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WIRELESS ELECTRICITY BILLING AND METER READING USING IOT

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ABSTRACT

Now a day's increasing importance of information processing and data transferring Industries, presenting the framework for an internet of things (IOT) devices are necessary. An automated energy meter reading can be used to upload the cloud storage and this Mechanism using Google forms and then global positioning system (GSM) network. Here GSM is used for sending and receiving data into cloud computing. This technique is used to reduce Electricity billing, human error level and also time consuming. Voltage and current level of data easily can transfer industries and receiving the acknowledgement into mobile phone by using IOT services. After this process, money has to pay through mobile phone. For secured data, has to create the individual IP address and password into Google spreadsheet. The above devices to be include high speed, low memory requirement and low computational complexity of the algorithm.

Key terms- IoT, GSM, Power meter, Smart grid.

1. INTRODUCTION

In recent years, humans work and life are increasingly tight with telecommunication and information. The information to society has changed human beings way of life as well as challenged the traditional residence. Homes of the 21st century will become more and more self-controlled and automated due to the comfort it provides, especially when employed in a private home. A home automation system is a means that allow users to control electric appliances of varying kind. Many existing, well-established home automation systems are based on wired communication. This does not pose a problem until the system is planned well in advance and installed during the physical construction of the building. But for already existing buildings the implementation cost goes very high. In contrast, Wireless systems can be of great help for automation systems. With the advancement of wireless technologies such as Wi-Fi, cloud networks in the recent past, wireless systems are used every day and everywhere.

A. NEED OF THIS PROJECT

The main aim of this work is to design a smart energy meter based on IOT for energy theft identification. GSM network is used for sending and receiving data.

B. DRAW BACKS OF EXISTING SYSTEMS

Most of the traffic lights around the world follow a predetermined timing circuit and it does not have any emergency vehicle clearance system. It results in the loss of valuable time life.

The system using GPS to tracking automobiles is not able to give protection to the vehicle. To overcome this problem, a GSM Modem based project introduced to enhance security.

Home automation System (HAS)

Home automation is the residential extension of building automation. It is automation of the home, housework or household activity. Home automation may include centralized control of lighting, HVAC (heating, ventilation and air conditioning), appliances, security locks of gates and doors and other systems, to provide improved convenience, comfort, energy efficiency and security. Home automation for the elderly and disabled can provide increased quality of life for persons who might otherwise require caregivers or institutional care.

The popularity of home automation has been increased greatly in recent years due to much higher affordability and simplicity through Smartphone and tablet connectivity. The concept of the "Internet of Things" has tied in closely with the popularization of home automation.

A home automation system integrates electrical devices in a house with each other. This techniques employed in home automation include those in building automation as well as the control of domestic activities, such as home entertainment systems, houseplant and yard watering, pet feeding, changing the ambiance "scenes" for different events (such as dinners or parties), lighting control system, and the use of domestic robots. Devices may be connected through a home network to allow control by a personal computer, and may allow remote access from the internet. Through the integration of information technologies with the home environment, systems and appliances can communicate in an integrated manner which results in convenience, energy efficiency, and safety benefits.

Automated "homes of the future" have been staple exhibits for World's Fairs and popular backgrounds in science fiction. However, problems with complexity, competition between vendors, multiple incompatible standards,[1] and the resulting expense have limited the penetration of home automation to homes of the wealthy, or ambitious hobbyists. Possibly the first "home computer" was an experimental home automation system

2. Internet of Things (IoT)

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IoT will consist of almost 50 billion objects by 2020.

British entrepreneur Kevin Ashton first coined the term in 1999 while working at Auto-ID Labs (originally called Auto-ID centers - referring to a global network of Radio-frequency identification (RFID) connected objects). Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine communications (M2M) and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is expected to usher in automation in nearly all fields, while also enabling advanced applications like a Smart Grid, and expanding to the areas such as smart cities.

"Things," in the IoT sense, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in

sensors, DNA analysis devices for environmental/food/pathogen monitoring[16] or field operation devices that assist firefighters in rescue operations. These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. Current market examples include smart thermostat systems and washer/dryers that use Wi-Fi for remote monitoring.

Besides the plethora of new application areas for Internet connected automation to expand into, IoT is also expected to generate large amounts of data from diverse locations that is aggregated very quickly, thereby increasing the need to better index, store and process such data

Block diagram transmitter:

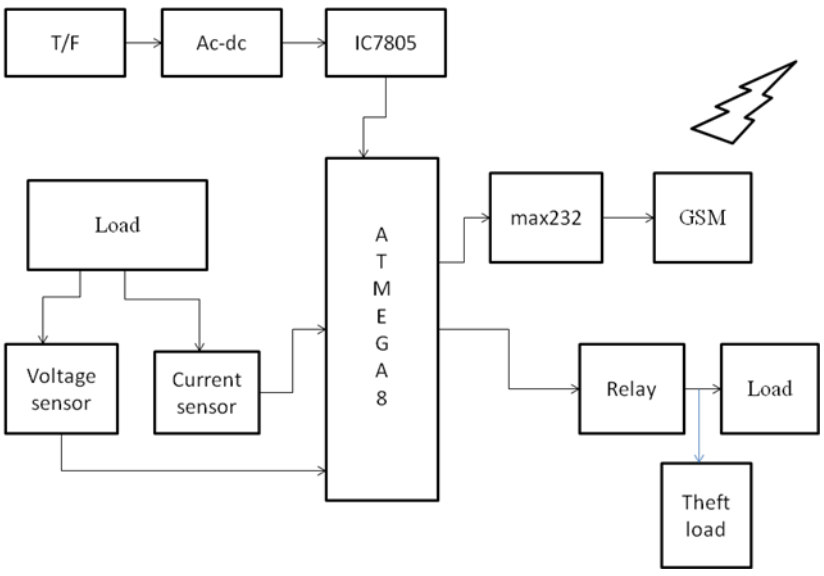

Fig-1:Transmitter block diagram

Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC.

3. Cloud computing

Cloud computing also known as on-demand computing, is a kind of Internet-based computing, where shared resources, data and information are provided to computers and other devices on-demand. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in third-party data centers. It relies on sharing of resources to achieve coherence and economies of scale, similar to a utility (like the electricity grid) over a network. At the foundation of cloud computing is the broader concept of converged infrastructure and shared services.

Fig-2: cloud networking.

Cloud computing, or in simpler shorthand just "the cloud", also focuses on maximizing the effectiveness of the shared resources. Cloud resources are usually not only shared by multiple users but are also dynamically reallocated per demand. This can work for allocating resources to users. For example, a cloud computer facility that serves European users during European business hours with a specific application (e.g., email) may reallocate the same resources to serve North American users during North America's business hours with a different application (e.g., a web server). This approach helps maximize the use of computing power while reducing the overall cost of resources by using less power, air conditioning, rack space, etc. to maintain the system. With cloud computing, multiple users can access a single server to retrieve and update their data without purchasing licenses for Proponents claim that cloud computing allows companies to avoid upfront infrastructure costs, and focus on projects that differentiate their businesses instead of on infrastructure. Proponents also claim that cloud computing allows enterprises to get their applications up and running faster, with improved manageability and less maintenance, and enables IT to more rapidly adjust resources to meet fluctuating and unpredictable business demand. Cloud providers typically use a "pay as you go" model. This can lead to unexpectedly high charges if administrators do not adapt to the cloud pricing model

RECEIVER SIDE:

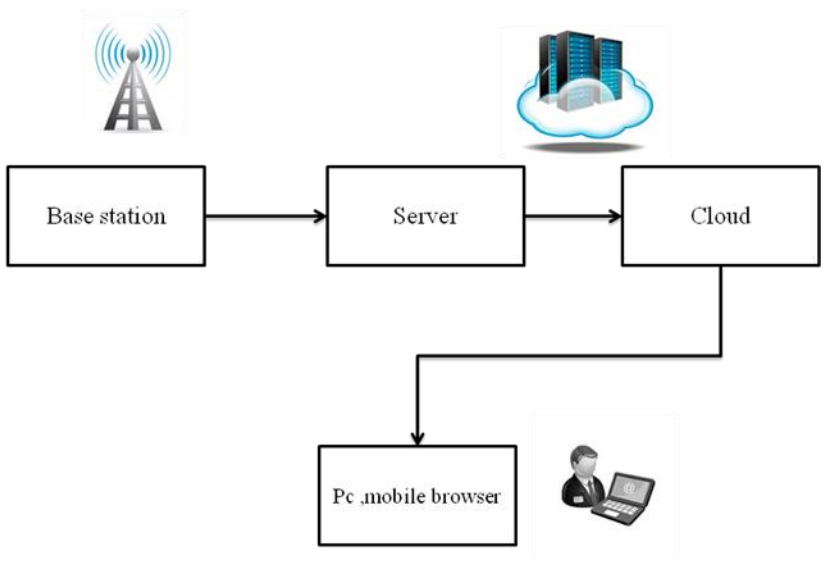

Fig-3:Receiver Block

This IR transmitter sends 38 kHz (frequency will be adjusted using R2). IR carriers at around 38 kHz carrier frequencies are widely used in TV remote controlling and ICs for receiving these signals are quite easily available.

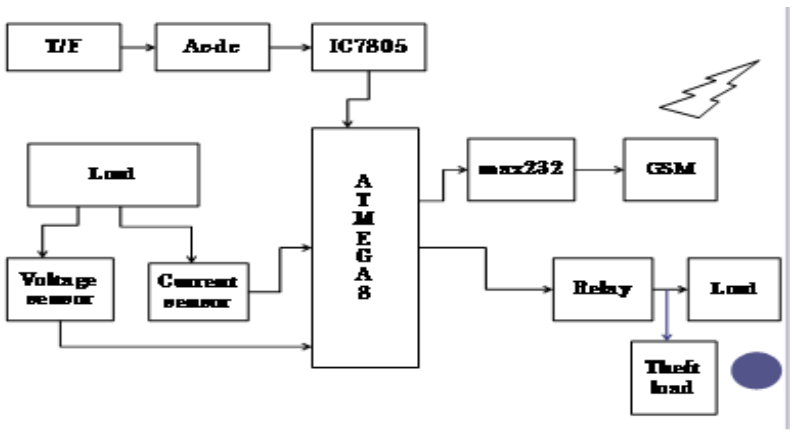

Fig-4:Opertion Block

4. MAX232

The **MAX232** created in 1987 by that converts signals from a (RS-232) serial port to signals suitable for use in-compatible digital logic circuits. The MAX232 is a dual transmitter / dual receiver that typically is used to convert the RX, TX, CTS, RTS signals.

The drivers provide TIA-232 voltage level from a single 5-volt supply by on-chip . This makes it useful for implementing TIA-232 in devices that otherwise do not need any other voltages. The receivers reduce TIA-232 inputs which may be as high as ±25 volts, to standard 5 volt levels. These receivers have a typical threshold of 1.3 volts and a typical of 0.5 volts.

The MAX232 replaced an older pair of chips MC1488 and MC1489 that performed similar RS-232 translation. The MC1488 quad transmitter chip required 12 volt and -12 volt and MC1489 quad receiver chip required 5 volt power. The main disadvantages of this older solution was the +/- 12 volt power requirement, only supported 5 volt digital logic, and two chips instead of one.

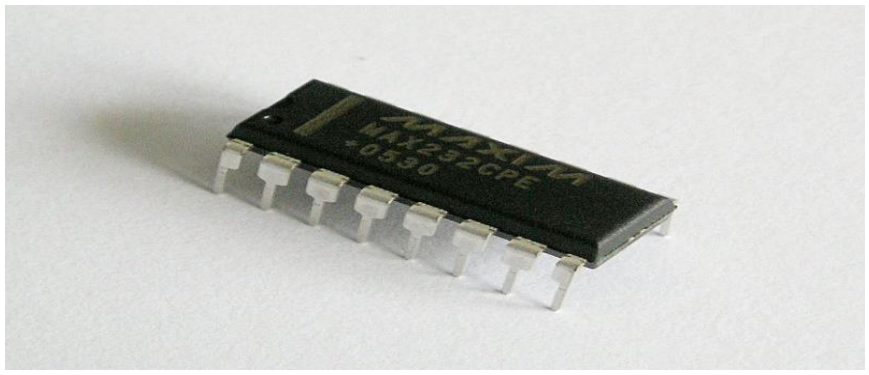

Fig-5: Pin Diagram of MAX232

The MAX232(A) has two receivers that convert from RS-232 to TTL voltage levels, and two drivers that convert from TTL logic to RS-232 voltage levels. As a result, only two out of all RS-232 signals can be converted in each direction. Typically, the first driver/receiver pair of the MAX232 is used for TX and RX signals, and the second one for CTS and RTS signals.

There are not enough drivers/receivers in the MAX232 to also connect the DTR, DSR, and DCD signals. Usually, these signals can be omitted when, for example, communicating with a PC's serial interface. If the DTE really requires these signals, either a second MAX232 is needed, or some other IC from the MAX232 family can be used. Also, it is possible to connect DTR (pin #4) directly to DSR (DE-9 pin #6) without going through any circuitry, which provides an automatic (brain-dead) DSR acknowledgment of the incoming DTR signal

4.1 BLOCK DIAGRAM:

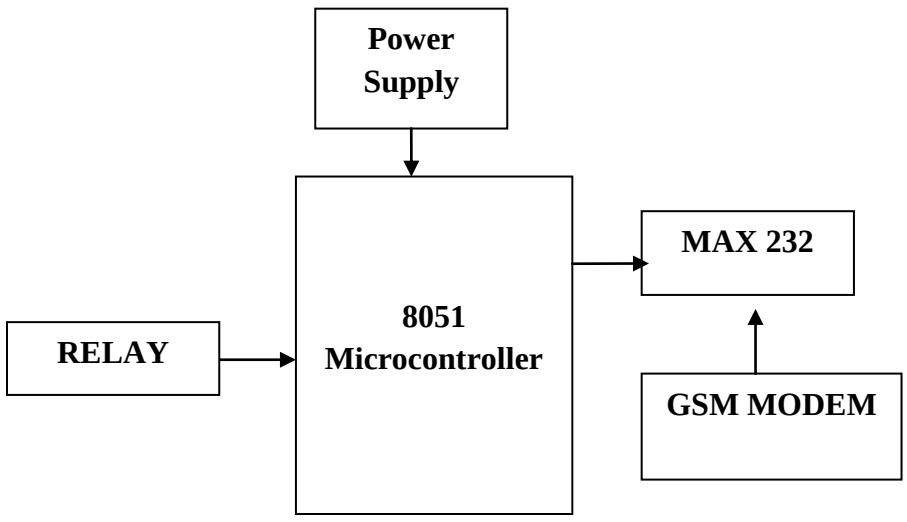

Fig-6.Block Diagram of theft vehicle intimation system

4.2 GSM MODEM:

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. The working of GSM modem is based on commands, the commands always start with AT (which means Attention) and finish with a <CR> character. For example, the dialing command is ATD<number>; ATD3314629080; here the dialing command ends with semicolon.

Current sensor:

A **current sensor** is a device that detects (AC or DC) in a wire, and generates a signal proportional to it. The generated signal could be analog voltage or current or even digital output. It can be then utilized to display the measured current in an ammeter or can be stored for further analysis in a data acquisition system or can be utilized for control purpose.

The sensed current and the output signal can be analog output, which duplicates the wave shape of the sensed output, which duplicates the wave shape of the sensed output, which is proportional to the average or RMS value of the sensed with a output, which duplicates the wave shape of the, which switches when the sensed current exceeds a certain threshold. This is Single-Supply Current Monitor circuit. Amplifying the voltage drop across a resistor placed in a series with the current to be measured is the essential of current monitoring. However it is difficult because with low precision op amps this greatly limits the overall resolution and only small voltage drops can be tolerated. Here is the schematic diagram of Single-Supply Current Monitor.

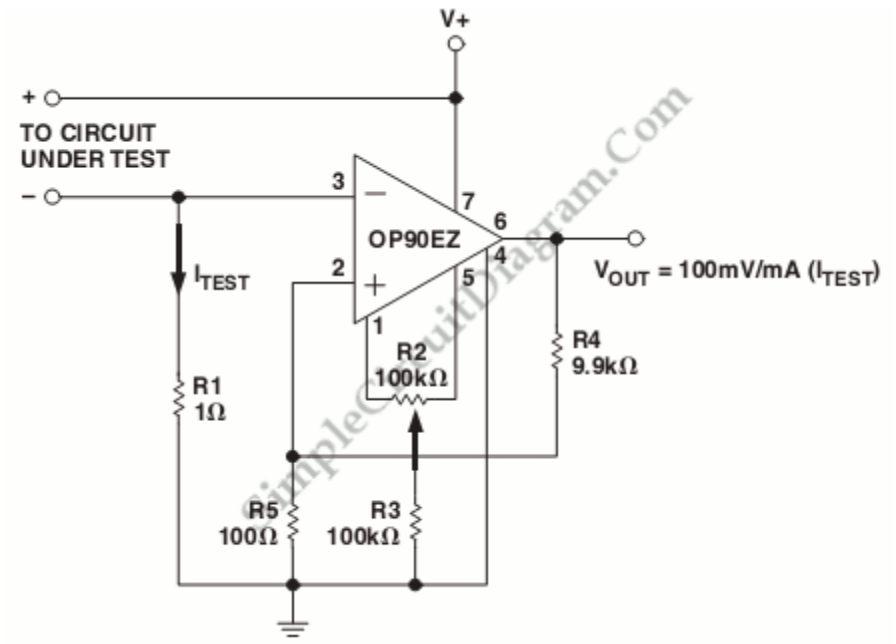

Fig-7. Single Supply Current Monitor Block

The resolution of this circuit is 10 µA and can used to monitor 20mA of current. The range of this circuit depends on the current sense resistor R1. The supply current of the current monitor which bypasses the current sense resistor, maybe necessary to be included in final result, when measuring total system current.

SPECIFICATIONS AND CHARACTERISTICS FOR GSM

The specifications and characteristics for GSM

- **Frequency band**— The frequency range specified for GSM is 1,850 to 1,990 MHz (mobile station to base station).
- **Duplex distance**— The duplex distance is 80 MHz Duplex distance is the distance between the uplink and downlink frequencies. A channel has two frequencies, 80 MHz apart.
- **Channel separation**— The separation between adjacent carrier frequencies. In GSM, this is 200 kHz.
- **Modulation**—Modulation is the process of sending a signal by changing the characteristics of a carrier frequency. This is done in GSM via Gaussian minimum shift keying (GMSK).
- **Transmission rate**—GSM is a digital system with an over-the-air bit rate of 270 kbps.
- **Access method**—GSM utilizes the time division multiple access (TDMA) concept. TDMA is a technique in which several different calls may share the same carrier. Each call is assigned a particular time slot.

4.3 MAX232 IC

MAX232 IC is used to convert the TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with PC.MAX232 IC is used to convert the TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with PC .The typical driver output voltage swing is ±8V when loaded with a nominal 5k½ RS-232 receiver and VCC = +5V. Output swing is guaranteed to meet the EIA/TIA-232E and V.28 specification, which calls for ±5V minimum driver output levels under worst-case conditions. These include a minimum 3k½ load, VCC = +4.5V, and maximum operating temperature. Unloaded driver output. voltage ranges from (V+ -1.3V) to (V- +0.5V). Input thresholds are both TTL and CMOS compatible. The inputs of unused drivers will be left unconnected since 400k½ input pull-up resistors to VCC are built in. The pull-up resistors force the outputs of unused drivers low because all drivers invert. The internal input pull-up resistors typically source 12µA, except in shutdown mode where the pull-ups are disabled. Driver

outputs turn off and enter a high-impedance state—where leakage current is typically microamperes (maximum 25µA)—when in shutdown mode, in three-state mode, or when device power is removed. Outputs will be driven to ±15V. The power-supply current typically drops to 8µA in shutdown mode. The MAX239 has a receiver three-state control line, and the MAX223, MAX225, MAX235, MAX236, MAX240,and MAX241 have both a receiver three-state control line and a low-power shutdown control. The receiver TTL/CMOS outputs are in a high-impedance, three-state mode .

2. PROPOSED SYSTEM

1. The proposed system is designed to prevent the electricity theft and wireless EB billing happening in the present scenario.

2. The increasing rates of the per unit electric power, because of theft of electricity due to this the electricity supplier companies are not able to recover the invested amount

3. Thus they have to undergo a large loss of revenue and thus, they increase the rates of electricity unit which the consumer has to pay .

RESULTS AND DISCUSSION

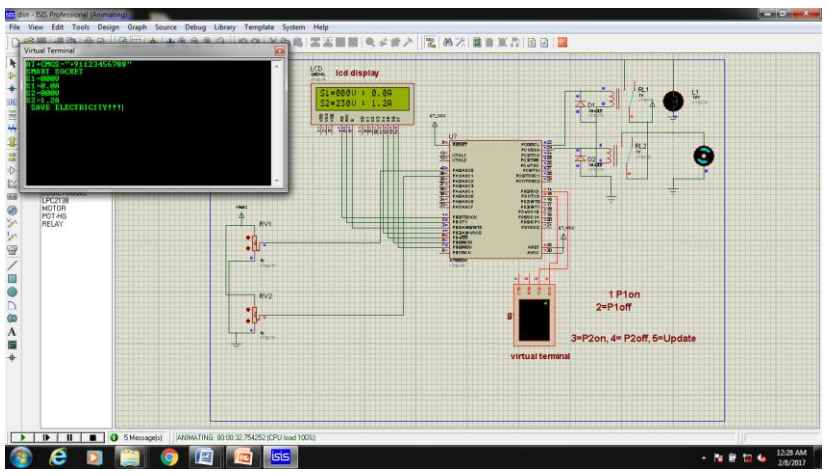

Fig-8.Schematic View in Proteus

PROTEUS software buttons are assumed as IR sensors .By varying each button different category of traffics are analyzed. Simulation results for density based traffic is shown below**,**

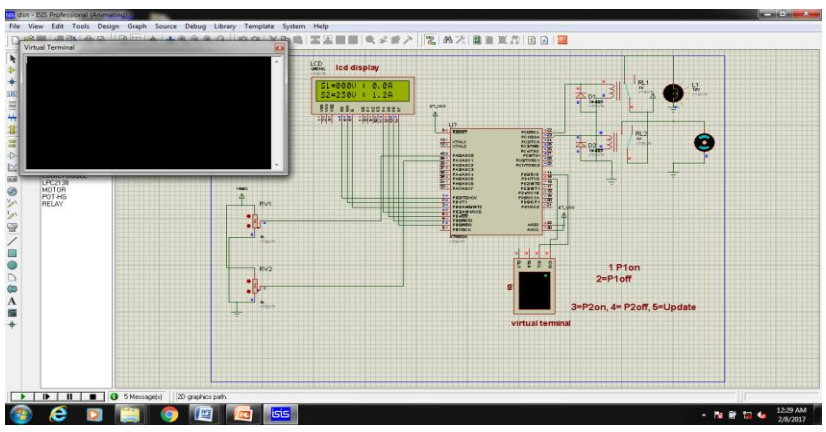

Fig-9. Theft Detection

A.THEFT VEHICLE INTIMATION

GSM MODEM is used to send alert to the user when the vehicle is switched on. Simulation for theft vehicle management is following.

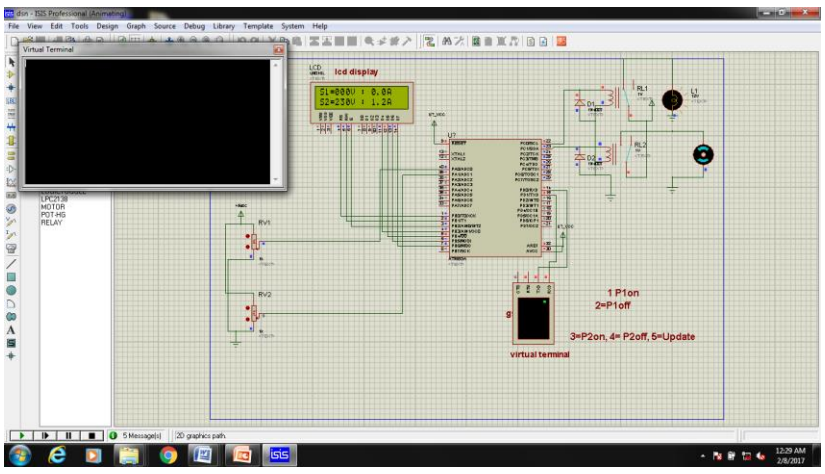

Fig-9: Vechicle Intimation

3.CONCLUSION

We have to minimizes the deployment and it possibly available smart home application, sensor, network. we believe this is key for a widespread acceptance of smart home. So easily transfer in our money using mobile**.** So quickly sending& receiving data.

To reduce human error level and time consuming. The amount of power to be saved and data will be secure the above system.

REFERENCES

[1] V. Giordano, F. Gangale, and G. Fulli, “Smart grid projects in Europe: Lessons learned and current developments, 2012 update”Eur. Commission, Joint Res. Centre, Inst. Energy Transp., Sci.Policy Rep., 2013.

[2] National Institute of Standards and Technology, NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0, Office of the National Coordinator for Smart Grid Interoperability-U.S. Department of Commerce, NIST Special Publication 1108, Jan. 2010

[3] R. Ma, H. H. Chen, Y. Huang, and W. Meng, “Smart grid communication: Its challenges and opportunities,” IEEE Trans. Smart Grid, vol. 4, no. 1, pp. 36–46, Mar. 2013.

[4] P. Palensky and D. Dietrich, “Demand side management: Demand response, intelligent energy systems, and smart loads,” IEEE Trans. Ind.Informat., vol. 7, no. 3, pp. 381–388, Aug. 2011.

[5] K. Samarakoon, J. Ekanayake, and N. Jenkins, “Reporting available demand response,” IEEE Trans. Smart Grid, vol. 4, no. 4, pp. 1842–1851, Dec. 2013.

[6] Energy Community. (2010). Energy Community RegulatoryBoard, A Review of Smart Meters Rollout for Electricity inthe Energy Community [Online]. Available: http://www.energycommunity.org/pls/portal/docs/744178.PDF

[7] A. A. Khan and H. T. Mouftah, “Web services for indoor energy management in a smart grid environment,” in Proc. 2011 IEEE 22nd Int. Symp. Pers. Indoor Mobile Radio Commun. (PIMRC), pp. 1036–1040.

[8] J. Byun, I. Hong, B. Kang, and S. Park, “A smart energy distribution and management system for renewable energy distribution and contextaware services based on user patterns and load forecasting,” IEEE Trans. Consum. Electron., vol. 57, no. 2, pp. 436–444, May 2011.

[9] A. Zaballos, A. Vallejo, and J. Selga, “Heterogeneous communication architecture for the smart grid,” IEEE Netw., vol. 25, no. 5, pp. 30–37, Sep. 2011.

[10] T. Sauter and M. Lobashov, “End-to-end communication architecture for smart grids,” IEEE Trans. Ind. Electron., vol. 58, no. 4, pp. 1218–1228, Apr. 2011.