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Automation of Home Appliances using Advanced Light Control System

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***Abstract*—** This world is Full of different kind of light sources some are natural ones while others are man-made light sources. The man-made light sources have only two modes of operation that is switch on and switch off there is no intermediate level that can be set according to the people available in the room and at the end everything needs to be controlled manually. These lead to wastage of electricity and at the same time a manual control is not effective in the modern era. Hence we purpose an advanced light control system which is capable of replacing the old generation light control system. The system is implemented on an embedded platform & is equipped with a infrared sensors(IR) which gives the required input for operation .The working of our light control system is based on the count of the people in the room at that moment of time.

***Keywords*—**Lignt Control System , Modern era, Embedded system, Electricity etc.

I. INTRODUCTION

Room automation involves the control and automation of various features of a room. It includes lighting, fan, exhaust etc. Nowadays the energy is wasted by modern people as they don't care much about energy so they use it according to their comfort. We must remember that energy is the most important aspect in every one's life, we should consider saving it. For this we can use the idea of automation.

Automation of rooms helps in optimizing energy consumption and easy usage of room operations. It optimizes energy without compromise the comfort of the user GSM module is used for remote controlling of room features by the user itself. LDR and temperature sensors help in monitoring room light and temperature conditions respectively. This data is used for automatic control of light intensity and fan speed control. PIR sensor is included for human detection and Thief alerts. Alerts are sent to user's cell phone. Shades are automated according to time and human presence.

The sound system which wakes up user in the morning also greets the user when entered to the room. Exhaust fan is provided to improve air quality. If we are bored with automation, we can always switch to manual controlling mode. By initiating the automated smart rooms we can neglect the unwanted wastage of energy.

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Home automation or smart home (also known as domotics or domotica) is the residential extension of building automation and involves the control and automation of lighting, heating (such as smart thermostats), ventilation, air conditioning (HVAC), and security, as well as home appliances such as washer/dryers, ovens or refrigerators/freezers that use Wi-Fi for remote monitoring. Modern systems generally consist of switches and sensors connected to a central hub sometimes called a "gateway" from which the system is controlled with a user interface that is interacted either with a wall-mounted terminal, mobile phone software, tablet computer or a web interface, often but not always via internet cloud services. These days, the web need ended up a normal interface that a significant number of gadgets use in place will improve the everyday life about numerous individuals.

Web aides us to get quick result for huge number of issues capable to interface starting with any of the remote spots which contributes with general expense decrease furthermore vitality utilization. Home mechanization might make portrayed as introduction for innovation organization in the home environment which provides straightforwardness which is more secure with its occupants.

Towards utilizing the innovation of web for Things, those examinations Furthermore execution about home mechanization have got extra Normal. Different remote advances which has the capacity to help some sort of remote information transfer, sensing also management like Bluetooth, Wi-Fi and other cell division networks would be used to enter abundant levels for discernment inside the home. It might provide an interface with home mechanization itself, by means of mobile phone or alternately the internet.

The Main objective of this work is

- Optimizing energy consumption without compromising comfort
- Automation of room functions and remote controlling
- First generation: wireless technology with proxy server, e.g. Zigbee automation; Second generation: artificial intelligence controls electrical devices, e.g. amazon echo; Third generation: robot buddy "who" interacts with humans, e.g. Robot Rovio, Roomba.

- Applications and technologies: Heating, ventilation and air conditioning (HVAC): it is possible to have remote control

of all home energy monitors over the internet incorporating a simple and friendly user interface.

- Lighting control system: Appliance control and integration with the smart grid and a smart meter, taking advantage, for instance, of high solar panel output in the middle of the day to run washing machines.

II. AUTOMATION

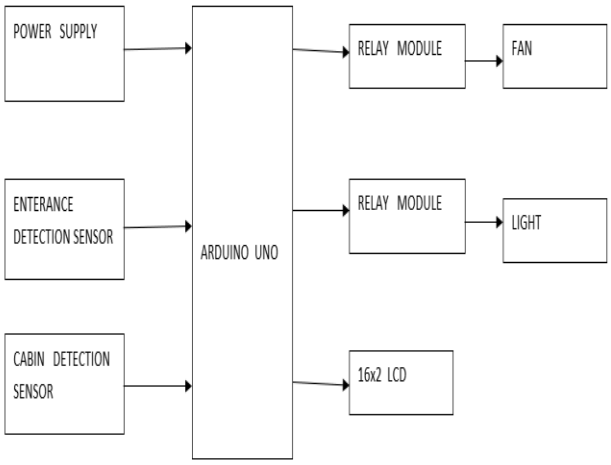

Figure 1. Block Diagram of proposed work

A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters. Some power supplies are separate standalone pieces of equipment, while others are built into the load appliances that they power. Examples of the latter include power supplies found in desktop computers and consumer electronics devices. Other functions that power supplies may perform include limiting the current drawn by the load to safe levels, shutting off the current in the event of an electrical fault, power conditioning to prevent electronic noise or voltage surges on the input from reaching the load, power-factor correction, and storing energy so it can continue to power the load in the event of a temporary interruption in the source power (uninterruptible power supply).

All power supplies have a power input connection, which receives energy in the form of electric current from a source, and one or more power output connections that deliver current to the load. The source power may come from the electric power grid, such as an electrical outlet, energy storage devices such as batteries or fuel cells, generators or alternators, solar power converters, or another power supply. The input and output are usually hardwired circuit connections, though some power supplies employ wireless energy transfer to power their loads without wired connections. Some power supplies have other types of inputs and outputs as well, for functions such as external monitoring and control.

A transformer is a passive electrical device that transfers electrical energy from one electrical circuit to one or more circuits. A varying current in any one coil of the transformer produces a varying magnetic flux, which, in turn, induces a varying electromotive force across any other coils wound around the same core. Electrical energy can be transferred between the (possibly many) coils, without a metallic connection between the two circuits. Faraday's law of induction discovered in 1831 described the induced voltage effect in any coil due to changing magnetic flux encircled by the coil.

Transformers are used for increasing alternating voltages at low current (Step Up Transformer) or decreasing the alternating voltages at high current (Step Down Transformer) in electric power applications, and for coupling the stages of signal processing circuits.

Since the invention of the first constant-potential transformer in 1885, transformers have become essential for the transmission, distribution, and utilization of alternating current electric power. A wide range of transformer designs is encountered in electronic and electric power applications. Transformers range in size from RF transformers less than a cubic centimeter in volume, to units weighing hundreds of tons used to interconnect the power grid.

III. ARDUINO UNO

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.

Figure 2. ARDUINO UNO

The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and

Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

The word "uno" means "one" in Italian and was chosen to mark the initial release of Arduino Software. The Uno board is the first in a series of USB-based Arduino boards; it and version 1.0 of the Arduino IDE were the reference versions of Arduino, which have now evolved to newer releases. The ATmega328 on the board comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer.

While the Uno communicates using the original STK500 protocol, it differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

The Arduino project started at the Interaction Design Institute Ivrea (IDII) in Ivrea, Italy. At that time, the students used a BASIC Stamp microcontroller, at a cost that was a considerable expense for many students. In 2003, Hernando Barragán created the development platform Wiring as a Master's thesis project at IDII, under the supervision of Massimo Banzi and Casey Reas, who are known for work on the Processing language. The project goal was to create simple, low-cost tools for creating digital projects by non-engineers. The Wiring platform consisted of a printed circuit board (PCB) with an ATmega168 microcontroller, an IDE based on Processing, and library functions to easily program the microcontroller. In 2003, Massimo Banzi, with David Mellis, another IDII student, and David Cuartielles, added support for the cheaper ATmega8 microcontroller to Wiring. But instead of continuing the work on Wiring, they forked the project and renamed it Arduino. Early arduino boards used the FTDI USB-to-serial driver chip and an ATmega168.[8] The Uno differed from all preceding boards by featuring the ATmega328P microcontroller and an ATmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

The Arduino/Genuino Uno has a number of facilities for communicating with a computer, another Arduino/Genuino board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A SoftwareSerial library allows serial communication on any of the Uno's digital pins.

IV. AUTOMATIC (SOFTWARE) RESET

Rather than requiring a physical press of the reset button before an upload, the Arduino/Genuino Uno board is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip.

This setup has other implications. When the Uno is connected to a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened.

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.

There are two types of infrared sensors: active and passive. Active infrared sensors both emit and detect infrared radiation. Active IR sensors have two parts: a light emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver. Active IR sensors act as proximity sensors, and they are commonly used in obstacle detection systems (such as in robots).

V.OPERATION

A PIR sensor can detect changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor.[2] When an object, such as a person, passes in front of the background, such as a wall, the temperature at that point in the sensor's field of view will rise from room temperature to body temperature, and then back again. The sensor converts the resulting change in the incoming infrared radiation into a change in the output voltage, and this triggers the detection. Objects of similar temperature but different surface characteristics may also have a different infrared emission pattern, and thus moving them with respect to the background may trigger the detector as well.

PIRs come in many configurations for a wide variety of applications. The most common models have numerous Fresnel lenses or mirror segments, an effective range of about 10 meters (30 feet), and a field of view less than 180. Models

with wider fields of view, including 360°, are available, typically designed to mount on a ceiling. Some larger PIRs are made with single segment mirrors and can sense changes in infrared energy over 30 meters (100 feet) from the PIR. There are also PIRs designed with reversible orientation mirrors which allow either broad coverage (110° wide) or very narrow "curtain" coverage, or with individually selectable segments to "shape" the coverage.

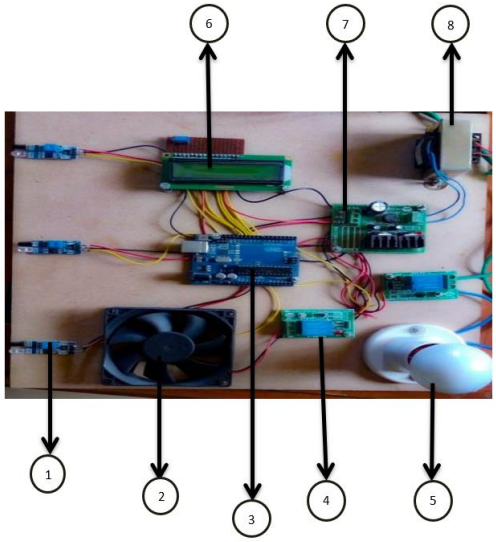

Figure 3. Hardware photograph

The figure 3 shows the hardware photograph. The components are,

1.IR SENSOR
2.FAN
3.ARDUINO UNO
4.RELAY
5.BULB
6.16*2 LCD
7.POWER SUPPLY
8.TRANSFORMER

VI. CONCLUSION

This Arduino based project will provide a competent method for lighting systems and make the whole process of energy saving easier and efficient. With a capability to change the amount of light emitted depending upon the outside condition is no doubt an innovation with many future application apart from the fact that it can also be used in many present day tech such as head lights, street light, park lights, industrial lights and many more. The usage of the smart lighting system will undoubtedly change the world that see today.

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