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Design and Implementation of an Advanced Home Automation

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Abstract: ***Technology is a never ending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. This paper presents the design and implementation of alexa based home automation system. The design is based on a PIC the home appliances are connected to the input/ output ports of this board via relays. The communication between the alexa and the PIC Controller is wireless. This system is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core.***
Keywords: Home automation; PIC microntroller; wimos LCD, sensors, GSM module.

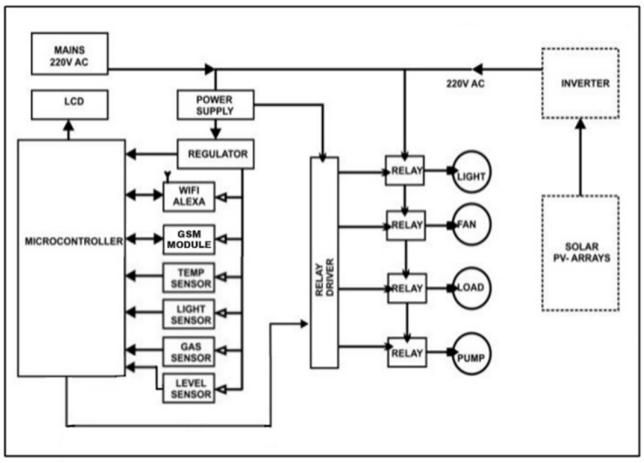
I. INTRODUCTION

The design and implementation of a secure alexa cell phone based home automation system. . Homes can be interfaced with sensors including motion sensors, light sensors and temperature sensors and provide automated toggling of devices based on conditions. More energy can be conserved by ensuring occupation of the house before turning on devices and checking brightness and turning off lights if not necessary. The system can be integrated closely with home security solutions to allow greater control and safety for home owners. The communication between the cell phone and the PIC Controller is wireless. In this system amazon alexa or Google assistance are used to communication between the human voice . This system is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core.

The development of digital information has led the rapid change in human lifestyle. The use of electricity is very important as one of the main source of energy that is vital in today modern life. Some kinds of mechanism using available technology could be used to reduce wastage in electricity usage.

As the technology grows, SMS technology has been widely accepted as a part of medium of communication . The purpose of using SMS is to provide widest coverage at minimal cost. Therefore the use of SMS would facilitate in controlling the electrical device at home from long distance and low in maintenance and independent from any physical geographical boundary.

II. METHODOLOGY

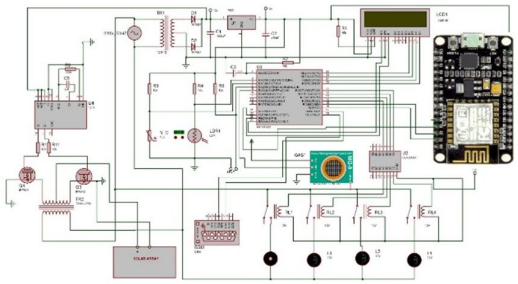


Block diagram , shows that solar arrays are used for the generation of electrical energy. DC power it connected to the inverter to convert AC power . the output of the inverter is 220v50Hz. Which is connected to the stepdown transformer to convert 220v into 12v. microcontroller gives the output command to the relay drive and relay turn on/off the load application from the recived command from the microcontroller.

Gas sensor, water level sensor. LDR, temperature sensor connected to microcontroller gives the Input signal to microcontroller. microcontroller will decide as per program and generated as output to operate the load LCD screen is used to control microcontroller for the monitoring the voltage, current, power,. alexa is used to operate the loads. GSM is used to check the status of the home.

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III. DESIGN



A. Design of microcontroller, relay and LCD interfacing.
B. Interfacing of GSM modem.
C. Connectivity testing of GSM modem.
D. Designing and development of voice based command through google assistance and amazon alexa.
E. Study of various sensors(LDR, temperature, GAS, level.)

IV. IMPLEMENTATION

There are certain parts which are dependant on each other. Functioning or command will be transferred to each part after in terms of electrical signals. The working functions of main parts are as follows

- Step down Transformer (220-12v)
- PIC microcontroller
- GSM Modem
- Wi-Mos 32
- Sensors
- Relay module

Paper is based on GSM and Alexa. Here PIC microcontroller and appliances are coupled with each other. We provide a supply of 12v to the PIC microcontroller. By using IOT application. We can operate the appliances. When gas leak in home. It will sense by gas sensor and show on display and GSM module send an update to mobile via SMS message so that immediately fault detect and the repair it.

Alexa is used to control home appliances by using application of smartphone. Here we connect relay module and driver IC. Driver IC is commonly used to relay module. Relay act as a switch between electrical load and driver IC . it has two configuration normally open (NO) and normally close (NC) input to relay. If we give OFF command from mobile the relay is inn “OFF” condition and if we give ON command from mobile then relay is in “ON” condition.

Here we connect PIC microcontroller and GSM module SIM900A. By using PIC microcontroller and ADC commands, user are able to send and receive SMS through SIM900A GSM module. To send an SMS or receive SMS we use ADC commands which is easiest way to communicate with GSM. ADC commands are special commands which follow UART protocol.

We used WiMos 32 as a wifi device which receives a commands through Google Assistance or Amazon Alexa. Initially login is required to create multiple devices with device ID’s on Amazon Alexa and also registered the devices on Mobile phone app ”Amazon Alexa/Google Assistance” from which we give the commands. Amazon alexa is a Server on which all the information regarding Device ON/OFF status, device ID is stored. The wimos device requires active internet connection for communication.

V. RESULT

In this home automation technic, we can control the domestic appliances automatically such as ligh ,fan ,pump and gas leakage in kitchen using Alexa and GSM technology .which results to reduce consumption of electricity also helps to prevent the severe damages. Not only for home but also we can use it in any small scale industries where such applications are in use.

VI. CONCLUSION

Low cost, secure, universally accessible, remotely controlled solution for automation of homes has been introduced. The approach discussed in this novel and has achieved the target to control home appliances automatically with SMS-based system

and alexa satisfying user needs and requirements. GSM technology capable solution has proved to be controlled remotely, provide home automation and is cost-effective. Hence we can conclude that the required goals and objectives of home appliances control system have been achieved.

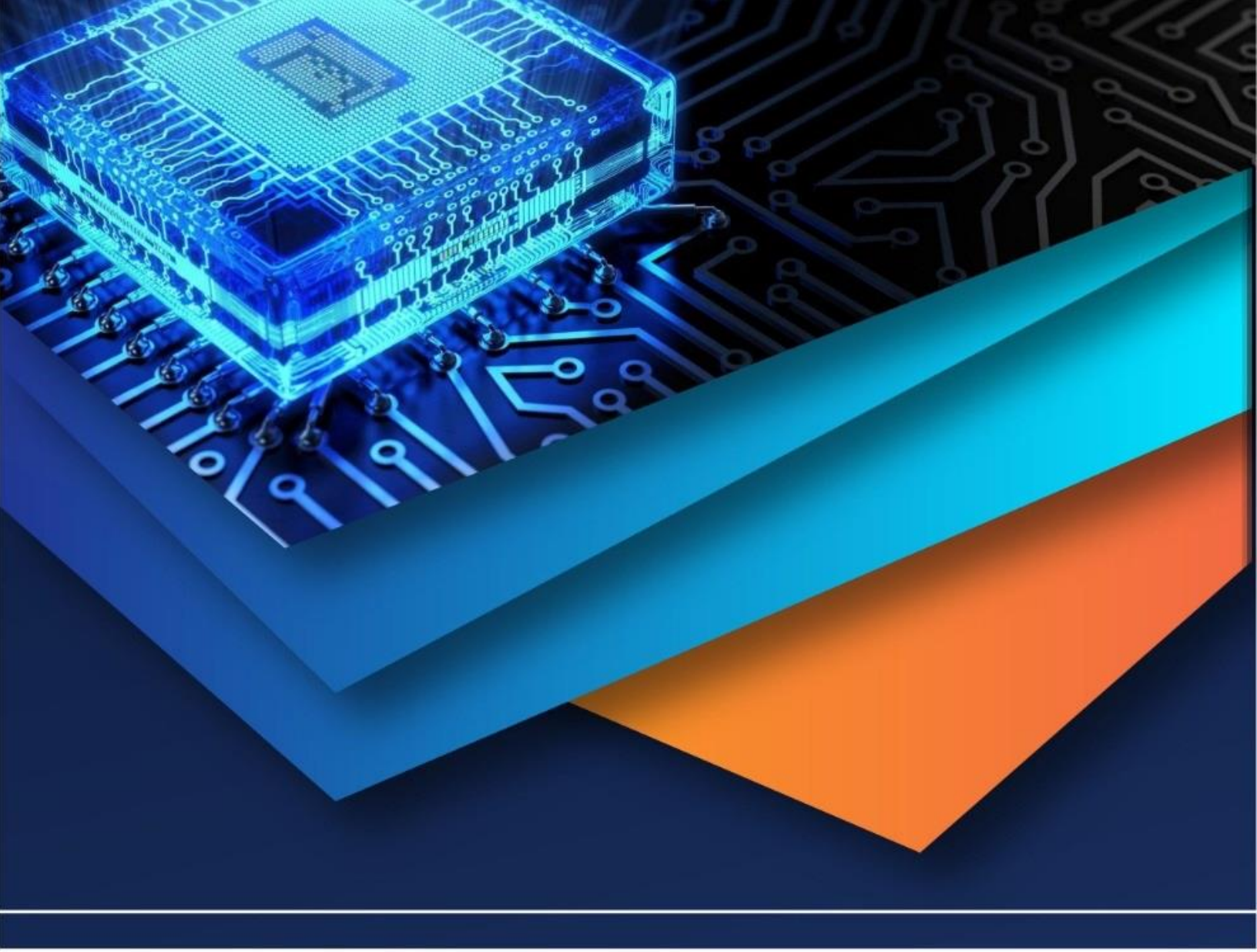
VII. ACKNOWLEDGEMENT

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