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RESEARCH ARTICLE

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E-BIKE SYSTEM

SUSHMA.M[1], Dr.G.N.KODANDA RAMAIAH[2], M.LAKSHMIPATHY[3]

[1]M.Tech Scholar, Department of ECE, Kuppam Engineering College, kuppam
[2]Professor & HOD, Department of ECE, Kuppam Engineering College, kuppam
[3]Assistant Professor, Department of ECE, Kuppam Engineering College, kuppam

SUSHMA.M

ABSTRACT

Engine plays an important role in automobiles, it is a machine that turns energy such as heat from burning fuel into mechanical motion. When fuel is burnt inside the engine it produces carbon monoxide. If the performance of the engine is degraded then it produces more carbon monoxide and also consumes more fuel. In current scenario there is no particular device to monitor the performance of the engine within the bike. In this project we use vibration sensor and carbon monoxide sensor to monitor the respective level through PIC microcontroller PIC16F877A there by performance of the engine, then it is compared with the threshold value(the value produced by the normal engine) using microcontroller P89V51RD2. If the obtained value exceeds the threshold values then there is voice intimation to the rider. Since we use two microcontrollers the performance of the module increases. In addition to this we implemented the features such as authentication and tracking of vehicle by using GSM and GPS, intimation of low fuel level in the tank, obstacle detection and monitoring bike stand.

Keywords: Microcontroller(PIC16F877A and P89V51RD2),GSM, GPS, Bike, Google map.

I. INTRODUCTION

We as a human being make silly mistakes while riding two wheeler ie, stands lifted, fuel in the tank. During night time we are unable to notice the obstacles which may cause accidents. If the bike is not serviced regularly the engine performance get degraded hence produces more CO, which is very harmful to the environment also it consumes more fuel. Now a day's bike theft rate increases even though many security methods are provided.

To overcome these entire drawback we have proposed a model which helps the rider and also to identify the stolen vehicle through voice announcement. Voice announcement is more effective than any other methods which are already in use. . A mechanical switch is placed at the stand to notice whether bike stand is lifted or not. If stand is not lifted we get a voice announcement. A float sensor is placed inside the tank to get notification when fuel level is less so that can travel minimum of ten kilometers. Ultrasonic sensor is placed in front portion of the vehicle. Ultrasonic sensor is used to identify the obstacles in the front while driving. If the obstacle is found we get voice intimation.

We have implemented a system which monitors the status of the bike engine by considering the key parameters such as vibration of the bike engine and density CO in exhaust. When the

performance of the engine degraded the values of vibration and CO in exhaust exceeds the threshold values and this will be intimated to the rider through voice.

Safety of the vehicle is extremely essential so we implemented vehicle tracking and locking system in the vehicle by using GPS and GSM, GPS to locate vehicle and GSM to lock the vehicle by message from owner. All these are controlled using microcontroller. We are using two microcontroller in this project, PIC microcontroller PIC16f877A to acquire the data and microcontroller P89V51RD2.

II BLOCK DIAGRAM:

The block diagram consists of two microcontroller, sensors, solenoid valve, IVRS unit, MUX, GSM and GPS unit. The two microcontrollers are PIC and 8051. The PIC microcontroller is to fetch the data and the 8051 microcontroller is to process the data. All the sensors output is connected to the PIC micro- controller. As soon as the PIC microcontroller received the signal from the sensor, it sends parallelly to the 8051 microcontroller. The 8051 microcontroller process the data and related operation will be performed by the command given by it. Different sensors are used to perform different function. Mechanical switch to identify the position of the bike stand. Ultrasonic sensor to identify the obstacles. Float sensor to measure the fuel level in the tank. Vibration sensor and CO sensor to measure the performance of the engine.

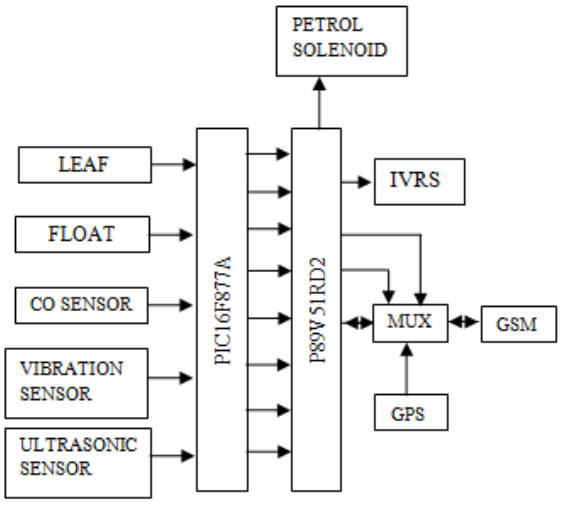

Figure 2.1 Block diagram

IVRS unit gives voice intimation to the rider. This the important feature that is implemented in this project. The output from the IVRS unit is given to loudspeaker which is controlled by the 8051 microcontroller. The gsm and gps unit is used for authentication and are connected to the 8051 microcontroller. Either gsm or gps are communicating to the 8051 microcontroller one at a time. The solenoid value is usedto control the flow of fuel from the tank to the engine. Its operation is controlled by Pic microcontroller

IIICOMPONENTSDESCRIPTION

A.P89V51RD2 Microcontroller: The P89V51RD2 is an 80C51 microcontroller with 64 KB Flash and 1024 bytes of data RAM. A key feature of the P89V51RD2 is its X2 mode alternative. The outline architect can run the application with the traditional 80C51 clock rate (12 clocks for every machine cycle) or select the X2 mode (6 clocks for every machine cycle) to accomplish double the throughput at the same clock frequency.

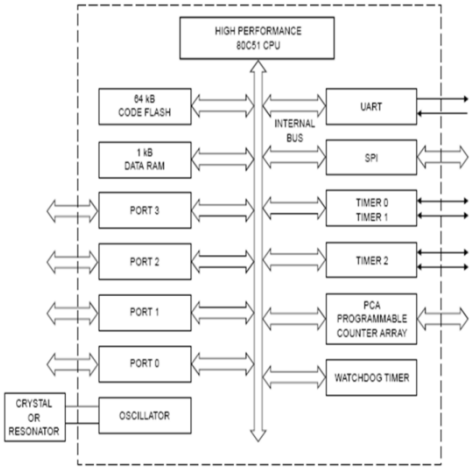

Figure 3.1 Block diagram of typical MCU

The Flash program memory bolsters both parallel programming and in serial In-System Programming (ISP). Parallel programming mode offers pack programming at rapid, reducing programming expenses and time to advertise. ISP permits a gadget to be reprogrammed in the finished item under programming control. The ability to handle/overhaul the application firmware makes an extensive variety of utilizations possible.The P89V51RD2 is likewise In-Application Programmable (IAP), allowing the Flash program

memory to be reconfigured even while the application is running

B.PIC16F877A Microcontroller:

10-bit, up to 8 channel Analog-to-Digital Converter (A/D) ,Brown-out Reset (BOR), Two analog comparators Programmable on-chip voltage reference (VREF) module Programmable input multiplexing from device inputs and internal voltage reference Comparator outputs are externally accessible

Figure3.2 Pin diagram of PIC Microcontroller

C. Sensors:

i. Ultrasonic sensor: The modules includes ultrasonic transmitters, receiver and control circuit. It works on the principle of Doppler effect. It is used for the detection of obstacles.

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Figure 3.3 Ultrasonic sensor

Ultrasonic sensor will transmit 8 40hz signal.If there is any obstacle the signal hits the obstacle and return backs got by the collector The distance of the obstacle is computed as

Distance=(time x velocity of sound)/2.

ii. CO Sensor:

The working circuit, standard measuring circuit of MQ-7 touchy components comprises of two sections. One is warming circuit having time control work (the high voltage and the low voltage work circularly). The second is the signal output circuit, it can precisely react changes of surface resistance of the sensor .

At the point when its inside warming component is enacted at 1.4 volt, the MQ-7 gas sensor reacts to CO gas by decreasing its resistance in extent to the measure of CO present noticeable all around presented to the interior component.

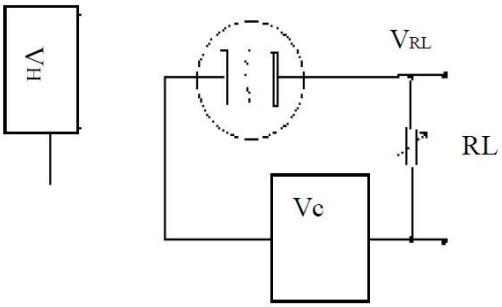

Figure 3.4 Circuit of MQ-7

iii. Float sensor:

A float sensor is a device used the level of liquid within a tank. The switch may be used in a pump, an indicator, an alarm, or other devices. It works on the principle of electromagnetic induction.

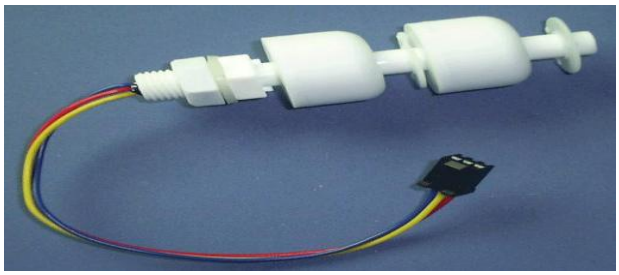

Figure 3.5Float sensor

iv. Leaf switch:

Leaf switch changes the direction of power. It is also called as snap switch. Leaf switch as three pins namely common pin, normally closed pin and normally opened pin.

Initially switch will be connected to common and normally closed pin and it performs the operation connected to that switch. When we press the switch the connection is made between common and normally open pin and performs the operation related to that switch.

Figure 3.6Leaf switch

v. Vibration sensor

Vibration sensor deals with the principle of piezeo electric effect. Use of weight or pressure produces power or Mechanical energy is converted to electrical energy is called piezeo electric effect.

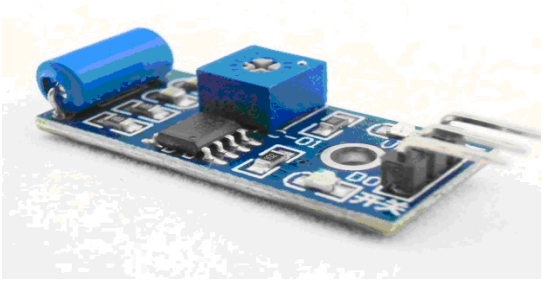

Figure 3.7 Vibration sensor

D.APR 9600

APR9600 single chip voice recorder and playback gadget from Aplus Integrated circuits makes utilization of a restrictive simple stockpiling technique actualized utilizing flash non-volatile memory process in which every phone is fit for saving to 256 voltage levels. This technology enables APR9600 to imitate voice signals in their characteristic structure

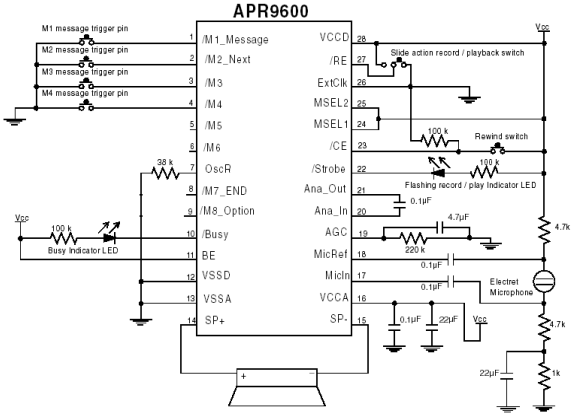

Figure 3.8 Pin diagram of ARP 9600

E. GPS Technology

The Global Positioning System (GPS) is a satellite-based route system comprises of a system of 24 satellites situated into space. The system gives fundamental data to military, civil and business clients around the globe and which is openly available to anybody with a GPS receiver. GPS works in any climate circumstances at anyplace in the world. Regularly no membership expenses or system charges to use GPS.

A GPS receiver must be bolted on to the sign of no less than three satellites to assess 2D position (scope and longitude) and track development. With four or more satellites in sight, the receiver can decide the client's 3D position (scope, longitude and height). Once the vehicle position has been resolved, the GPS unit can decide

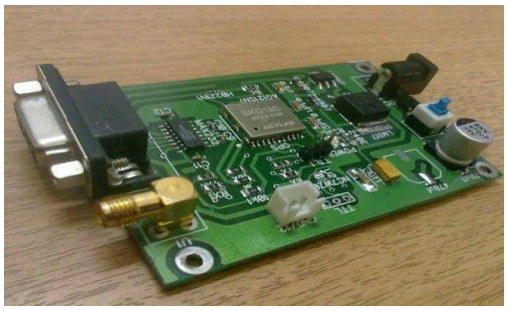

Figure 3.9 Typical GPS

Other data like, velocity, separation to destination, time and other. GPS receiver is utilized for this examination work to recognize the vehicle location and give data to capable individual through GSM innovation.

F. GSM Modem SIM300 V7.03

The GSM modem is a particular sort of modem which acknowledges a SIM card works on a supporter's mobile number over a network, much the same as a PDA. It is a phone without display. Modem sim300 is a triband GSM/GPRS motor that deals with EGSM900MHz, DCS1800MHz and

Figure 3.10 Typical GSM

PCS1900MHz frequencies.GSM Modem is RS232-logic level perfect, i.e., it takes-3v to - 15v as logic high and +3v to +15 as logic low.MAX232 is utilized to change over TTL into RS232 logic level converter utilized between the microcontroller and the GSM board.

G. petrol solenoid:

A solenoid valve is an electromechanically operated valve.

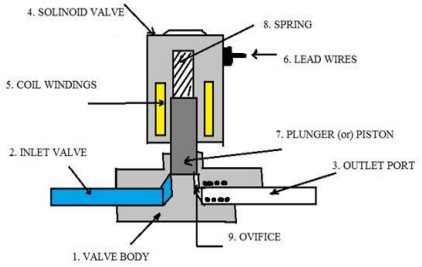

Figure 3.11 Petrol solenoid

The valve is worked by an electric current through a solenoid valve on account of a two – port valve. Solenoid valve are the most every now and again utilized control components as a part of liquids and their errands are to shut off, release, distribute (or) mix fluids.

IV FLOW CHART:

A. Main flow chart: The bike status monitoring flow is as shown in Figure. When we start the bike, GSM get initialized by sending greeting SMS to the prestored phone number. Microcontroller looks for the input from the sensor. The output of the sensor is converted to digital by using ADC. If any sensor is activated, intimated through voice announcement is given in Figure 4.1.

B. Authentication flow chart:

The bike authentication flow is as shown in the figure. If the authentication is enabled, the microcontroller will monitor the vibration sensor. If there is input from the vibration sensor i.e. is bike is thefted, and then owner gets the message. Based on the message from the owner the bike will stop and get location of the bike.

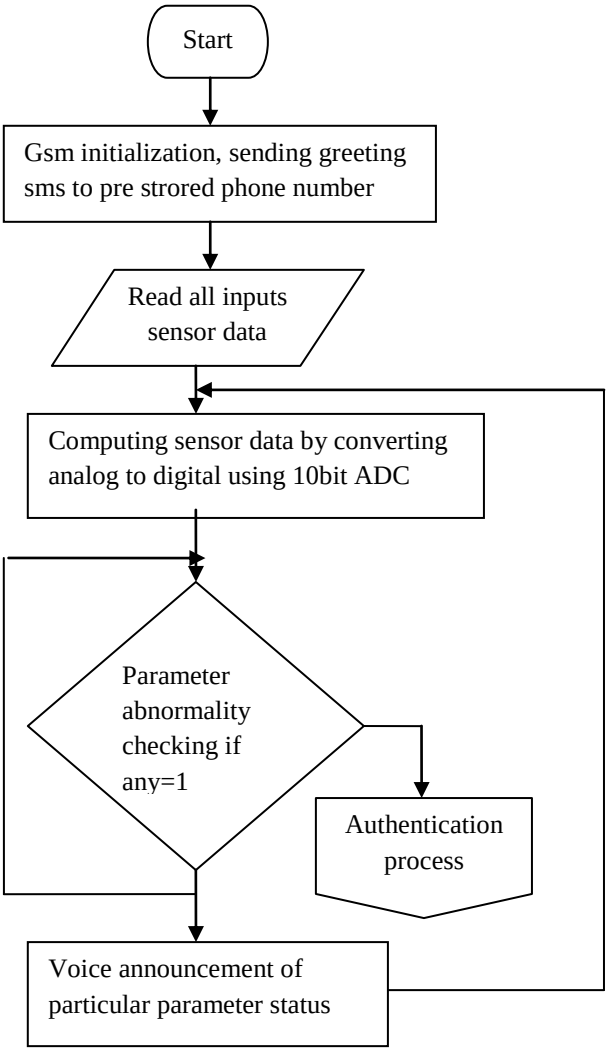

Figure 4.1: Flow chart to monitor bike

V DEBUGGING AND TESTING PROCESS

A microcontroller-based system is a complex activity that involves hardware and software interfacing with the outer world. The debugging and testing of microcontroller-based systems separated into two gatherings: software-only tools and software-hardware tools. Software-only tools come as screens and simulators, which are independent of the hardware being worked on. Software-hardware tools are generally hardware subordinate, more costly and reach from in-circuit emulators and in-circuit simulators to in-circuit debuggers. The factors to consider while choosing a debugging apparatus are cost, convenience and the components offered during the debugging process.

A software simulator is a computer program running on an independent hardware and it simulates the CPU, the instruction set and the I/O of the target microcontroller. Simulators offer the least cost advancement tools for microcontroller-based systems and most companies offer their simulator programs for nothing out of pocket.

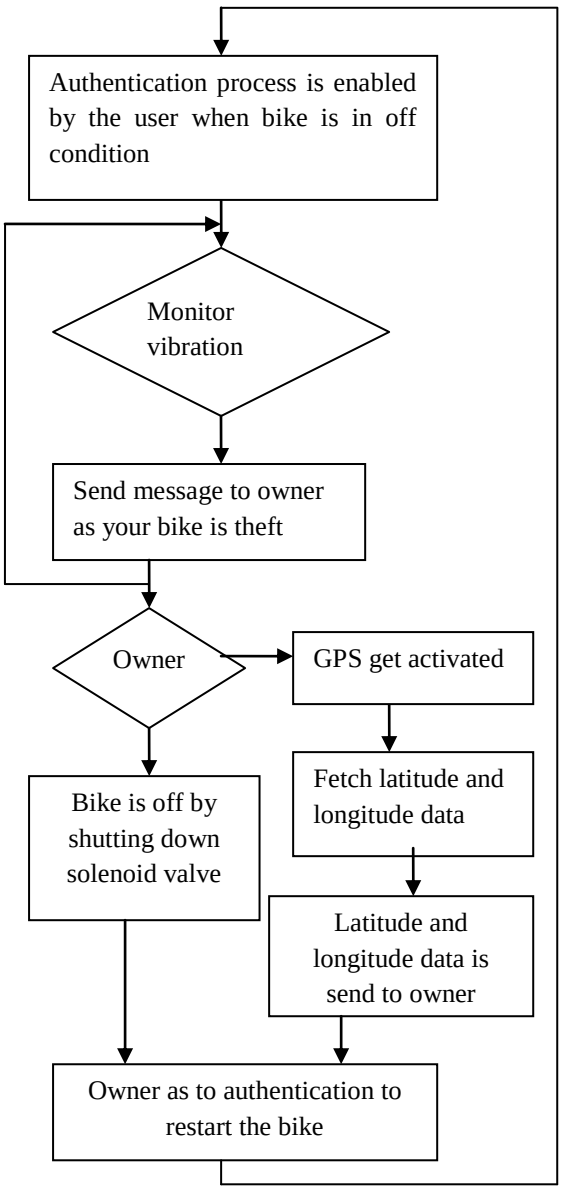

Figure 4.2: Flow chart for authentication of bike

The client program worked in a mimicked situation where the client can insert breakpoints within the code to stop the code and afterward investigate the internal registers and memory, display and change the estimations of program variables etc. Incorrect logic or blunders in computations can investigate by stepping through the code in recreation. Simulators keep running at paces 100 to 1000 times slower than the actual micro controller hardware and, consequently, long time deferrals ought to maintain a strategic distance from while simulating a program. Micro controller-based systems more often than not have interfaces to different outside devices such as motors, I/O ports, timers, A/D converters, displays, push catches, sensors and sign generators, which are generally difficult to reenact. Some advanced simulators, such as the Proteus from Lab center Electronics permit the reproduction of different fringe devices such as motors, LCDs, 7-segment displays and consoles, and clients can create new fringe devices. Inputs to the simulator can come from documents that may store complex computerized I/O signals and waveforms. Yields can be as type of advanced information or waveforms, more often than not put away in a document, or displayed on a screen. A few simulators accept only the assembly language of the target microcontroller. The greater part of the microcontroller software has composed an abnormal state language such as C, Pascal or Basic, and it has become necessary to reproduce a program has written in an abnormal state language.

The software program has written in c or assembly language and compiled using Keil software. After compiler operation, the hex code created and put away in the computer. The hex code of the program ought to be stacked into the AT89C52 by using Top win Universal programmer.

VI HARDWARE ASSEMBLING AND TESTING:

Initial step, we have to make single side PCB layout for the given circuit chart. After made the PCB the accompanying procedure is required to finish the project.

- Assemble every one of the parts on the PCB in view of circuit graph. TX and RX pins of the GSM modem to sticks 13 and 14 of MAX 232 and addition a substantial SIM in the GSM modem.

- Connect the GPS module as indicated by circuit chart.
- This projects executed and tried effectively by us.
- This framework is extremely helpful and secure for bicycle propri

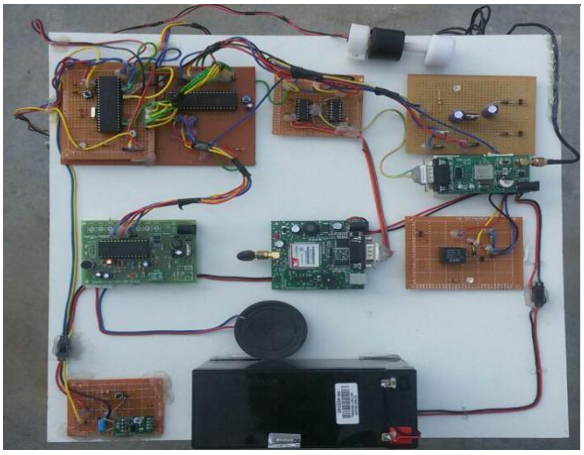

Figure 6.1: Hardware kit

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