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Tracking and Theft Prevention System for Two Wheeler Using GSM and GPS

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Abstract – In automobile field, the security and theft prevention are one of the main areas in current scenario. The security goals are achieved by the GSM, GPS technology. But it is commonly used for the four wheeler and not in the two wheeler. Using these technologies, we can only track and monitor the vehicle. Previously, GPS is used to get the current position of the two wheeler and that data will be send to the user mobile phone through the GSM. This paper implements for theft prevention in two wheeler using GSM, GPS and Android technology. It can track, monitor and stop the stolen two wheeler too by this system. The two wheeler position is obtained by the GPS module, which is send to the microcontroller, which then sends the message to the user smart phone through the GSM module. Here PIC microcontroller, air solenoid and water solenoid valves are interfaced with GSM modem and GPS module which will be fixed in the two wheeler. User can stop the vehicle under theft by android application.

Keywords: GPS, GSM, Android, Two wheeler, solenoid valve.

I. INTRODUCTION

Introducing a system in Two Wheeler to provide security and sending vehicle information to the owner. This feature would help the owner for decision making and tracking of vehicle in case of theft and saving valuable life, time and money. This paper introduces an Android based tracking and theft prevention system. Vehicle tracking system is a miniature model of Global Positioning System (GPS). GPS is used to find out the position or location of the vehicle around the world. The peltier Unit is attached at the exhauster along with the Thermal Electric Generator (TEG). Through this unit the heat energy is converted into power using the peltier effect. The generated power will be stored in battery used in two wheelers. GPS will be fixed in the vehicle to monitor current position of the vehicle. With the help of the GPS value, we can calculate the distance with respect to time. The direction and the distance are fed into the microcontroller and that will be transmitted to GSM through digital modulation techniques. At the receiver end the signal will be detected and demodulated with digital demodulation technique. Then the signal will be given to Android mobile. Android mobile is used to control the air solenoid, water solenoid and power cable in vehicle engine system,

II. SYSTEM ANALYSIS

Despite the various technologies that have been introduced in recent years to deter car thefts and tracking, it was reported that as many as cars were stolen yearly across the world. According to National Crime Information Center (NCIC), in 2006, 1,192,809 motor vehicles were reported stolen, the losses were 7.9$ billion. Several security and tracking systems are designed to assist corporations with large number of vehicles and several usage purposes. They can't permit the owner to communicate with the vehicle online, even if the owner is certain that his vehicle was stolen. The proposed security system in this project is designed to track and monitor vehicles and also to stop the vehicle if stolen and to track it online for retrieval. This system is an integration of several modern embedded and communication technologies.

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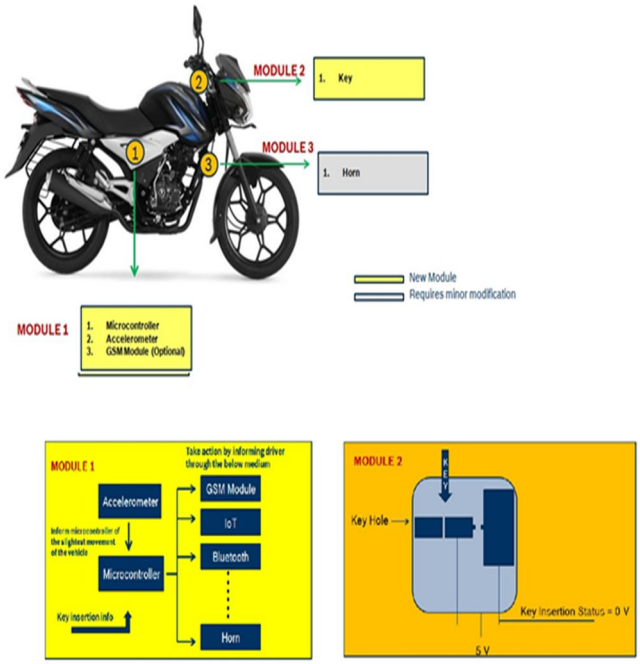

Figure.1 Block diagram of security system.

To provide location and time information anywhere on Earth, the Global Positioning System (GPS) is commonly used as a space based global navigation satellite system. The location information provided by GPS systems can be visualized using Google Earth. In wireless data transporting, GSM and SMS technology is a common feature with all network service providers. Utilization of SMS technology has become popular because it is an inexpensive, convenient and accessible way of transferring and receiving data with high reliability. As shown in Figure.1, when the car starts running, the client receives a confirmation SMS that it is running now. If this is illegal operation or any intruders try to run the car, the owner can send SMS to switch off the car. Afterwards, the system will check the mobile number for received message, to confirm that the phone number could access the security system

A. Structure of anti-theft tracking system

The system has two main units. The first is security unit which is embedded in the vehicle. This unit consists of a GSM modem, GPS receiver, control relay, current sensor and Microcontroller. The current sensor will send an analog signal to the microcontroller when The car is running. The microcontroller will send SMS directly to the owner for conformation. NC control relay contacts are connected with the hot line that powers the fuel pump and ECM. The microcontroller can send a signal to the relay to cut off the

B. Vehicles retrieval

When the car is in motion, the client receives a confirmation SMS indicating the status. If this is illegal or any intruders tries to run the two wheeler, the owner can send SMS to switch off the two wheeler the system will also check the mobile number of the message sender, to confirm that the phone number is legal or illegal to access the system and if the phone number is legal the system will turn off the two wheeler.

III. OVERVIEW OF THE CONVENTIONAL AND PROPOSED SYSTEM

The concept of the project is to provide vehicle related information to the owner so that appropriate decisions can be taken by owner for saving valuable time and money. The system is capable for providing the information below.

A. Security Related

1) Vehicle theft information.
2) Key reminder System.

B. Vehicle Related

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1) Vehicle Mileage(LEVEL SENSOR)
2) Alert in case of possibility of fuel leakage(FUEL SENSOR
3) Rear Break light damage info(LDR)
4) Battery Power(CURRRENT TRANSFORMER)
5) Tracking of vehicle in case of theft, through GPS.
6) Vehicle Service reminder.

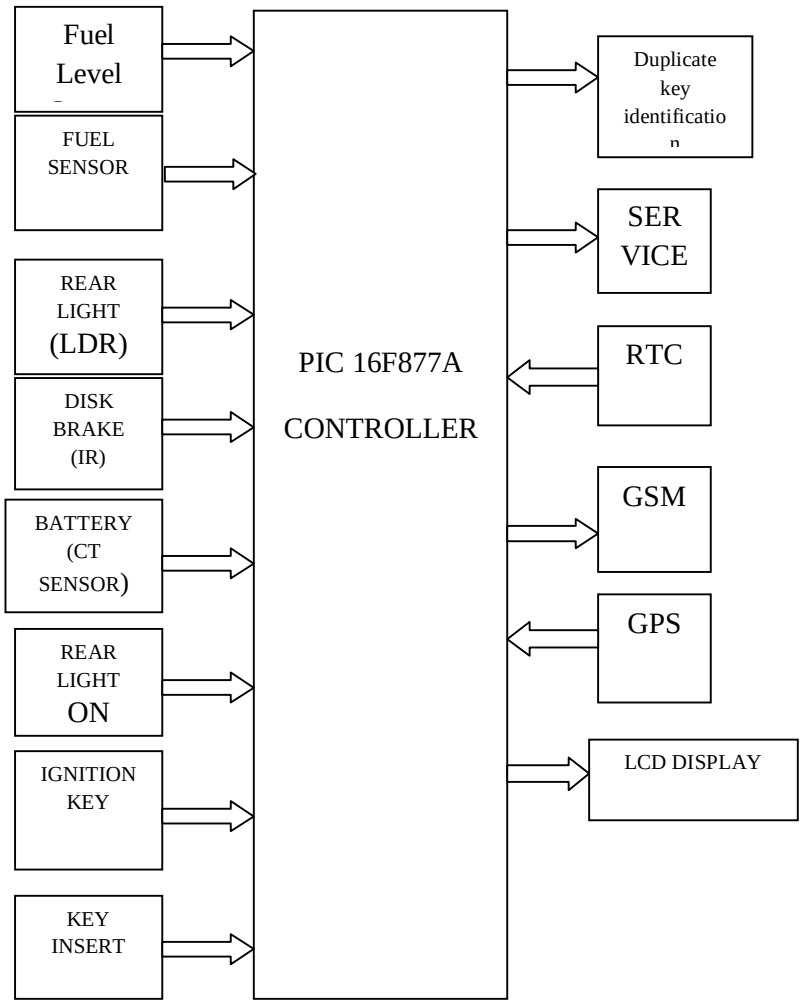

Figure.2.Block diagram of Vehicle Security system

IV. WORKING PRINCIPLE – SECURITY RELATED

Purpose of the each Module is mentioned below
Module 1 – Detects the motion of the vehicle. (Even the slightest motion)
Module 2 – Detect the insertion of the key to the Key hole.
Communication between Module 1 and Module 2 is through wired communication. The key insertion status is recorded by Module 2, which is further passed to Module 1.
Module 2 now starts running which would monitor the accelerometer and detect the slightest movement of the vehicle. If the key is inserted, and the accelerometer doesn't sense any movement for 5-10 sec, information is passed to the driver through GSM or Horn which can be customized.
Working Principle – Vehicle Related

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A. Rear Brake Damage Information

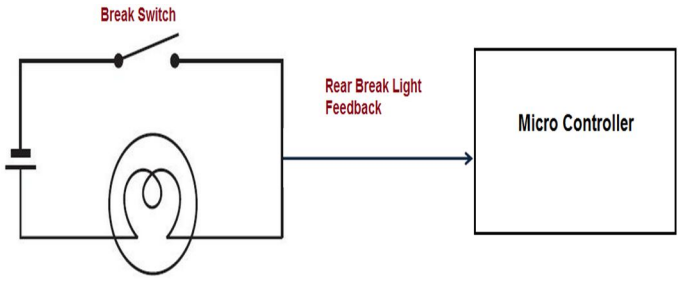

Figure.3. Rear brake damage information

When the rear break is applied, voltage is provided to rear break light and thus it glows. In this system a feedback is taken from the bulb. When the circuit is connected logic high is received at controller which ensures the bulb is glow. Else the bulb is damaged. These also can done using light dependence resistance.

B. Battery Power

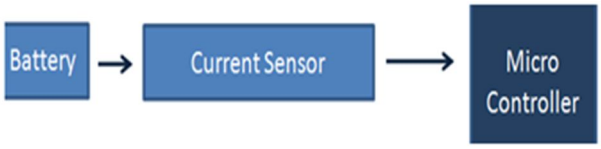

Figure.4.Block -Power of battery

As shown in the figure.3. it is calculated using Current Sensor, which converts the current of battery to voltage which is then read by controller using ADC. If the current is below threshold it mean the power of the battery is
low and this information needs to be intimated to driver.

C. Disc Pad Replacement Information

The disc pad is connected with switch, which provides high voltage when the break pad is thinner. This pad is readily available in market which needs to be used. Once we receive a high voltage from the pad, its read by controller and is understood that disc pad is to be replaced. If not replaced the wheel may get locked during breaking which would lead to accidents.

D. Alert In Case Of Fuel Leakage

This system would detect the owners driving behavior and vehicle mileage. If the vehicle mileage is less than the threshold considering owners driver behavior fuel leakage is identified. These can be also measured using MQ9 sensor depend on ADC value from sensor.

E. Vehicle Service Remainder

The refilling of the Engine oil is detected and time value form the RTC is used to identify the next vehicle service and it is indicated to user.

F. Vehicle Tracking

The GPS information of vehicle would be captured by microcontroller which would help in identifying the location of the vehicle in case of theft and sent to the owner using GSM Module.

V. LEVEL SENSOR (FUEL INDICATION)

The principle behind magnetic, mechanical, cable, and other float level sensors involves the opening or closing of a mechanical switch, either through direct contact with the switch, or magnetic operation of a reed. With magnetically actuated float sensors, switching occurs when a permanent magnet sealed inside a float rises or falls to the actuation level. With a mechanically actuated float, switching occurs as a result of the movement of a float against a miniature (micro) switch. For both magnetic and mechanical float level sensors, chemical compatibility, temperature, specific gravity (density), buoyancy, and viscosity affect the selection of the stem and the float. For example, larger floats may be used with liquids with specific gravities as low as 0.5 while still maintaining buoyancy. The choice of float material is also influenced by temperature-induced changes in specific gravity and

viscosity – changes that directly affect buoyancy.

A. *Fuel Sensor (MQ9)*

Sensitive material of MQ-9 is SnO2, which with lower conductivity in clean air. It make detection by method of cycle high and low temperature, and detect CO when low temperature (heated by 1.5V). The sensor's conductivity is more higher along with the gas concentration rising. When high temperature (heated by 5.0V), it detects Methane, Propane etc combustible gas and cleans the other gases adsorbed under low temperature. Please use simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration. MQ-9 gas sensor has high sensitivity to Carbon Monoxide, Methane and LPG. The sensor could be used to detect different gases contains CO and combustible gases, it is with low cost and suitable for different application.

B. *LDR (measuring REAR brake)*

This resistor works on the principle of photo conductivity. It is nothing but, when the light falls on its surface, then the material conductivity reduces and also the electrons in the valence band of the device are excited to the conduction band. These photons in the incident light must have energy greater than the band gap of the semiconductor material. This makes the electrons to jump from the valence band to conduction.

C. *IR Sensor (Disc brake)*

All objects which have a temperature greater than absolute zero (0 Kelvin) posses thermal energy and are sources of infrared radiation as a result. Sources of infrared radiation include blackbody radiators, tungsten lamps and silicon carbide. Infrared sensors typically use infrared lasers and LEDs with specific infrared wavelengths as sources. A transmission medium is required for infrared transmission, which can be comprised of either a vacuum, the atmosphere or an optical fiber. Optical components, such as optical lenses made from quartz, CaF_2, Ge and Si, polyethylene Fresnel lenses and Al or Au mirrors, are used to converge or focus the infrared radiation. In order to limit spectral response, band-pass filters can be used. Next, infrared detectors are used in order to detect the radiation which has been focused. The output from the detector is usually very small and hence pre-amplifiers coupled with circuitry are required to further process the received signals.

D. *Current Sensor (To measure battery current)*

A current sensor is a device that detects and converts current to an easily measured output voltage, which is proportional to the current through the measured path.

When a current flows through a wire or in a circuit, voltage drop occurs. Also, a magnetic field is generated surrounding the current carrying conductor. Both of these phenomena are made use of in the design of current sensors. Thus, there are two types of current sensing: direct and indirect. Direct sensing is based on Ohm's law, while indirect sensing is based on Faraday's and Ampere's law. Direct Sensing involves measuring the voltage drop associated with the current passing through passive electrical components.

E. *GSM (Global system mobile)*

GSM is a digital, mobile; radio standard developed for mobile, wireless, voice communications. GSM uses a combination of both the time division multiple access (TDMA) and frequency division multiple access (FDMA). With this combination, more channels of communications are available, and all channels are digital.

F. *GPS (Global position system)*

GPS is a satellite based navigation system. It uses a digital signal at about 1.5 GHz from each satellite to send data to the receiver. The receiver can then deduce its exact range from the satellite, as well as the geographic position (GP) of the satellite. The GP is the location on the Earth directly below the satellite. This establishes a line of position (LOP) on the Earth.

VI. SOFTWARE IMPLEMENTATION

SOFTWARE IMPLEMENTATION PIC Simulator is a Development Tool for the AT90S Series of PIC microcontrollers. This manual describes the how to install and use PIC Simulator. PIC Simulator enables the user to fully control execution of programs on the AT90S In-Circuit Emulator or on the built-in PIC Instruction Set Simulator. PIC Simulator supports source level execution of Assembly programs assembled with the PIC programmer and C programs compiled with IAR Systems ICCA90 C Compiler for the PIC microcontrollers. PIC Simulator runs under Microsoft Windows95 and Microsoft Windows NT. PIC Simulator enables

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execution of PIC programs on an PIC in-Circuit Emulator or the built-in PIC Instruction Set Simulator. In order to execute a program using PIC Simulator, it must first be compiled with IAR Systems C Compiler or assembled with Atmel's PIC Assembler to generate an object file which can be read by PIC Simulator. PIC Simulator incorporates a number of different commands. The commands can be given in various ways: through menu selections, toolbar buttons and by keyboard shortcuts.

The key window in PIC Simulator is the Source window. When an object file is opened, the Source window is automatically created. That is shown in Fig 5. The Source window gives information about the control flow of the program. In addition, PIC Simulator offers a number of other windows which enables the user to have full control of the status of every element in the execution target.

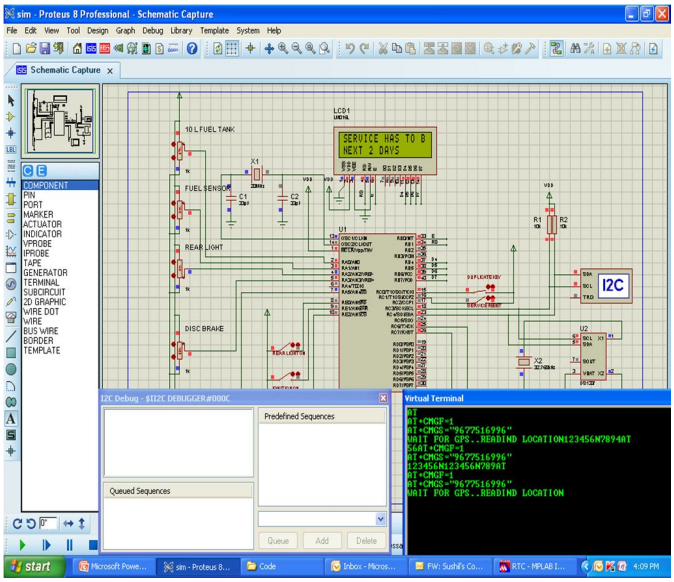

Figure.5.The Complete structure of the vehicle security system

VII. EXPERIMENTAL PROCESS

The execution starts from the GSM modem. When the two wheeler engine starts, it will send the message to owner mobile. Then GPS sends the location of the two wheeler to the owner smart phone frequently. If the owner wants to stop the stolen two wheeler, he activates the command from the android mobile. Activated command will be received in the microcontroller through GSM module. Fig 6.GSM and GPS interfaced with microcontroller and solenoid valves connected with driver relay circuit. Then the microcontroller cut the fuel supply into the engine by solenoid valve operation. The solenoid valves are operated by the microcontroller output. Figure 6.

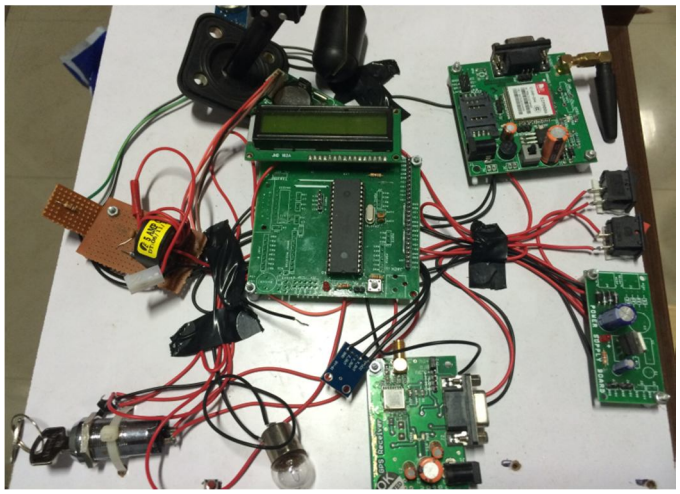

Figure.6.Hardware of two wheeler security system

GPS simulation output at HyperTerminal. Enter the GPS Signal Status command GSS, to view the satellites currently tracked by the GPS receiver. Figure 6 shows a typical response from GPS. Figure.6.GSM data transmission simulation result. HyperTerminal software is now ready for sending and receiving serial data. Figure.6 shows how to use two different terminal programs to exchange data with embedded application.

VIII. CONCLUSION

In this paper, theft prevention system for two wheeler based on GSM is implement. Dedicated android application is designed for control the solenoid valves through the PIC microcontroller. Thermal electrical generator is also fixed on the heat surface and it will generate small amount of the power according the peltier effect. GSM and GPS are interfaced with microcontroller and GPS device sends the value to the microcontroller frequently. Then the GSM get the GPS value and it will send the location of the two wheeler to the owner mobile through SMS. Android application is designed for control the solenoid valve. Finally the theft is directly prevented by the two wheeler owner itself.

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