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POWER THEFT DETECTION USING WIRELESS SYSTEM: A DISTRIBUTED APPROACH FOR POWER THEFT PREVENTION

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Abstract

Electricity is indispensable to our daily life. Traditional remote meter reading system uses telephone lines and Modem to transmit data and control signals, but with the drawbacks of high maintenance costs, poor scalability and instable performance of Modem that is charged for too long. The objective of this project is to design a system in order to avoid the displeasure for the users from paying hefty bill irrespective of use of the electricity due to theft using Gsm module.

Key Terms **-** Power Theft, GSM Module, PC Interface, Current Sensors.

I. INTRODUCTION

Electricity is now more than a necessity. The need of electricity is increasing day by day. With increasing need of electricity the power theft is also increasing. It has become a must to develop a system to avoid the increasing theft. With the development of GSM network and its increasing popularity, GSM Modem and Short Message are gradually used to transmit information but there are still a few shortcomings, such as the unsatisfactory real-time ability to control the theft of electricity when user is not at home.

The objective of this project is to design a system in order to avoid the displeasure for the users from paying hefty bill irrespective of use of the electricity due to theft .Utility companies are under pressure. Growing populations are using increasing amounts of power, which is putting a strain on existing supplies. In many countries the increase in demand is growing at a faster rate than transmission capacity and the cost of providing power is also increasing due to higher fuel prices and increases in the cost of construction and capital expenses. This project provides an overview of Wireless Sensor Network for Power Management, including the cost savings as well as theft indicator cum prevention system it can provide. It then looks at how fits into this picture, and the ways in which it is ideally suited for the development. Our project uses PIC microcontroller along with relay drivers, sensors and GSM module to detect power theft as well as wastage of energy in malls and hotels.

II. MARKET SURVEY

Such system is not available in the market but it has only manual system. Microcontroller based system

is not available yet it's a prototype system what we are trying to develop since the microcontroller and GSM is an exciting, challenging, and growing field; it will pervade industry for decades to come. To meet the challenges of this growing technology, we will have to conversant with the programmable aspect of the microcontroller. Programming is a process of problem solving and communicating in a strange language of mnemonics. The projects could be developed significantly faster and much easily using a microcontroller.

III. BLOCK DIAGRAM

In this project you start or stop the meter by a unique number sms via gsm system. This PIN number is sent to microcontroller. Here the microcontroller is the flash type re programmable microcontroller which we have already programmed with PIN number. So the typed PIN number is compared with stored number if the PIN number is valid the microcontroller activates the relay driver circuit. Relay output is directly given to meter system. Now we can start the meter. This is for the purpose of theft identification and prevention.

The microcontroller is also programmed to limit the power consumption to a certain limit for particular periods of time. The microcontroller will switch off the ligths and fans if the consumption limit is exceeded for a particular time of the day.

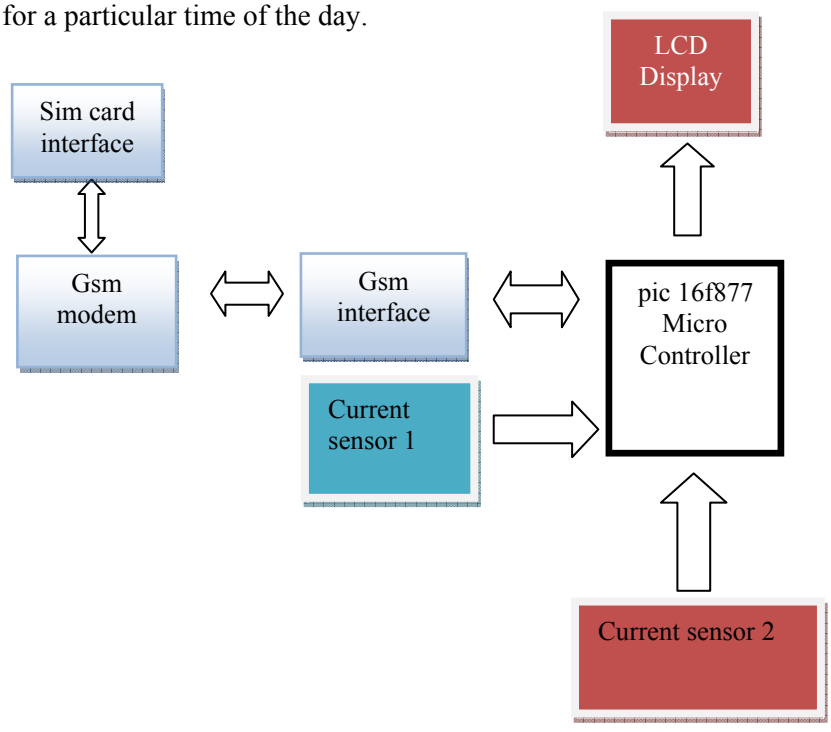


Fig 1

Brief methodology:

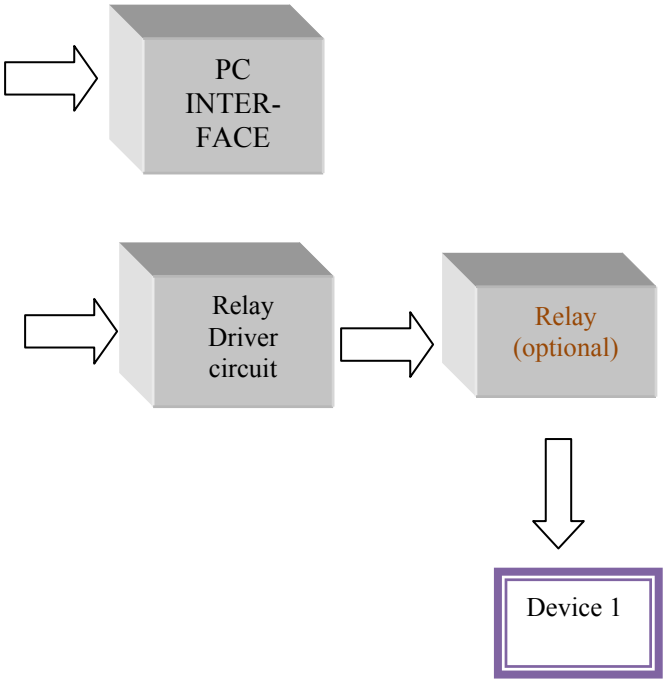
The project is designed with:

- Current sensor
- Gsm
- Pc interface
- Lcd display
- Pic 16f877

IV. HARDWARE AND SOFTWARE

A. CURRENT SENSOR:

The Wilson WCS2720 has precise solutions for AC or DC current sensing in industrial, commercial, and communications systems. The device package allows for easy implementation by the customer. Typical load detection and management, switch mode power supplies, and over current fault protection. The device is not intended for automotive applications. The device consists of a precise, low-offset, linear Hall circuit with a copper conduction path located near the surface of the die. Applied current flowing through this copper conduction path generates a magnetic field which the



close proximity of the magnetic signal to the Hall transducer. A precise, proportional voltage is provided by the low-offset, chopper-stabilized BiCMOS Hall IC, which is programmed for accuracy after packaging.

The output of the device has a positive slope (>VIOUT(Q)) when an increasing current flows through the primary copper conduction path (from pins 1 and 2, to pins 3 and 4), which is the path used for current sampling. The internal resistance of this conductive path is 1.2 mΩ typical, providing low power loss.

B. MICROCONTROLLER PIC 16F877 :

This is the heart of the circuitry. It is the main block which takes the inputs and processes it and gives the output. All the other blocks work in accordance with the microcontroller.

- Only 35 single-word instructions to learn
- All single-cycle instructions except for program branches, which are two-cycle
- Operating speed: DC – 20 MHz clock input DC – 200 ns instruction cycle
- Up to 8K x 14 words of Flash Program Memory, Up to 368 x 8 bytes of Data Memory (RAM), Up to 256 x 8 bytes of EEPROM Data Memory
- Pinout compatible to other 28-pin or 40/44-pin PIC16CXXX and PIC16FXXX microcontrollers

C. GSM

The diagram below shows the flow of the data via a GSM module. The first embedded device is the microcontroller which sends the data to the module. The module then via wireless link will send the data to the GSM receiver in mobile phone. The mobile phone here acts as a second embedded device which reads the data.

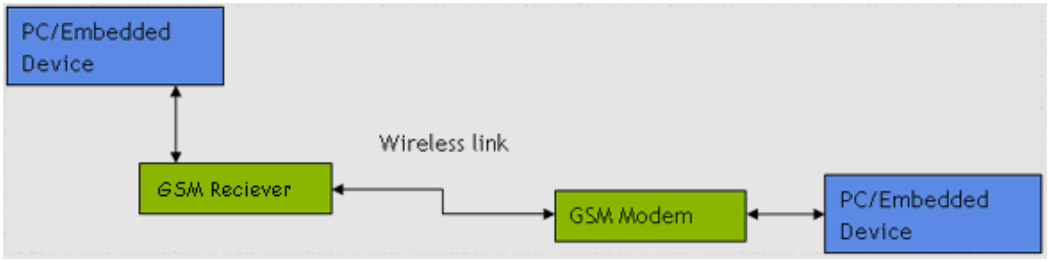


Fig.2

More and more applications emerged with the rapid development of wireless data services, such as meter navigation, remote monitoring, wireless Internet access, wireless POS, etc. Thus, more and more devices need to be able to do wireless communication.

With this background, Sky microwave Corp. develops its MOD 9001 BENQ GSM/GPRS Modem. Users of this product can add wireless communication capability easily to their own products, and then, develop many applications. The MOD 9001 BENQ GSM/GPRS Modem mostly fits the need of data transfer, with SMS data communication, GPRS data navigation, Circuit Switch / Data Connectivity, TCP/IP protocol etc. Because the easy setting up in SCM (Single Chip Micyoco), it is convenient for network data communication. The MOD 9001 BENQ GSM/GPRS Modem with small size, which fits both embedded application and external peripheral equipment. The AT command set and RS232 interface will offer easy data connection without any extra circuit control. Traditionally, the above applications use digital cellular, CDPD or other wire-line modem to do communication, and these technologies are of the disadvantages of high communication expense, limited communication range, dial before communications, etc. When we begin to use MOD 9001 BENQ GSM/GPRS Modem, all these problems disappeared

D. MAX232

A standard serial interfacing for PC, RS232C, requires negative logic, i.e., logic '1' is -3V to -12V and logic '0' is +3V to +12V. To convert a TTL logic, say, TxD and RxD pins of the uC chips thus need a converter chip. A MAX232 chip has long been using in many uC boards. It provides 2-channel RS232C port and requires external 10uF capacitors. This I.C. also includes two receivers and two transmitters in the same package. This is useful in many cases when you only want to use the Transmit and Receive data Lines. You don't need to use two chips, one for the receive line and one for the transmission.

This is very essential for continuous monitoring of the power consumed. It will be essential for linking the computer with the microcontroller. Below shows the connection diagram of max 232.

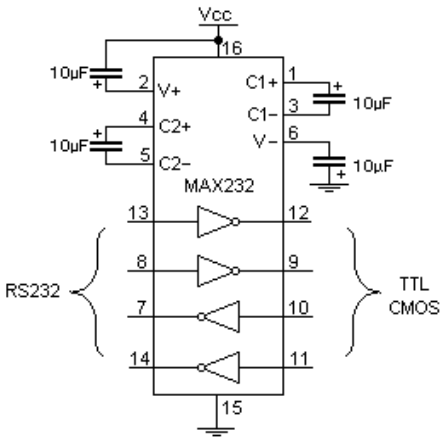


Fig. 3

E. 16X2 LCD DISPLAY

Features:

- Maximum input voltage: 5.3VDC
- Operating input voltage: 5VDC
- 8-bit interface data bus
- Controller: HD47780 equivalent
- Character font size: 0.125"W x 0.200"H
- 16 pin/terminals
- Display size: 2.5"L x 0.7"W
- Module size: 3.4"L x 1.2"W x 0.5"T

Description:

This is a 16 character by 2 line display, with the standard HD44780 chipset. It works great with any microcontroller and it is very easy to interface. This LCD has 8-bit parallel interface. It is possible to use all 8 bits plus 3 control signals or 4 bits plus the control signals.

LCD is used as a backup for computer. It is essential for displaying the provider and users power consumption. Below shows the pin diagram of lcd display.

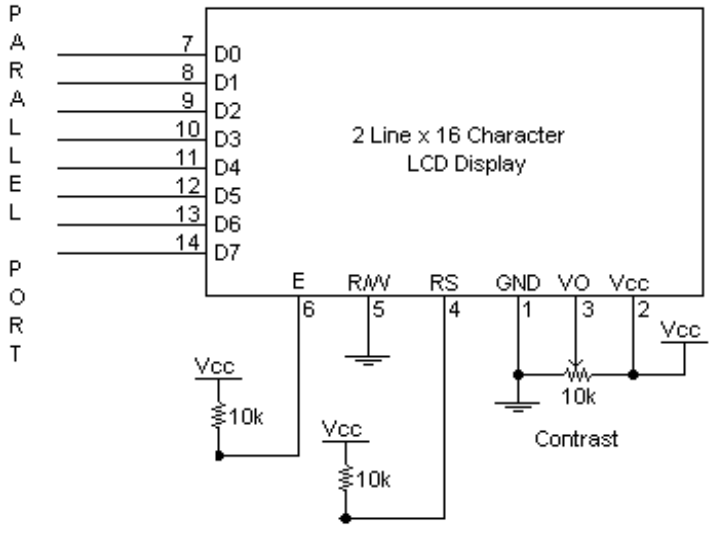


Fig. 4

F.SOFTWARE:

The software used in programming the PIC is PIC BASIC PRO Compiler. The compiler is the tool that converts your BASIC program into Assembly Language. PBP is a compiler. PBP depends on an IDE for user interface, and an assembler to finish the conversion to machine-language**.**

The assembler is the tool that converts the Assembly Language into machine language. The assembler runs after the compiler, and is normally invoked automatically. PBP is designed to use Microchip's MPASM assembler, which is

included with MPLAB.

a. ADVANTAGE:

1. Low power consumption.
2. It helps both customer and msebs.
3. This project is very useful to the government and private msebs as well as to the finance company.

VI. APPLICATION:

1. It can be used in domestic households.
2. It can be implemented in malls where huge amounts of power is wasted.
3. It can also be implemented in schools and collages.

VII. CONCLUSION:

The challenges and "green" legislation that utilities are facing today, combined with increased demand from consumers for more flexible offerings and cost savings, make this project both timely and inevitable. Wireless open standard technology is being selected around the world as the energy management and efficient technology of choice. Implementing this project with an open standard such as GSM helps to keep costs down, ensure interoperability, and future-proof investments made by both utilities and consumers. Consumers and businesses will see changes they never dreamed possible.

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