and executing the respective commands. The sketch also calls a .html webpage stored on the SD card and communicates this one line at a time over the internet, acting as a web server. Users can login remotely on this web server and using the UI provided, control the appliances.

Use of IR transmitter: An IR remote works by turning the LED on and off in a particular pattern. However, to prevent interference from IR sources such as sunlight or lights, the LED is not turned on steadily, but is turned on and off at a modulation frequency (typically 36, 38, or 40KHz). The time when a modulated signal is being sent will be called a mark, and when the LED is off will be called a space. Each key on the remote has a particular code (typically 12 to 32 bits) associated with it, and broadcasts this code when the key is pressed. If the key is held down, the remote usually repeatedly broadcasts the key code. For an NEC remote, a special repeat code is sent as the key is held down, rather than repeatedly sending the code. For Philips RC5 or RC6 remotes, a bit in the code is toggled each time a key is pressed; the receiver uses this toggle bit to determine when a key is pressed down a second time. On the receiving end, the IR detector demodulates this signal, and outputs a logic-level signal indicating if it is receiving a signal or not. The IR detector will work best when its frequency matches the sender's frequency, but in practice it doesn't matter a whole lot.

Transmitter section

Receiver Section

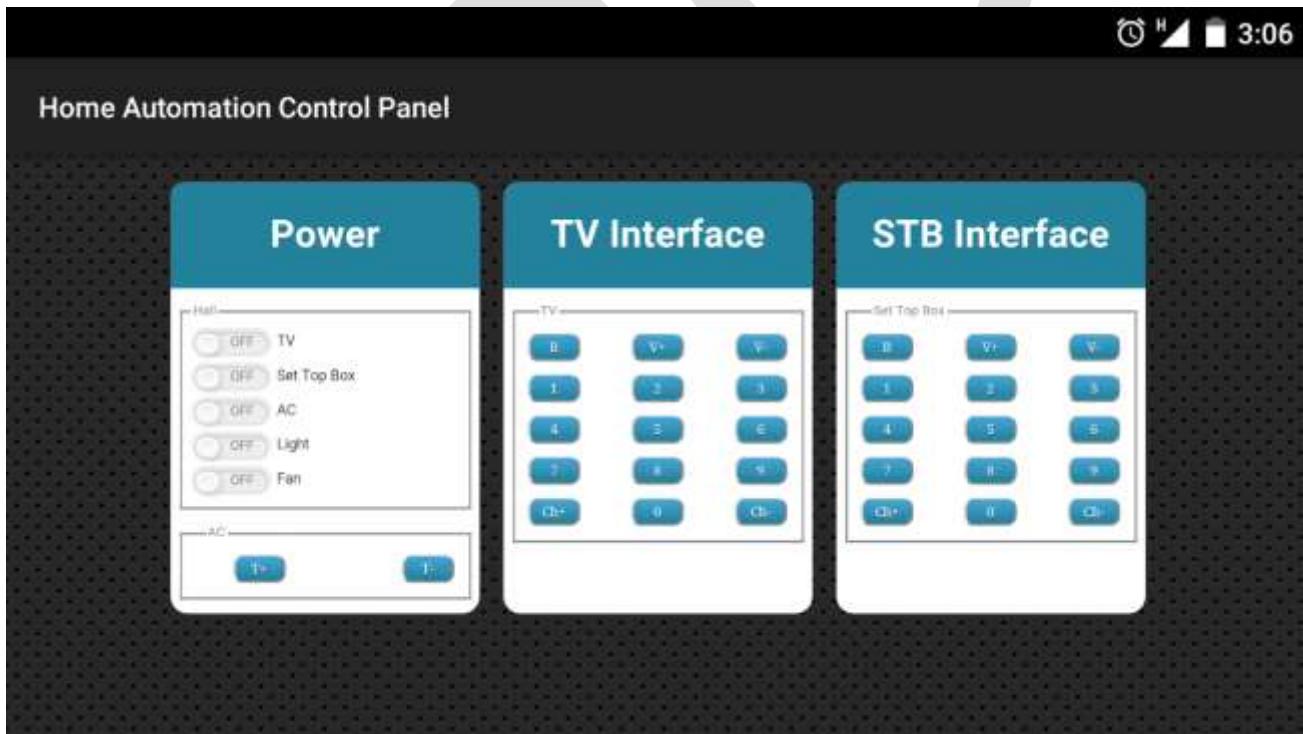**Block Diagram of Infrared Remote Control Switch**

Implemented Output:

FIG 3. OUTPUT OF THE SYSTEM.

CONCLUSION

It is evident from this project work that home automation system can be cheaply made from low-cost locally available components and be used to control multiple appliances ranging from the television to the air conditioning system and even the entire house lighting system. And better still, the components required are so small and few that they can be packaged into a small container. The designed home automation system was tested a number of times and certified to control home appliances used like the lights, fans and the television. This home automation system can also be implemented over Bluetooth, Infrared and WAP connectivity without much change to the design and yet still be able to control a variety of home appliances. Hence, this system is scalable and flexible.

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