DESIGN OF SMART ENERGY METER USING IOT

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Abstract: *The main aim of this project is to reduce the theft of power with the help of an energy meter which is integrated one in such a way that when our meter of energy tampers then it can send the message of alerting to the user which can use this project mostly, they are concerned authorities with the help of GSM which indicates the power theft. As there is an increase of using the power that is electricity as the time pass day by day can lead it few attempts of the tampering of the meter which is the energy meter. This system of the whole project helps a lot in detecting the tampering of the meter. So, the whole system of this project is done by using Raspberry Pi. So, in this project, the modem of GSM is connected with Raspberry pi. The LCD is also connected with Raspberry Pi which can show the information.*
Keywords: Smart Energy Meter, Raspberry Pi, GSM, Relay, LCD

I.INTRODUCTION

Due to industrial growth and urbanization energy is the basic need of our life. It is also known as a strategic commodity. Any vulnerability about it is a supply of energy can undermine the working of the whole economy, especially in creating financial aspects.

Due to the limited availability of resources, it is necessary to manage the consumption of electricity. To recognize and eliminate the misuse of electricity by figuring out which equipment utilizes how much amount of electricity is the main aim. Building sectors are consuming the largest electricity in India.

The problems faced by both the consumers and the distribution companies are addressed by this "IOT Based Smart Energy Meter". The project mainly deals with a smart energy meter, which utilizes the features of embedded systems i.e., a combination of hardware and software to implement the desired functionality.

II.LITERATURE SURVEY

1) Friedemann Mattern and Christian Floerkemeier discuss the vision, the challenges, possible usage scenarios, and technological building blocks of the "Internet of things". They conclude with the discussion of social and governance issues that are likely to arise as the vision of the Internet of Things becomes reality.

2) S.Senthil Arumugam and S. Prabakaran present an understanding survey of smart electricity meters and their usage focusing on an understanding part of the metering process, distinct stakeholder's interests, and the technologies are utilized to meet the expectations of stakeholder interests. Besides they provide an outstanding part of challenges as well as opportunities arising exactly to the advent of big data and the accumulation well-known of cloud environments.

3) Praveen Vadda and Sreerama Murthy proposed a research work to measure and analyze the power consumption of electricity used by the customer using Smart metering. They use the ARIMA model with the XLASTAT tool with the flattening technique for this purpose.

4) Azfar Tufail and Hummayoun Naeem provide some enhancement in the conventional Metering system by smart metering. The consumption of electrical energy is measured by smart meter providing additional information compared to a conventional energy meter.

III. PROPOSED SYSTEM

In this proposed system GSM technology is implemented for transmitting the information about power theft to the supplier. The system is designed in such a way as to prevent electricity thefts from happening in the current scenario. This system is being interfaced with Raspberry Pi; if any problem is detected then the message will be sent to the user via GSM. This will prevent electricity

theft as much as possible. The proposed system gives a solution for the existing problems like power theft, wastage of energy, and transmission line fault that are faced by the authorized power suppliers. If the balance is low, it will send a reply that the balance is low and recharge.

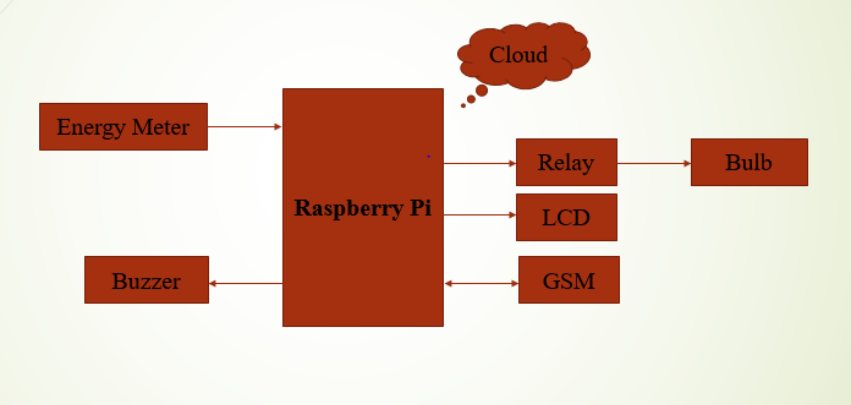
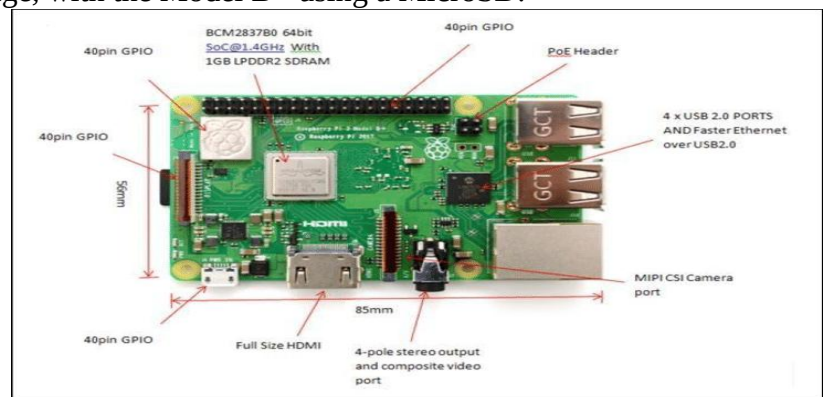


Figure1 : Block Diagram

A. RASPBERRY PI

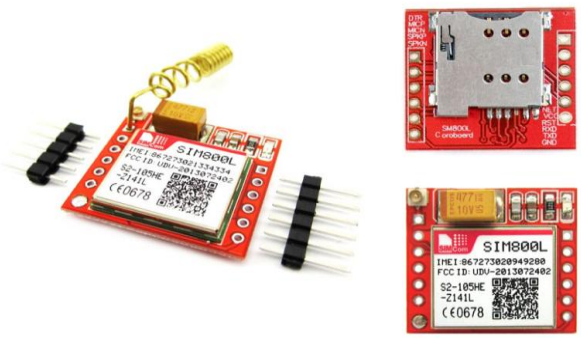
Raspberry Pi is a credit-card-sized computer and it is designed in the United Kingdom by the Raspberry Pi foundation to teach basic computer science to school students and every other person interested in computer hardware, programming.

It has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM. It does not include a built-in hard disk or solid-state drive, but it uses an SD card for booting and also for persistent storage, with the Model B+ using a MicroSD.



B. GSM

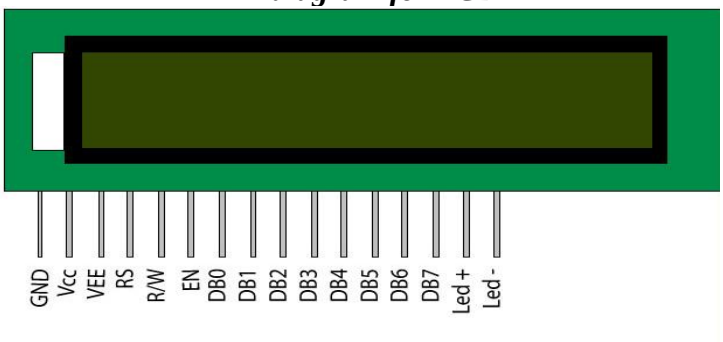
A GSM modem is a device that can be either a mobile phone or a modem device that can be used to make any other processor communicate over a network. A GSM modem requires a SIM card to be operated and it operates over a network range subscribed by the network operator. It can be connected to a computer through a serial connection, USB connection, or Bluetooth connection.



C. LCD

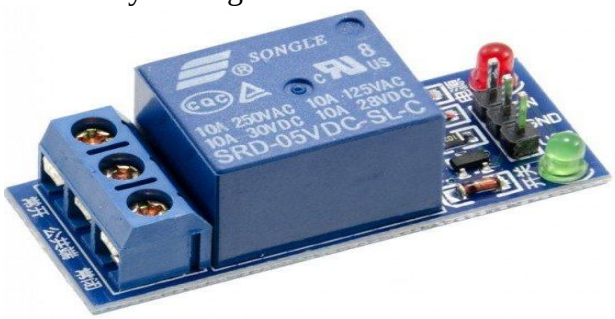
A 16x2 LCD implies 16 characters can be shown per line and two such lines exist. Each character is shown in a lattice of 5x7 pixels in this LCD. There are two registers in this LCD, in particular Command and Data.

Pin diagram for LCD



D. RELAY

A relay is an electromagnetic switch used to turn on and off a circuit by a low power signal, or where several circuits must be controlled by one signal.



E. BUZZER

A buzzer or a beeper is an audio signaling device, which may be mechanical, electromechanical. A Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers, and other electronic products for sound devices.

Several applications can be developed for images using python. Applications developed are: Python, Gogh, imgSeek etc. These are several applications which are developed using Python.

NOOBS (New Out Of Box Software):

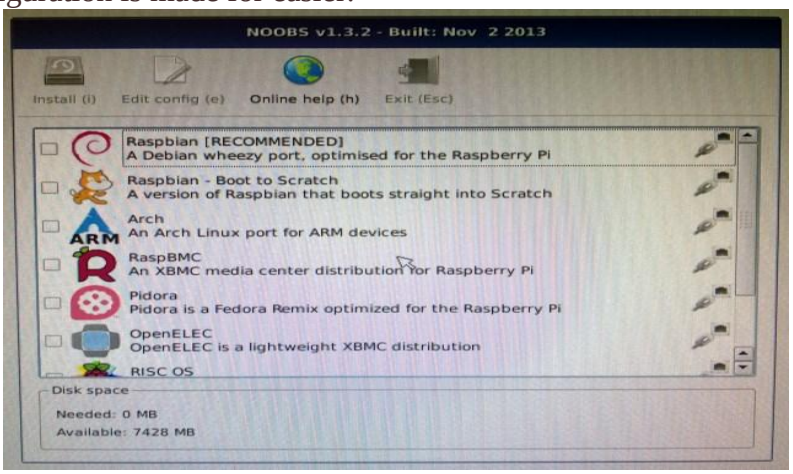
Despite its success, there's something about the Raspberry Pi that may just put people off: so far, setting it up has not been particularly user friendly. NOOBS aims to vary that! Intended for youngsters to grip with computing in countries where IT skills are rare, the Raspberry Pi has proved

to be a surprisingly popular device – especially considering the relatively low specification. It would not be much easier if the tools for installing the Pi could be simply copied to an SD card And therefore the computer launched?

The Raspberry Pi Foundation obviously thought so as they need released NOOBS, a tool for streamlining Installation, running multiple operating systems and simply configuring your OS options.

WHAT IS NOOBS?

NOOBS is a user interface enabling the easy installation of a choice of operating systems for your Raspberry Pi. Once installation is complete, NOOBS provides configuration that means to configure your Pi; previously this would have been something you would do by opening a text file. With NOOBS, configuration is made for easier.

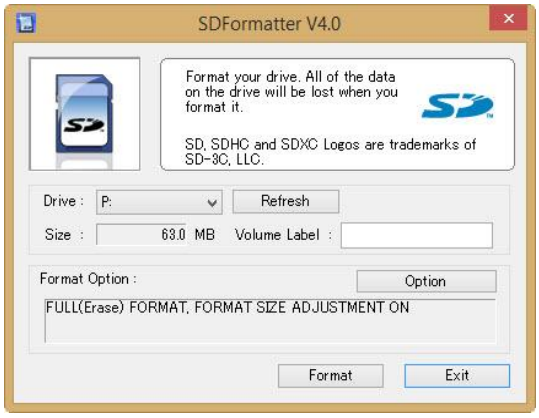


CHOOSING YOUR RASPBERRY PI OS WITH NOOBS

Setting up NOOBS is simple, but before you start, let's have a look at the available Raspberry Pi operating systems that can be installed:

Raspbian - Debian release for Raspberry Pi
OpenElec - Streamlined XBMC release
RISC OS – classic British operating system
Raspbian – Version configuration for boot for Desktop
Arch - Linux build for Raspberry Pi
RaspBMC – Raspbian with XBMC
Pidora – Raspberry pi fork of Fedora

CONFIGURING YOUR SIM CARD FOR NOOBS

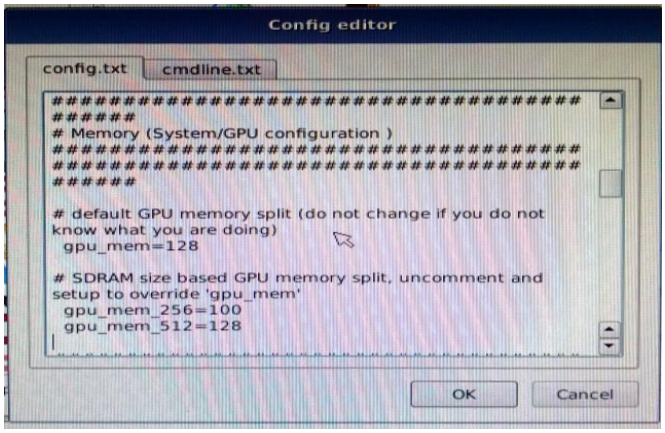


After using the download link above, you'll also need to grab the SD Card Association formatting tool from www.sdcard.org/downloads/formatter 4.

Use the formatted tool to erase and reformat your card, ensuring that the correct drive letter is selected. Select Format Size Adjustment on Windows. If you're on Linux, use gparted instead. This suggests that the contents of the NOOBS zip file should be at the basis of the SD Card, against a folder called NOOBS_lite_X_X_X.

You should then safely inject the SD Card, insert it into your Raspberry Pi and boot up the little computer!

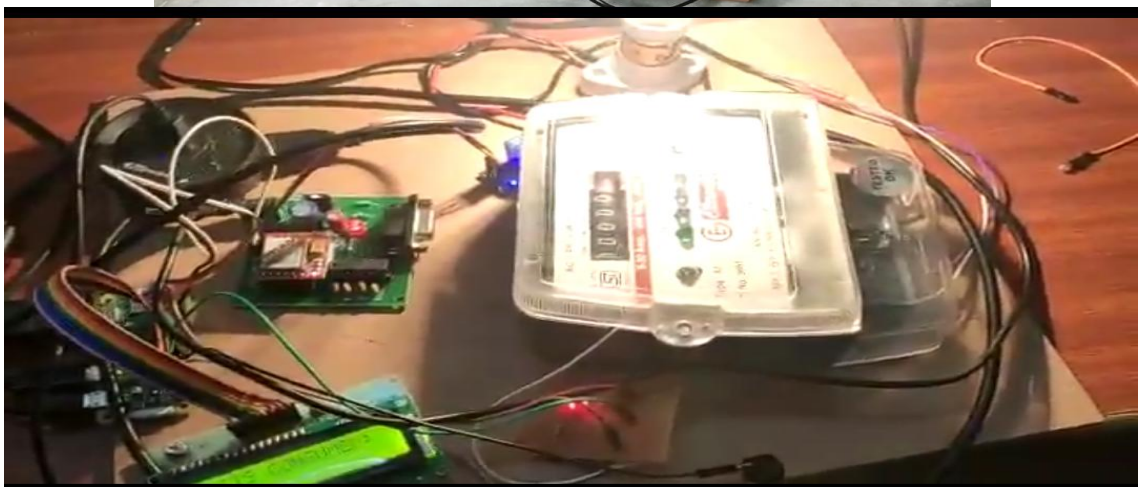
OS INSTALLED? EASILY SETUP YOUR RASPBERRY Pi WITH NOOBS

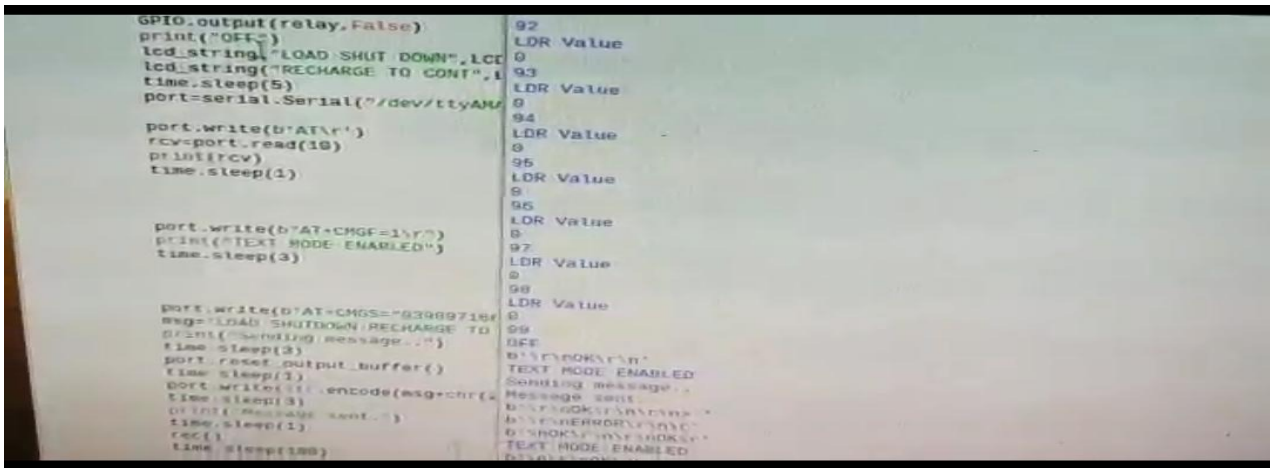


To access these, you will need to hold Shift as the computer boots. It will return you to the NOOBS screen where you can highlight your chosen OS and use the Edit configbutton (or e key) to configure your OSes.

You'll see tabs, like config.txt and like cmdline.txt which you can use to configure how a particular Raspberry Pi operating system boots and runs. Memory options can be set here. Click OK to return to the main NOOBS screen, and select Exit to launch the OS selection menu.Note that you are allowed to add operating systems from this screen after the initial installation.

TESTING RESULTS





CONCLUSION

This system consists of the electricity meter which measures the electricity bill and informs the consumer about the number of units consumed and associated costs with it. A Smart Energy Meter design using GSM technology can make the users to pay for the electricity before its consumption. In this way, consumers hold the credit and then use the electricity until the credit is exhausted. Smart energy meters will create awareness of unnecessary wastage of power and will tend to reduce wastage of power.

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