

FIELD PROGRAMMING GATE ARRAY BASED HOME AUTOMATION AND POWER MONITORING SYSTEM

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Abstract— Due to tremendous growth of technology, and human effect on the world's nature, and it changing into the cleaner and huge essential energy system. Also the two public and private sectors are decided to decrease the electricity usage, by this there is so many ways to reduce the electricity usage. In this paper we introduce the Field Programming Gate Array(FPGA) based home automation and power monitoring system through this we can reduce the power usage in apartments, houses and some of the small scale industries. Through this they can operate the electronic devices by smart phone and also they can monitor the real time consumption data and electricity price by an enabled smart meter. By this they can aware of the electricity consumption and it can be communicate with the consumer by SMS type.

Index Terms— Home automation, power management, Fpga, Smart meter, SMS

I. INTRODUCTION

With the quickly growing the many wireless gadgets in recent years, home automation obtained major appreciation. Few decades ago electricity will travels thousand of miles from the main electricity generating plants. The major energy loss occur while travelling from plant to consumers. The design of current power grid is not suitable and not used in further development. Nowadays smart grid become one of the most electronic gadget on the agenda for many governments and users, hence it is the key to grow the identify the current issues and meets the electricity demands.

Old power grids are being changing to smart grids by using these types of smart devices we can improve the security for consumers and also efficiency in power structure. Older power grids are not accurate in measuring in units and through this it is difficult to calculate the price. If it measure wrongly then price is high or low by this government will face the issues. By smart grid we can avoid these types of problems and through these smart grids(sd) we can solve the problems facing by the government and calculate the consuming units by the consumer.

Nowadays we must replace the power meters to smart grid meters for consumers. If government cannot replace the updated smart grids the consumers can theft the electricity

energy by stop the rotating of disc in power meters by using the card board. By doing this meter can't measure the consuming power. By performing these types of cheating activities government will faces the losses in electricity sector. Smart grid meters help to protect these types of thefts and these devices can measure the accurate units consumed by the user.

The suggest savvy home exchanging framework presents principle access management of the home's power, vitality gathering, and capacity for the dynamic electronic segment of the hardware, and remote correspondence for shrewd switches and attachments. A significant focal point of the proposed framework is to make a remote shrewd home framework with an additional usefulness of security to a structures power supply while expelling the electrical expenses of the dynamic electronic segments and remote correspondence modules. The primary commitments of the paper are to accomplish two destinations: (1) A functional plan and usage of security (get to control framework) for a structure's capacity supply which includes a locking highlight with the end goal that solitary approved faculty is proficient of adjusting the power condition of the shrewd attachments and switches in a structure; and (2) A model of vitality collecting and capacity framework for the dynamic electronic segments of the hardware, and remote correspondence for keen switches furthermore, attachments.

II. PREVIOUS WORK DONE ON HOME AUTOMATION:

There are several projects done based on home automation, majorly there are several gadgets developed by using Arduino board and ZigBee modules. By developing home automation projects using these components are not good and they can't handle the huge loaded electronic devices such as washing machines and air conditions remote ally. Arduino is not secured for the electronic gadgets they can easily hackable and consumer can face the issues. For operate the multiple devices they want to be reprogrammable for operate the devices. And there are few projects that are made by using Field Programmable Gate Array(FPGA) as an microcontroller, by using FPGA's we can communicate all the electronic devices easily and also operate the loaded

devices easily. It gives very secured for the consumers and it is non hackable.

III. PROPOSED WORK IN OUR PROJECT:

In our project we develop home automation by using field programming array and then through this we can secure our gadgets from hackers who can control our gadgets unknowingly of our mind. And also we introducing power monitoring system by this we can know how much power is consuming daily and we can estimate how much units are using per day with price. This can be received in the form of short message service(SMS) to the mobile phone. By this we can aware of consumption of electricity and then we can reduce the usage of power. This is mainly used for the small scale industries they can aware of usage of power and they can consume the power as per they earn. And also it is used for old age people and crippled people who can't operate the gadgets effectively. From this they can operate the devices easily by using the mobile phone. This is low power monitoring system developed by using programmable logic device. PLDS allow the quick growth of prototypes and structures of complex hardware system using FPGA. In energy meter we implement LDR sensor that usually used for calculate impulse generating in meter. And loads are connected to energy meter. FPGA is interfacing between relay, energy meter and GSM module relays that are connected to load. Relays are connected to FPGA and while loads are ON LDR sensor calculate impulse and then we already programmed to FPGA kit. After reaching certain units it sends message through GSM module with price tag. The system contain less cost components and easily exists which cut down the overall system expenditure.

A. HARD WARE TOOLS:

- FPGA Kit(Spartan 3)
- Gsm module
- Smart meter
- Relay
- 60w Lights

1) FPGA Kit(Spartan 3)

The Spartan®-3 age of FPGAs incorporates the Extended Spartan-3A family (Spartan-3A, Spartan-3AN, and Spartan-3A DSP stages), alongside the previous Spartan-3 and Spartan-3E families. These groups of Field Programmable Gate Arrays (FPGAs) are explicitly intended to address the issues of high volume, cost-touchy electronic applications, for example, purchaser items. The Spartan-3 age incorporates 25 gadgets offering densities running from 50,000 to 5 million framework doors. The Spartan-3 stage was the business' initial 90 nm FPGA, conveying more usefulness and data transfer capacity per dollar than was

beforehand conceivable, setting more prominent principles in the programmable rationale industry. The Spartan-3E stage expands on the achievement of the prior Spartan-3 stage by including higher highlights that improve framework execution and lessen the expense of arrangement. The Extended Spartan-3A family expands on the achievement of the prior Spartan-3E stage by further upgrading arrangement and decreasing capacity to give the least absolute expense. The Spartan-3AN stage gives the extra advantages of non-unpredictability and a lot of on-board client streak. The Spartan-3A DSP stage expands the thickness range and includes assets regularly required in advanced sign handling (DSP) applications. On account of their particularly minimal effort, Spartan-3 age FPGAs are unmistakably fit to a wide scope of purchaser gadgets applications, including broadband access, home systems administration, show/projection, and computerized TV hardware. The Spartan-3 age FPGAs give a better option than veil modified ASICs. FPGAs keep away from the high starting cost, the



FIG 1:Spartan 3 kit

extensive improvement cycles, and the intrinsic rigidity of customary ASICs. Likewise, FPGA programmability grants configuration updates in the field with no equipment substitution essential, an inconceivability with ASICs.

2) B.SOFTWARE TOOL:

XILINX Software

Code used:

VHDL

3) APPLICATIONS

- It is mainly used for small scale industries.
- Low power consumption.
- Easily can monitor consuming power through mobile.
- Easily communicate with heavy loaded applications.

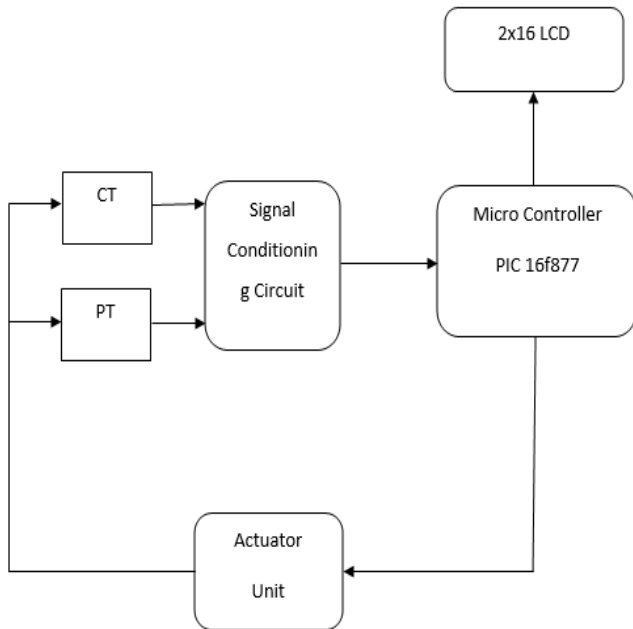


FIG 2:Block diagram

IV. RESULT AND DISCUSSION

When the load such as lights and motor are on, then current consuming is started and then relay is connected into the Field Programming Gate Array(FPGA) that used for switching the current to the load. FPGA is interfacing between energy meter and load. The amount of power is consumed is displayed in energy meter and then we want to fix the certain units code. If current reaches the equal units that is fixed in code then it sends the SMS to the mobile phone through the GSM module.

It calculate the consuming current by using LDR sensor that has been placed in energy meter. By LDR sensor we can calculate impulse. if it generates 100 pulse waves then it is equal to 1 Watt. After every one watt it will sends the message, as we programmed in code.

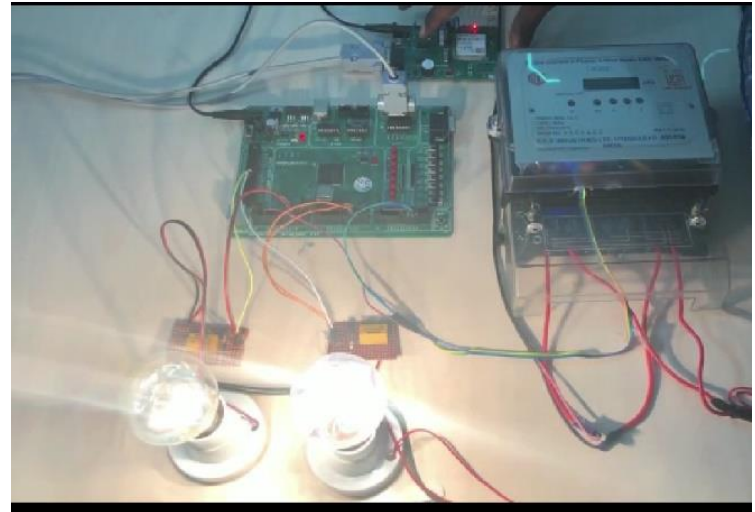


FIG 3:prototype of home automation and power monitoring system.

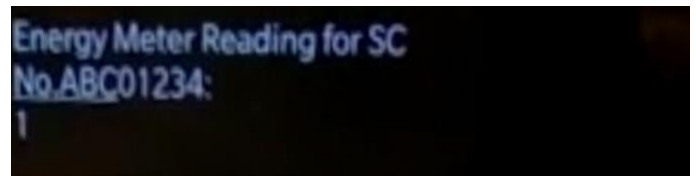


FIG 4: Message received by mobile phone through GSM module

V. CONCLUSION:

As we discussed in this paper the simple architecture of Home automation and power monitoring system from this we can operate the electronic devices and we can communicate through them by Bluetooth. And we are using smart grid that is used for monitor the consuming energy and also we can received SMS from the device by using GSM module. In that SMS we can see the consumed units with the price through this they can reduce the power consumption after reaching the certain units that set by the user

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