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Green Intelligent Home Technology

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Abstract: A Green Intelligent Home in which the home environment is monitored by ambient intelligence to provide context-aware services and facilitate remote home control. Green Intelligent Home domain is a new trendy way of home automation and energy conservation. . It describes collective information about sensors, multimedia devices, protective systems , communication protocols, which are widely used in green intelligent home implementation . Different fields and their significance are explained according to their scope of use in green intelligent homes. The main objective of this paper is to identify the main applications of various home automation technologies and future enhancements needed in this field.
Keywords: Green intelligent homes; energy conservation; home automation; protective context.

I. INTRODUCTION

Green Intelligent home is one of the promising technological advancement in the field of automation system. Various research works were carried out in home automation filed. Green Intelligent Homes offer a better quality of life by introducing automated appliance control and assistive services. They optimize user comfort by using context awareness and predefined constraints based on the conditions of the home environment .Green Intelligent homes involves incorporating smartness into dwellings for comfort, eco-friendly, safety, security, and energy conservation. Remote monitoring systems are common components of Green Intelligent Homes, which use telecommunication and web technologies to provide remote home control and support patients remotely from specialized assistance centers. The energy management systems associated with the smart living mainly deals with efficient provision, co -production and consumption of energy. A home needs three things to make it green and intelligent-

A. *Power Source*—Solar, Wind, Garbage;
B. *Intelligent control*—gateway to manage the featured systems;
C. *Home automation*—products within the home and links to services and systems outside the home.

Considering the current trends in Green intelligent home research, we can define the Green Intelligent Home as an application of ubiquitous computing that is able to provide assistive services in the form of ambient intelligence , security and home automation.
This Green Home Consist of following modern technologies-

II. REVIEW ON GREEN INTELLIGENT HOME TECHNOLOGY

This project is based on the eco friendly and smart living nature which conducted mainly on experiment environment.
In this project we use a solar panel to provide power supply
Which provides 230V AC which is step down using the transformer (12-0-12) .The 12V ac input is fed to the bridge diode to gives 12V pulsating DC. This DC voltage is filtered through the capacitor to remove the ripples. The filtered DC is fed to 7805 regulator to fetch +5v regulated output. This regulated voltage is given to all the components to function properly.
In this project we have used two sets of IR sensors one outside the gate and other one just inside the gate. When the IR sensor gives analog output, this signal is converted in digital signal using op-amp LM324.When any of the sensors is cut the gate opens. And the gate is opened till the other sensor is not cut. We have used this procedure to count the number of person. If outside sensor is cut before then the counter is increased and vice versa.
There is LDR sensor also provided which measures the intensity of light inside. This signal is also an analog signal we have to convert it into digital signal using same Op-amp LM324. If there are persons inside and the intensity of light is below a certain limit then the light inside is switched on. The dc bulb is connected to the motor driver. We have used the left out H-bridge of the motor driver. The Accessories are used in this project are –

A. DC ADOPTER
B. DIP BASE

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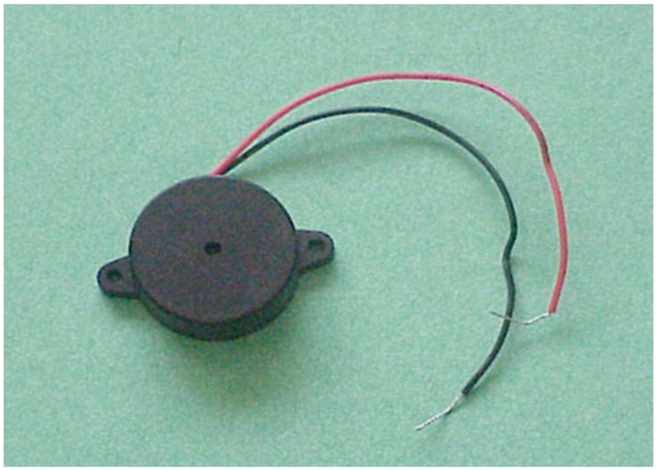
C. POWER JAC
D. SWITCHE
E. BERGE STRI
F. CONNECTOR
G. DC CONNECTORS

Elements are used in this projects –

1) Buzzer: A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.



2) *Microcontroller:* The microcontroller development effort resulted in the 8051 architecture, which was first introduced in 1980 and has gone on to be arguably the most popular micro controller architecture available. The 8051 is a very complete microcontroller with a large amount of built in control store (ROM &EPROM) and RAM, enhanced I/O ports, and the ability to access external memory. The maximum clock frequency with an 8051 micro controller can execute instructions is 20MHZ.Microcontroller is a true computer on chip. The design incorporates all of the features found in a microprocessor: CPU, ALU, PC, SP and registers. It also has the other features needed to, make complete computer: ROM, RAM, parallel I/O, serial I/O, counters and a clock circuit. The 89C51/89C52/89C54/89C58 contains a non-volatile FLASH program memory that is parallel programmable. For devices that are serial programmable(In-System Programmable (ISP) and In-Application Programmable (IAP) with a boot loader)All three families are Single-Chip 8-bit Microcontrollers manufactured in advanced CMOS process and are Derivatives of the 80C51 microcontroller family. All the devices have the same instruction set as the 80C51.
3) *Description:* The AT89s8253 is a low power, high performance CMOS 8-bit micro computer with 8K bytes of flash programmable and erasable read only memory(PEROM).The device is manufactured using Atmel's high density nonvolatile memory technology and is compatible with the industry standard 80c51 and 80C52 instruction set and pin out. The on-chip flash allows the program memory to be reprogrammed in system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with flash on a monolithic chip, the Atmel AT89s8253 is a powerful microcomputer which provides a highly flexible and cost effective solution to many embedded control applications. The main advantages of 89s8253 over 8051 are:
a) Software Compatibility
b) Program Compatibility
c) Maximum erase cycle
4) *Processor Architecture:* The 8051 is the name of a big family of microcontrollers. The device which we are going to use along this tutorial is the 'AT89S8253'which is a typical 8051 microcontroller manufactured by Atmel™. Note that this part doesn't aim to explain the functioning of the different components of a 89S52 microcontroller, but rather to give you a general idea of the organization of the chip and the available features, which shall be explained in detail along this tutorial.

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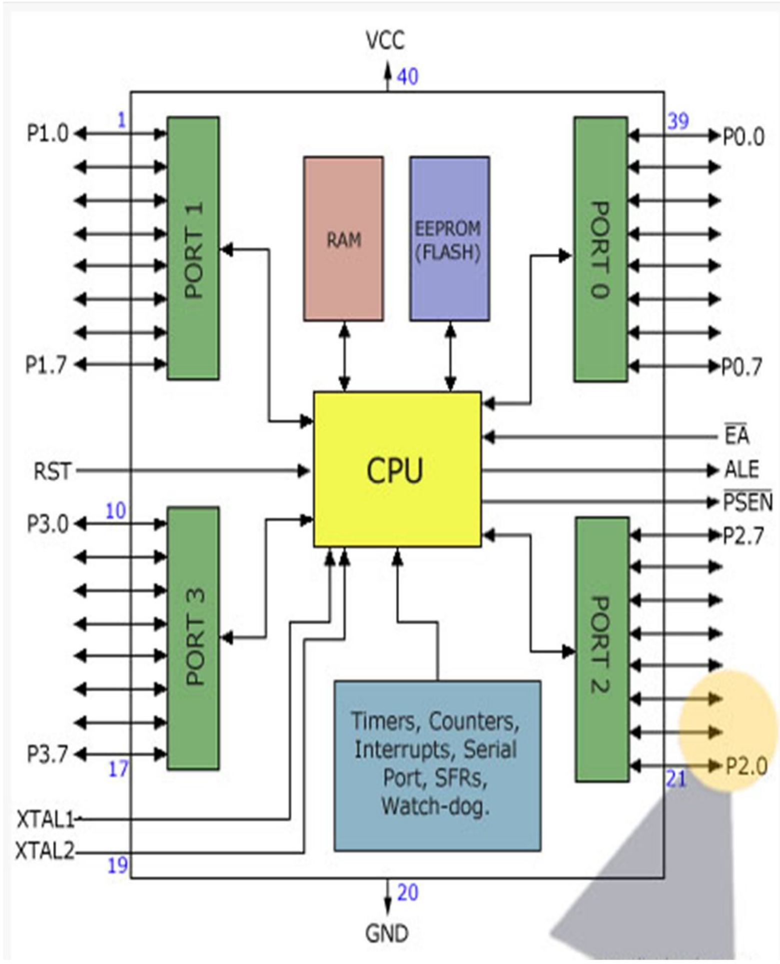

5) *Capacitor:* The function of capacitors is to store electricity, or electrical energy. The capacitor also functions as filter, passing AC, and blocking DC. The capacitor is constructed with two electrode plates separated by insulator. They are also used in timing circuits because it takes time for a capacitor to fill with charge. They can be used to smooth varying DC supplies by acting as reservoir of charge. The capacitor's function is to store electricity, or electrical energy. The capacitor also functions as a filter, passing alternating current (AC), and blocking direct current (DC). This symbol (—||—)is used to indicate a capacitor in a circuit diagram. The capacitor is constructed with two electrode plates facing each other but separated by an insulator. MWhen DC voltage is applied to the capacitor, an electric charge is stored on each electrode. While the capacitor is charging up, current flows. The current will stop flowing when the capacitor has fully charged.
Commercial capacitors are generally classified according to the dielectric. The most used are mica, paper, electrolytic and ceramic capacitors. Electrolytic capacitors use a molecular thin oxide film as the dielectric resulting in large capacitance values. There is no required polarity, since either side can be the most positive plate, except for electrolytic capacitors. These are marked to indicate which side must be positive to maintain the internal electrolytic action that produces the dielectric required to form the capacitance. It should be noted that the polarity of the charging source determines the polarity of the changing source determines the polarity of the capacitor voltage.
6) *Crystal Oscillator:* A crystal oscillator is an electronic circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time (as in quartz wristwatches), to provide a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters and receivers. The most common type of piezoelectric resonator used is the quartz crystal, so oscillator circuits designed around them were called "crystal oscillators".

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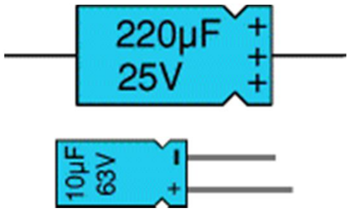

A crystal oscillator is an electronic circuit that produces electrical oscillations at a particular designed frequency determined by the physical characteristics of one or more crystals, generally of quartz, positioned in the circuit feedback loop. A piezoelectric effect causes a crystal such as quartz to vibrate and resonate at a particular frequency. The quartz crystal naturally oscillates at a particular frequency, its fundamental frequency that can be hundreds of megahertz. The crystal oscillator is generally used in various forms such as a frequency generator, a frequency modulator and a frequency converter. The crystal oscillator utilizes crystal having excellent piezoelectric characteristics, in which crystal functions as a stable mechanical vibrator. There are many types of crystal oscillators. One of them is a crystal oscillator employing an inverting amplifier including a CMOS (complementary metal oxide semiconductor) circuit, and used, for example, as a reference signal source of a PLL (phase-pocked poop) circuit of a mobile phone. Crystal oscillator circuits using crystal have a number of advantages in actual application since crystals show high frequency stability and stable temperature characteristic as well as excellent processing ability. Temperature-compensated crystal oscillators, in which variation in oscillation frequency that arises from the frequency-temperature characteristic of the quartz-crystal unit is compensated, find particularly wide use in devices such as wireless phones used in a mobile environment. A surface mounting crystal oscillator is used mainly as a frequency reference source particularly for a variety of portable electronic devices such as portable telephones because of its compact size and light weight.Crystal Oscillator of different frequencies with uses-

Frequency (MHz)	Primary uses
0.032768	Real-time clocks, quartz watches and clocks; allows binary division to 1 Hz signal ($2^{15} \times 1$ Hz)
1.8432	UART clock; allows integer division to common baud rates. (= $2^{13} \times 3^2 \times 5^2$. 16 × 115200 baud or 96 × 16 × 1200 baud)
2.4576	UART clock; allows integer division to common baud rates up to 38400
3.2768	Allows binary division to 100 Hz (32768 × 100 Hz, or $2^{15} \times 100$ Hz)
3.575611	PAL M color subcarrier
3.579545	NTSC M color subcarrier. Because these are very common and inexpensive they are used in many other applications, for example DTMF generators
3.582056	PAL N color subcarrier
3.6864	UART clock (2 × 1.8432 MHz); allows integer division to common baud rates
4.096	Allows binary division to 1 kHz ($2^{12} \times 1$ kHz)

H. DIODE BRIDGE

A diode bridge is an arrangement of four (or more) diodes in a bridge circuit configuration that provides the same polarity of output for either polarity of input. When used in its most common application, for conversion of an alternating current (AC) input into a direct current (DC) output, it is known as a bridge rectifier. A bridge rectifier provides full-wave rectification from a two-wire AC input, resulting in lower cost and weight as compared to a rectifier with a 3-wire input from a transformer with a center-tapped secondary winding

The essential feature of a diode bridge is that the polarity of the output is the same
regardless of the polarity at the input. The diode bridge circuit is also known as the Graetz circuit .

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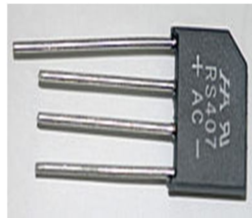
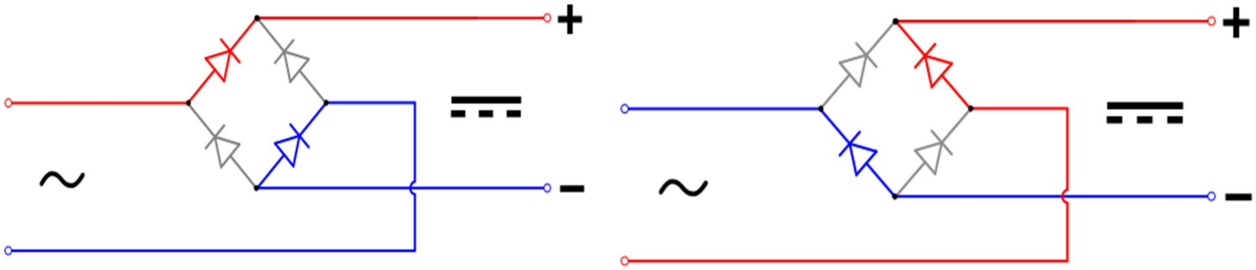


Operation According to the conventional model of current flow originally established by Benjamin Franklin and still followed by most engineers today, current is assumed to flow through electrical conductors from the positive to the negative pole. In actuality, free electrons in a conductor nearly always flow from the negative to the positive pole. In the vast majority of applications, however, the actual direction of current flow is irrelevant. Therefore, in the discussion below the conventional model is retained.
In the diagrams below, when the input connected to the left corner of the diamond is positive, and the input connected to the right corner is negative, current flows from the upper supply terminal to the right along the red (positive) path to the output, and returns to the lower supply terminal via the blue (negative) path.

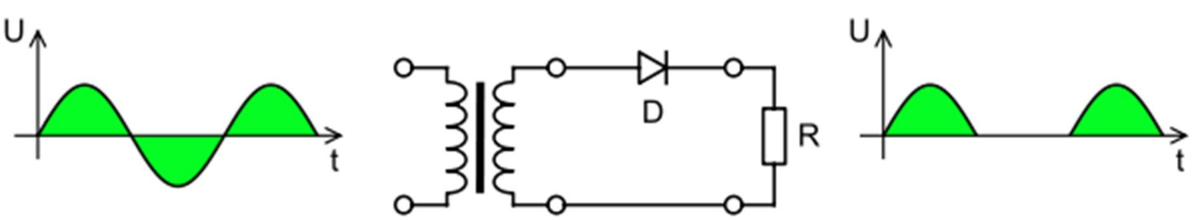


n each case, the upper right output remains positive and lower right output negative. Since this is true whether the input is AC or DC, this circuit not only produces a DC output from an AC input, it can also provide what is sometimes called "reverse polarity protection".

I. Rectifiers

A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as rectification.
The simple process of rectification produces a type of DC characterized by pulsating voltages and currents (although still unidirectional

1) *Half_Wave Rectification:* In half wave rectification of a single-phase supply, either the positive or negative half of the AC wave is passed, while the other half is blocked. Because only one half of the input waveform reaches the output, mean voltage is lower. Half-wave rectification requires a single diode in a single-phase supply, or three in a three-phase supply. Rectifiers yield a unidirectional but pulsating direct current; half-wave rectifiers produce far more ripple than full-wave rectifiers, and much more filtering is needed to eliminate harmonics of the AC frequency from the output.



2) *Full Wave Rectifier:* A full-wave rectifier converts the whole of the input waveform to one of constant polarity (positive or negative) at its output. Full-wave rectification converts both polarities of the input waveform to DC (direct current), and yields a higher mean output voltage. Two diodes and a center tapped transformer, or four

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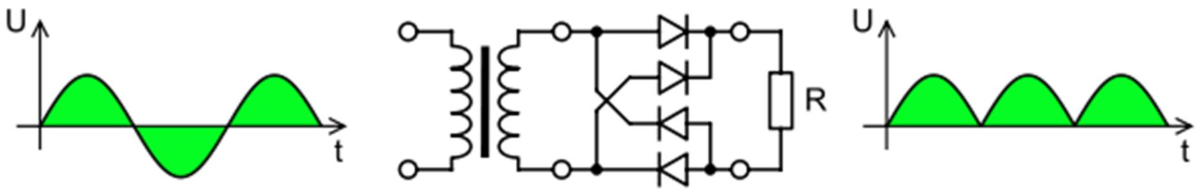
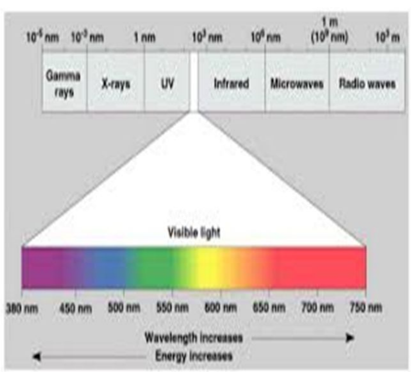
diodes in a bridge configuration and any AC source (including a transformer without center tap), are needed. Single semiconductor diodes, double diodes with common cathode or common anode, and four-diode bridges, are manufactured as single components.

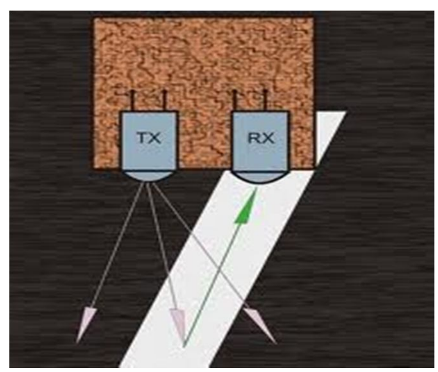


3) *Bridge Rectifier:* A bridge rectifier makes use of four diodes in a bridge arrangement to achieve full-wave rectification. This is a widely used configuration, both with individual diodes wired as shown and with single component bridges where the diode bridge is wired internally.

J. IR Sensor

Infrared (IR) light is electromagnetic radiation with longer wavelengths than those of visible light, extending from the nominal red edge of the visible spectrum at 0.74 micro-meters (µm) to 300 µm. This range of wavelengths corresponds to a frequency range of approximately 1 to 400 THz, and includes most of the thermal radiation emitted by objects near room temperature. Infrared light is emitted or absorbed by molecules when they change their rotational-vibration movements. Infrared light is used in industrial, scientific, and medical applications. Night-vision devices using infrared illumination allow people or animals to be observed without the observer being detected. In astronomy, imaging at infrared wavelengths allows observation of objects obscured by interstellar dust. Infrared imaging cameras are used to detect





heat loss in insulated systems, to observe changing blood flow in the skin, and to detect overheating of electrical apparatus.

This sensor finds wide applications. This consists of an IR transmitter and photo-diode as IR receiver. When we apply a potential across the transmitter it transmits IR rays. It should be noted that IR is not a visible ray so one cannot test the IR easily that whether it is transmitting or not. Implant the proper potential across the IR transmitter and see the transmission using a camera.

The feature of the IR led almost same(however rays are not visible) as LED so to make the transmitter include a series resistance of 220 ohm- 1.5 K-ohm then apply the desired potential 5V or 9 V. Check the transmitter using the camera. The IR led should be connected in forward bias (that its positive should be connected to positive and negative to the negative).

The IR receiver is an electronic component whose resistance decreases with increasing IR intensity. It is also called as "Photo diode" The photodiode is reversed biased so the depletion region of the junction is very thick thus the resistance. When IR having energy falls on such a junction more electron hole pairs is generated increasing the conductance making the depletion region thin? Due to this additional energy, these electrons/holes become free and jump in to the conduction band. Due to these charge carriers, the conductivity of the device increases, decreasing its resistivity.

Design the transmitter source first than put the receiver in front of the transmitter Put the multi-meter knob on the proper resistance range and put the cathode and anode terminal on the terminal of the IR receiver. Put the IR source in front of the photodiode and check the resistance and then put off the IR source and check the resistance. Also vary the IR intensity and check the resistance.

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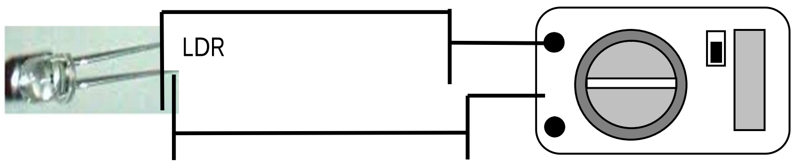
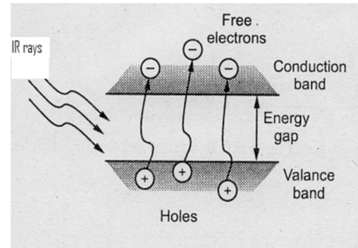
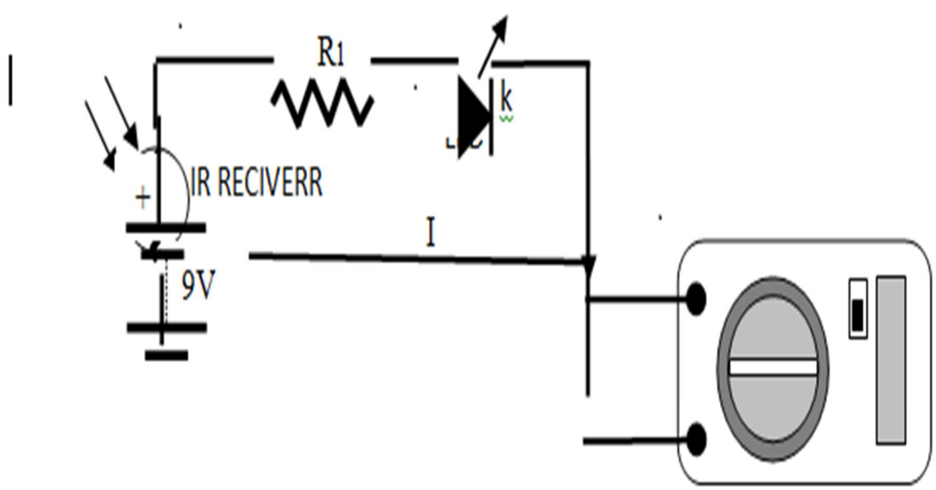
Measure the resistance of the IR with the IR source and without the IR .

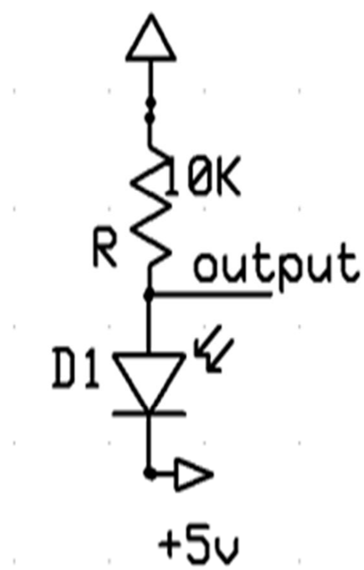




Resistance of photodiode with source	R1
Resistance of photodiode without source	R2

Always R1< R2 We apply a +5 V power supply across the IR receiver. Now if we put the IR source in front of receiver resistance changes. So if the resistance changes the voltage drop across it must also change.
But if the only load is the photodiode than according to Kirchhoff's second law the whole voltage will drop across the photodiode whether its resistance is less or more.
So to monitor the voltage variation we implant a series resistance with the photodiode as shown in figure. The resistance value in series should comparatively higher than that of the photodiode (>10K).Secondly IR receiver also cannot directly bear 5V it damages (the series resistance protect it).
Keep in mind the photodiode should be reverse biased. Put the knob on proper voltage range. Connect the cathode of multi-meter at the ground of power source and anode at the interface point of photodiode and the resistor (that is output).
Check the voltage in IR source condition and without IR else you can justify it with following circuit, where the intensity of LED varies with varying IR intensity conditions





Embedded System Embedded Systems are components integrating software and hardware jointly and specifically designed to provide given functionalities.
"An embedded system is an application that contains at least one programmable computer (typically in the form of a microcontroller, a microprocessor or digital signal processor chip) and which is used by individuals who are, in the main, unaware that the system is computer-based.
An embedded system is not always a separate block - very often it is physically built-in to the device it is controlling.
The software written for embedded systems is often called firmware, and is stored in read-only memory or flash convector chips rather than a disk drive. It often runs with limited computer hardware resources: small or no keyboard, screen, and little memory.

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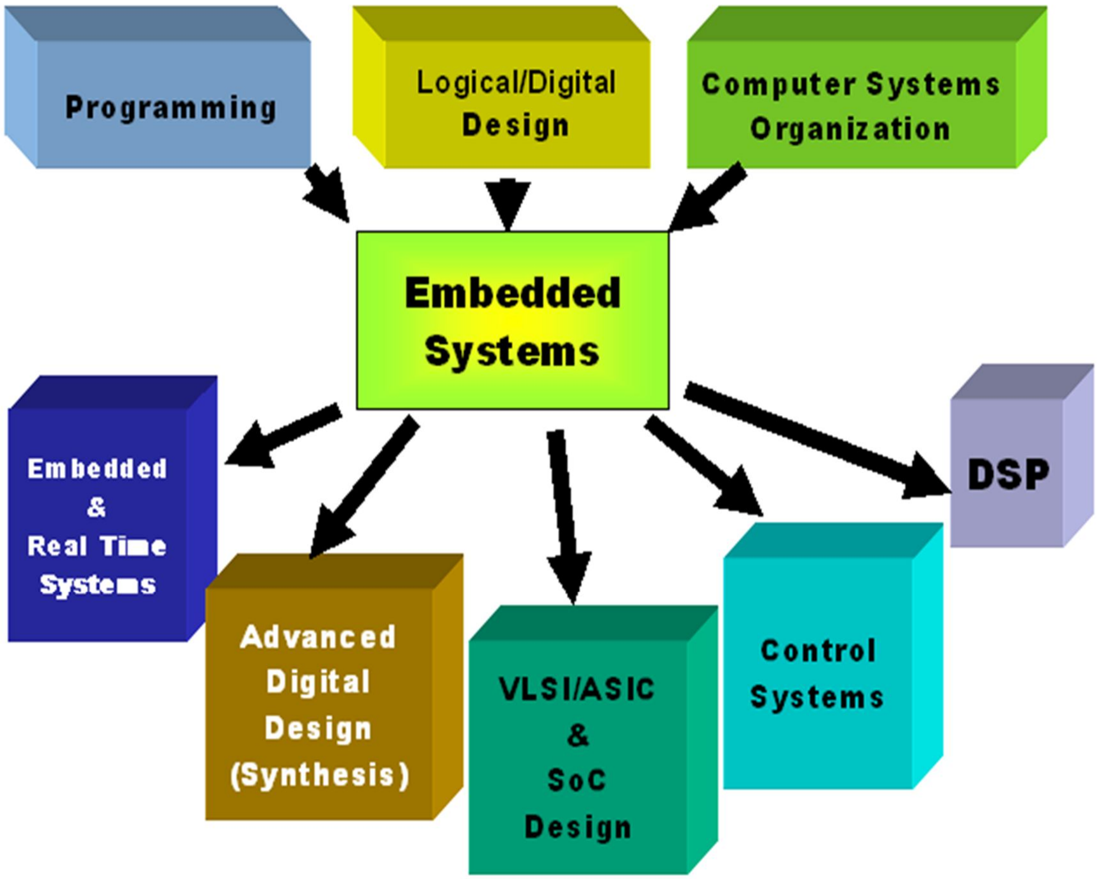

III. ADVANTAGES OF GREEN INTELLIGENT HOME

According to Winkler, a "green intelligent home" is a home that is able to proactively change its environment to provide services that promote an independent lifestyle for elderly users.

People with chronic illness, disabled people and old people residing at home alone are mostly benefitted by green intelligent home application. This smart technology of assessment can improve the environmental conditions, as it utilized the green sources of power like wind, solar etc.

This Green intelligent home also provides the work reduction as automatic gate opener system ,automatic switching of lights. Green Intelligent home constitute an interdisciplinary domain. The architecture of a smart home depends on other branches of engineering, e.g., sensor technology, communication, and information technology. Smart homes will benefit from the improvement and diffusion of these technologies.

IV.FUTURE CHALLENGES

Future homes will be able to offer almost all required services, e.g., advance communication system, medical technology, utilization of green energy, entertainment, and security systems. People spend a significant amount of time in their houses, which attracts potential investors to promote the integration of all possible services into traditional homes. Recently, a new research area regarding the intelligent control of electricity usage has emerged.

Current trends in smart home research imply that health-care services will receive more emphasis in the future. One of the main objectives will be providing assistive services for the elderly and disabled. Remote monitoring will become more popular because this technology requires less manpower. Other services related to comfort and security will be improved gradually with the improvement of associated components.

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V. CONCLUSION

Green Intelligent homes represent a potential research area, and their significance is growing rapidly because of increasing industrial demand. This study presents a general overview of Green Intelligent home projects that are arranged according to their intended services..

The main aim of this paper is to state that, to live a life up to expectations and realize a large-scale commercialization, Green Intelligent Home technology has to reach a higher level of maturity, which can be done only by identifying, analyzing and implementing a wide range of aspects, from both technological and non-technological areas. This paper identifies several future directions of green intelligent home research. The trends indicate the increasing popularity of using middleware to integrate heterogeneous devices. Because multivendor devices will coexist in future, the use of middleware is an efficient solution to create networks that will overcome the limitations of diverse device integration. It also discusses the significance and limitations of smart home building blocks. The taxonomy of devices, media, protocols, algorithms, methods, and services presents an informative comparison between the associated technologies The future healthcare service provider will consider the green intelligent home an effective way of providing remote healthcare services, especially to the elderly and disabled who do not require intensive healthcare support. For the same reason, assistive healthcare services will draw more attention to prospective researchers. In the future, smart homes will be connected to various service providers to automate and optimize services. The system will also use different user interfaces to acquire user feedback, most of which will be based on auditory, visual, and haptic perceptions. Recently, people have become concerned about information security, which can be easily solved by using concepts from computer security and cryptography.

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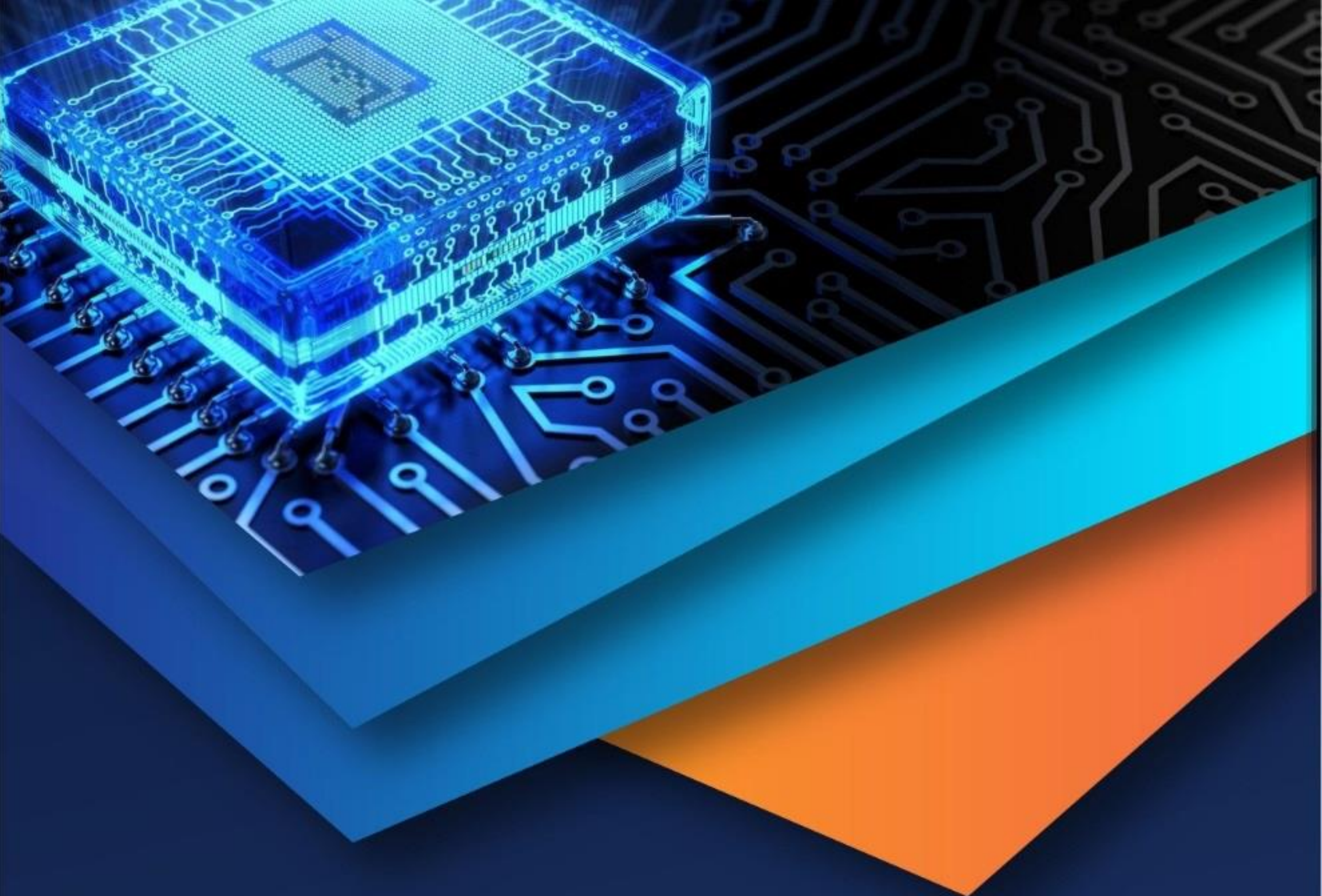

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