Home Automation System

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Abstract — *Home Automation technology has proved to contribute to increased independence and safety. Two surveys has been conducted in Norway to collate experience on home automation technology as part of home care services. We found that the technology is installed in newly built residential flats, aiming at old residents in need of care. The findings inspired us to further investigate the implications of installing this technology in existing houses and flats.*

Keywords- *IC ULN2003A,Triac,Microcontroller,Automation.*

I. INTRODUCTION

A Home Automation system essentially provides the controls that allow users to change setting in lighting, fans, air conditioning, heating and sensors for moisture, proximity, pressure, temperature, fire to monitor a variety of conditions with various forms of data/video transmission. Home automation is the use of one or more computers to control basic home functions and features automatically and sometimes remotely. An automated home is sometimes called a smart home. The wireless automation system is activated through a keypad, touch buttons, mobile, internet or any device which can connect to the internet or any kind of network. The fundamental components of a well-designed home automation system include a computer or smartphone with the appropriate programming, the various devices and systems to be controlled, interconnecting cables or wireless links, Internet connection, and an emergency backup power source for the computer, its peripherals, and the essential home systems. **Home automation is also called as 'domotics' (domestic robots).** Devices may be connected through a computer network to allow control by a personal computer, and may allow remote access from the internet. Through the integration of information technologies with the home environment, systems and appliances are able to communicate in an integrated manner which results in convenience, energy efficiency, and safety benefits.[1]

II. NEED OF HOME AUTOMATION

The primary purpose of automation is to aid us in living a more convenient and comfortable life. Right now, your home probably employs many types of technology, from the light switch that controls your globes, to the alarm system that protects your belongings. Home automation simply takes this technology a step further, by automating these devices and providing a method to communicate with them.
Need of Home Automation System lies in the following facts-

A. Comfort:

It makes homes more comfortable, since it is a way to customize our own home environment, e.g. when you arrive at your home you are welcome with a pleasant temperature depending if it's winter or summer.

B. Security:

It makes homes safer, since it allows immediate action when a problem occur, e.g. a flood or gas leak is detected & the system immediately turns off the gas/water/electricity.

C. Economy:

It makes homes more economic since it can optimize the available resources according to your needs, e.g. it can set your room light according with the natural Sun light, it can guarantee that power consumption does not exceed x KW/hour, or it can simply guarantee that you don't forget the lights on when you go to bed or out for a weekend.

D. It is needed by some groups in society:

It can make it much easier for some physically handicapped or elderly to live in their own homes without intensive support. It will be also really useful for some people who spend a lot of their time working away from home.[5]

III. COMPONENTS OF HOME AUTOMATION SYSTEM

Home automation systems commonly exist of hardware and software components, which are all part of the complete system. Each of these components can perform a function, some components are multifunctional.

Hardware Components can be categorized into 3 categories:

1. Input (using keyboard, switches etc)
2. Output (display, loudspeakers etc)
3. Control (controlling components like dimming the lights, Fan speed controlled)

1.Input Functions

Input functions are mostly performed by components called sensors. Sensors can be anything from a simple on/off switch to a capacitive proximity.

Some examples of sensors:

1. Switch
2. Motion sensor
3. Light sensor (photodiode, photo resistor)
4. Video/audio acquisition sensor (video camera, microphone)
5. Smoke detector, gas detector[6]

2. Output functions

Output functions are mostly performed by components called coordinators. Coordinators use a signal from the automation system to change the state of an object in the controlled environment (e.g. Switching AC power to the circuit feeding the light bulbs).

Electronic Coordinators consists of the following things:

1. Electro-mechanical switches (relays)
2. Dimmers
3. Power switches

3. Control functions

Control functions are performed by a master controller which does the following functions:

1. Master Controller manages the communication between coordinators.
2. It is an interface between coordinators home automation server.

This report includes home automation system hardware with interfacing of relays, fan control circuitry and light dimmer circuit using microcontroller by generating PWM signals for the controlling of Fan and Light digitally.

IV. CONCLUSION

This project is designed, implemented and tested successfully. This is a very good project which save our valuable time, energy and also helps the physically handicapped to control house hold devices with their smartphone after completing the software development part. Fan control circuit is used here to control the speed of fan digitally by using PWM waveforms hence there is no need to go to the electric board and varies the speed. The Future expansion of this project can implement GSM modem with this system to control the appliances from outside the home.[8]

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