



GSM Based Fuel Theft Detector Using Microcontroller

¹Naomi Somer Lepcha,²Tshering Sangmo Sherpa, ³Jitendra Singh Tamang

^{1,2,3}Department of E&C Engineering, Sikkim Manipal Institute of Technology (SMIT), Majitar
Email: ¹naomisomer@gmail.com, ²tsheringsangmosherpa@gmail.com, ³js.tamang@gmail.com

Abstract: In this paper we have focused on developing an enhancement of the vehicle alarm security system via SMS. The system will manipulate a mobile phone to send SMS. Even though the SMS can be sent using the features available in the mobile, the objective of this experiment is to activate the SMS sending by the mobile phone using external program connected physically to the mobile phone.

Antitheft security system utilizes an embedded system designed with GSM to monitor and safeguard a car. In attempt of theft the system sends text message to the car owner and at the same time starts up an alarm from the buzzer installed within the system. The safety of vehicles fuel is extremely essential for public so this project came to our notice due to the alarming rate at which vehicles fuel are being stolen in our country and with this design our vehicle can also be monitored irrespective of where it is parked, provided there is a GSM network coverage. Our model (theft detector) uses very few electronic components and looks very small and compact and can be mounted on vehicles easily.

Keywords: GSM Technology, AT89S52 Microcontroller, LCD Display, IR sensor, GSM module.

I. INTRODUCTION:

In the present days vehicle fuel theft is one of the main concerns of many bike owners and car owners. Many times we have heard or some of us have already faced that petrol from their bike or cars has been stolen. Main intention of this detector is to avoid such situation. A simple, cost-effective solution is proposed here, by

which vehicles fuel security is maintained while the vehicle owner is anywhere across the globe. This model detector has a GSM modem which sends SMS to owner of vehicle when there is fuel theft going on. GSM based Vehicle Fuel Theft Detection System with SMS indication has application in Car, Bikes and all other vehicles. While implementing the model, we have used telecommunication, to be specific; SMS is integrated or improvised to the present vehicle security system [2]. Instead of human to human telecommunication, this system creates new entity which is machine to human telecommunication [9]. Technology already tracks or monitors animals, people, vehicles and other objects to eliminate the need for constant human observation [8]. These technologies need to be small, economical and consume a minimal amount of power. GSM technology is being used extensively in hand-held devices and wireless computing because of its characteristics [6]. This project aims to use GSM technology to monitor security of fuel. This system is an upgrading and improving vehicle security system by integrating SMS features to alert vehicle owners whenever intrusion occurs. The study of telecommunication is an interesting field because it involves digital signal processing, signal and systems, programming and more [1]. This inspires people to improvise the technology into daily use. The system is made up of a GSM modem, AT89S52 microcontroller, LCD16X2 and a power supply Unit. The Fuel Detector involves hardware and software parts construction and the integration of both parts to create the system.

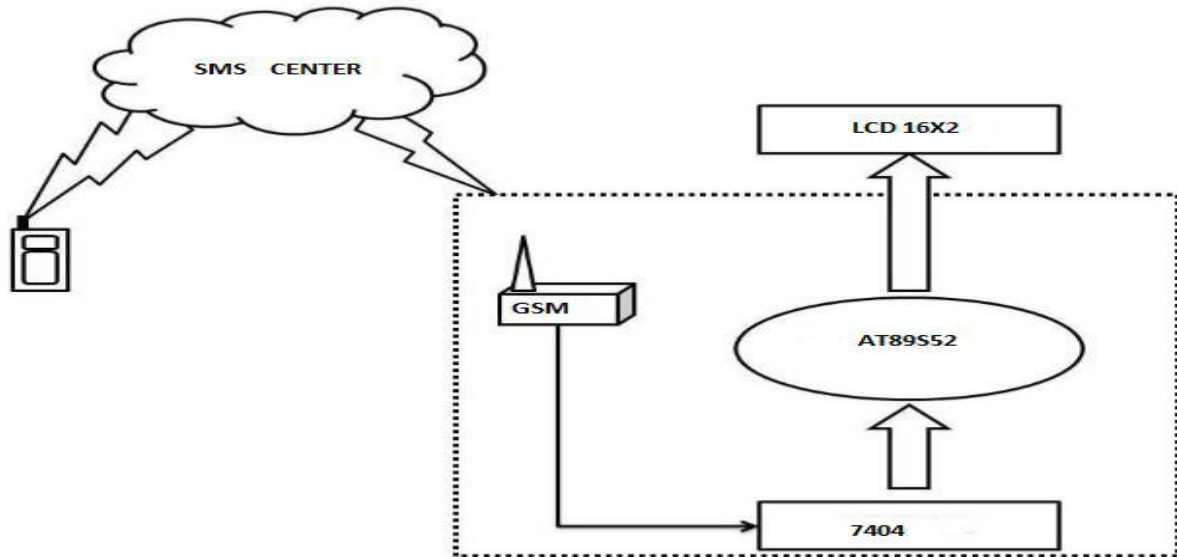


Figure 1: Overview of the System

II. METHODOLOGY:

The figure above shows how the interfacing of the GSM with microcontroller. The GSM module is for communication between the microcontrollers with mobile phones through UART. To communicate over UART or USART, we just need three basic signals which are namely, RxD (receive), TxD (transmit), GND (common ground). GSM modem interfaces with

microcontroller for SMS. Text message may be sent through the modem by interfacing only three signals of the serial interface of modem with microcontroller i.e., TxD, RxD and GND. The transmit signal of serial port of microcontroller is connected with transmit signal (TxD) of the serial interface of GSM Modem while receive signal of microcontroller serial port is connected with receive signal (RxD) of serial interface of GSM Modem.

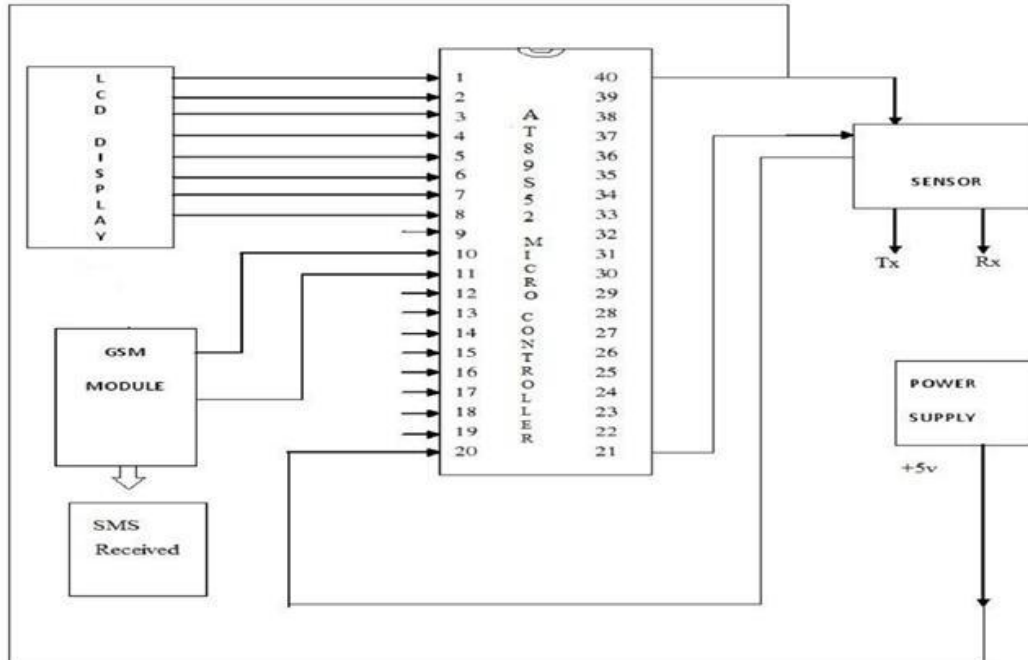
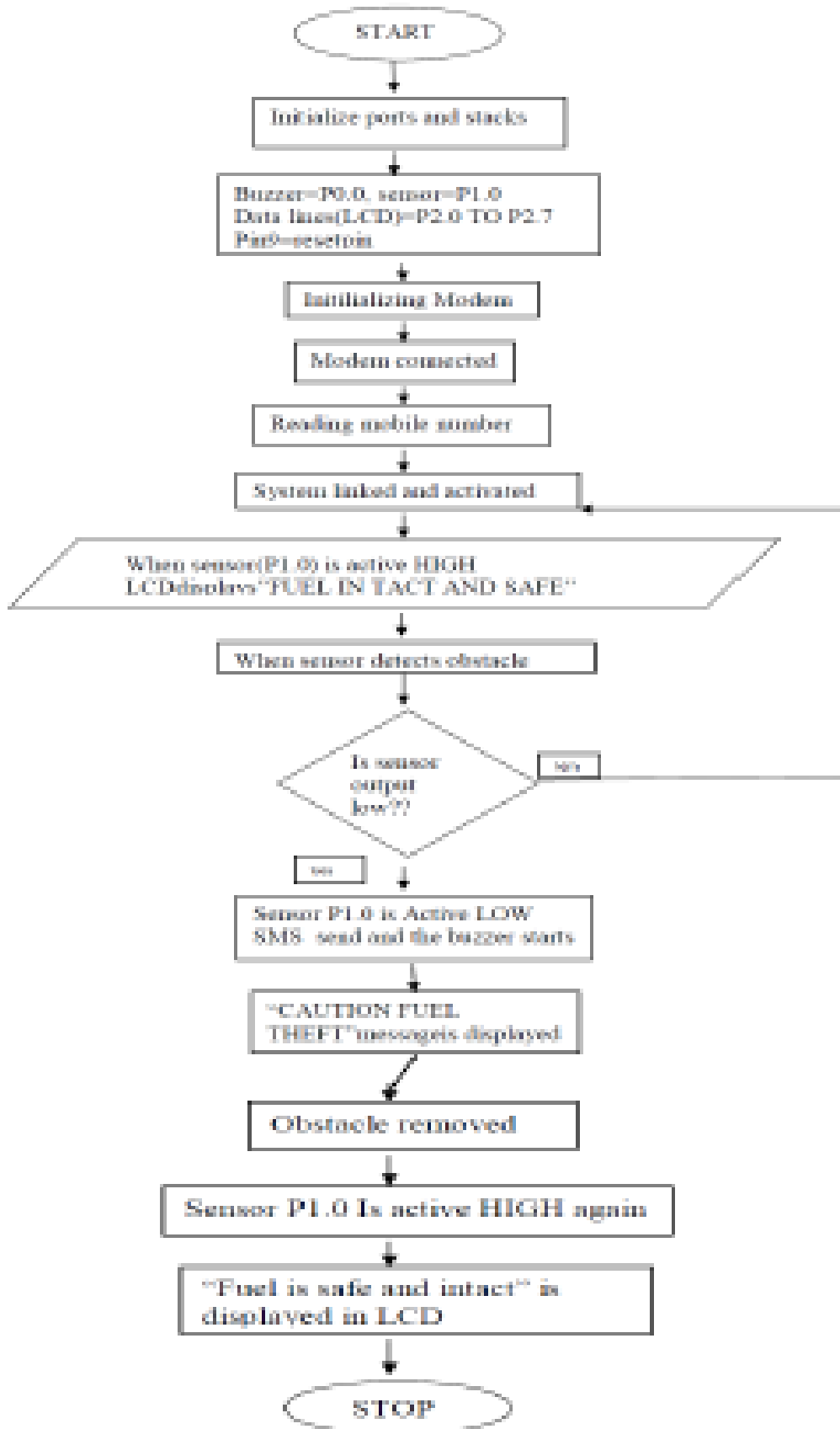


Figure 2: Simple Architecture of GSM Based Fuel Security System

The complexity of coding substantially increases, but once programmed the module works at its robust best since it is a dedicated embedded system and not a general purpose computer. The design procedure involves identifying and assembling all the required

hardware and ensuring safe interfacing between all the components. Then we have the coding process which has to take care of the delays between two successive transmissions. The limiting constraint is the RAM of the microcontroller rather than the coding-complexities.

The Flow-Chart and the Algorithm used for the Model is being given below:



The Algorithm for the following program is mentioned below:

- Step 1 Start
- Step 2 Initialize ports and stack , P1.4=ALARM, P2.0=sensor, Data lines (LCD)=P0.0 to P0.7,
- Step 3 Initializing modem and modem connected
- Step 4 Reading the mobile number
- Step 5 System activated
- Step 6 Active high (“ Fuel is intact and safe”) displayed on LCD
- Step 7 IR sensor
- Step 8 Active low= Armed condition (“Caution Fuel Theft”), Sends SMS , alarm starts
- Step 9 Message is displayed on LCD and owner’s mobile
- Step 10 Obstruction when not present

- Step 11 Disarmed condition=Active high (“Fuel is intact and Safe”)
- Step 12 Send sms to owner’s mobile and is displayed on LCD
- Step 13 End

III. RESULTS:

The system makes use of an embedded system based on the GSM technology. An interfacing mobile is connected to the microcontroller. When a person attempts fuel theft then the microcontroller commands the GSM modem to send a text message as an alert to the vehicle owner and further an alarm is raised by the buzzer installed within the system. In this system we interfaced the microcontroller AT89S52 with SIM 900A modem to decode the message.

Step by step procedure to operate the system is shown below:

STEP-1:



After switching on the system, the GSM based fuel theft security is installed.

STEP-2:



After the system is activated the modem is initialized and connected.

STEP-3:



GSM Modem is activated and interfaced properly with the peripherals

STEP-4:



The system then reads the mobile number that is loaded in the microcontroller

STEP-5:



After the system is activated it displays the safety of the fuel on the LCD screen

The circuit is kept standby through an IR beam focused on to the Photodiode. When the beam path breaks, alarm will be triggered.

STEP-6:

When the sensor is obstructed as shown in the images below i.e. between the LED and the phototransistor, it becomes active low. During which the message about the fuel theft is displayed on the LCD screen and an alarm message is sent to the mobile no. which is loaded in the microcontroller and the buzzer starts ringing.



After the obstruction is removed from the sensor, it becomes active high. During which the message "fuel is intact and safe" will be displayed on the LCD screen and a message about its safety is sent to the mobile number that is loaded in the microcontroller.

IV. CONCLUSION:

A cost effective, simple, miniature and robust GSM based anti-fuel theft security system has been

successfully designed and constructed. After the sensor is obstructed i.e. between the LED and the phototransistor during which the message about the fuel theft is displayed on the LCD screen and an alarm message is sent to the mobile no. which is loaded in the microcontroller. Upon reception by microcontroller it sends text message and starts up an alarm. The system exhibits a satisfactory performance. This system has many advantages such as large capability, wide areas range, low operation costs, effective, strong expandability and easy to use in vehicles or any place with fuel storage. Upgrading this setup is very easy which makes it open to future a requirement which also makes it more efficient. The total set-up is all about controlling fuel-theft. The system is about making vehicle more secure by the use of GPS, GSM technology [3].

This system can be further enhanced by the use of camera and by developing a mobile based application to get the real time view of the vehicle, which would be more convenient for the vehicle owner to track the crime scene (theft).

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