

Implementation Of Method For Real Time Monitoring Dynamic Vehicle Loading Based On Multi Sensors

A. Deepak RatnaMehar¹, V. Nikhil², B. VeereshKumar³

Under Graduate,ECE Dept,VBIT,Ghatkesar,Hyderabad,India

Under Graduate,ECE Dept,Sri VenkateswaraEnggCollege,Chennai,India

Asst.Prof,ECE Dept,VBIT,Ghatkesar,Hyderabad,India

ABSTRACT

Monitoring of vehicle loading using multi sensors is a digital measurement system for checking the weight of product in vehicles as well as detects any gas leakage from the vehicle. Weight of the product is measured by using load cell and gas leakage is detected by using gas sensor. A load cell is a transducer that is used to convert a force into electrical signal. Gas sensor is a device used to detect gas leakage from the vehicles. In our Embedded Project; load cell measures the weight of the vehicle as well as weight of the product. The controller compares the measured load and predefined load.

If the load is more than predefined load a message will be sent to authorized persons. If any gas is released from the vehicles the gas sensor detects it and that information also goes to the authorized persons by the SMS. The SMS will be sent through GSM module. By using AT commands we can activate the GSM module and send the information. Here we are using 89s52 micro controller to process the information.

Keywords: Embedded Project, Controller, load cell, gas sensor, GSM module, AT commands, SMS.

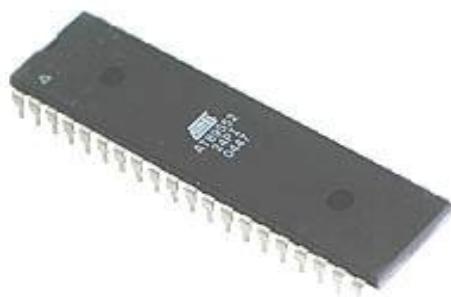
I.INTRODUCTION

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, sometimes with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use. Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale. In our Embedded Project, load cell

measures the weight of the vehicle as well as weight of the product. The controller compares the measured load and predefined load. If the load is more than predefined load a message will be sent to authorised persons. If any gas is released from the vehicles, the gas sensor detects it and that information also goes to the authorized persons by the SMS.

II.Microcontrollers for Embedded Systems

Microprocessors and Microcontrollers are widely used in embedded system products. An embedded system product uses a microprocessor or Microcontroller to do one task only.



In our embedded project, we are using 89s52 micro controller to process the information. The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

III. GSM (Global System for Mobile communications)

GSM is the most popular standard for mobile phones in the world. Its promoter, the GSM Association, estimates that 80% of the global mobile market uses the standard. GSM is used by over 3 billion people across more than 212 countries and territories. Its ubiquity makes international roaming very common between mobile phone operators, enabling subscribers to use their phones in many parts of the world. GSM differs from its predecessors in that both signaling and speech channels are digital, and thus is considered a second generation (2G) mobile phone system. This has also meant that data communication was easy to build into the system. GSM EDGE is a 3G version of the protocol. The ubiquity of the GSM standard has been an advantage to

both consumers, who benefit from the ability to roam and switch carriers without switching phones and also to network operators, who can choose equipment from any of the many vendors implementing GSM. GSM also pioneered a low-cost to the network carrier, alternative to voice calls, the short message service, which is now supported on other mobile standards as well. In this project, if the measured load is more than predefined load a message will be sent to authorized persons. If any gas is released from the vehicles the gas sensor detects it and that information also goes to the authorized persons by the SMS. The SMS will be sent through GSM module. By using AT commands we can activate the GSM module and send the information.

GSM Frequencies

GSM networks operate in a number of different frequency ranges. Most 2GGSM networks operate in the 900 MHz or 1800 MHz bands. Some countries in the Americas use the 850 MHz and 1900 MHz bands because the 900 and 1800 MHz frequency bands were already allocated. Most 3GGSM networks in Europe operate in the 2100 MHz frequency band. The rarer 400 and 450 MHz frequency bands are assigned in some countries where these frequencies were previously used for first-generation systems. GSM-900 uses 890–915 MHz to send information from the mobile station to the base station and 935–960 MHz for the other direction, providing 124 RF channels spaced at 200kHz.

Network structure

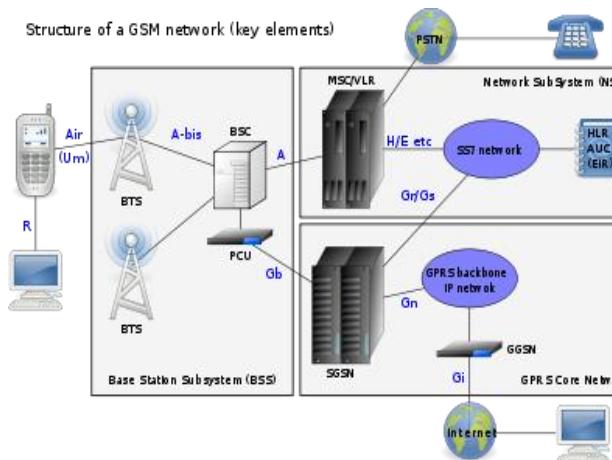


Fig: The structure of a GSM network

IV. LOAD CELLS

A load cell is a force sensing module - a carefully designed metal structure, with small elements called strain gauges mounted in precise locations on the structure. Load cells are designed to measure a specific force, and ignore other forces being applied. The electrical signal output by the load cell is very small and requires specialized amplification. Load cells are designed to measure force in one

direction.

They will often measure force in other directions, but the sensor sensitivity will be different.

How they work

Strain-gauge load cells convert the load acting on them into electrical signals. The measuring is done with very small resistor patterns called strain gauges - effectively small, flexible circuit boards. The gauges are bonded onto a beam or structural member that deforms when weight is applied, in turn deforming the strain-gauge.

V. GAS SENSORS



MQ2 flammable gas and smoke sensor detects the concentrations of combustible gas in the air and

outputs its reading as an analog voltage. The sensor can measure concentrations of flammable gas of 300-10,000ppm. The sensor can operate at temperatures from -20-50°C and consumes less than 150mA .

Connecting five volts across the heating (H) pins keeps the sensor hot enough to function correctly. Connecting five volts at either the A or B pins causes the sensor to emit an analog voltage on the other pins. A resistive load between the output pins and ground sets the sensitivity of the detector. Please note that the picture in the datasheet for the top configuration is wrong. Both configurations have the same pin out consistent with the bottom configuration.

VI.RS-232

In telecommunications, RS-232 (Recommended Standard 232) is a

standard for serial binary data signals connecting between a DTE (Data terminal equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports.

Scope of the standard

The Electronic Industries Alliance (EIA) standard RS-232-C as of 1969 defines:

- Electrical signal characteristics such as voltage levels, signaling rate, timing and slew-rate of signals, voltage withstand level short-circuit behavior, and maximum load capacitance.
- Interface mechanic characteristics, pluggable connectors and pin identification.
- Functions of each circuit in the interface connector.
- Standard subsets of interface circuits for selected telecom applications.

- The framing of characters in the data stream.
- Protocols for error detection or algorithms for data compression
- Power supply to external devices.

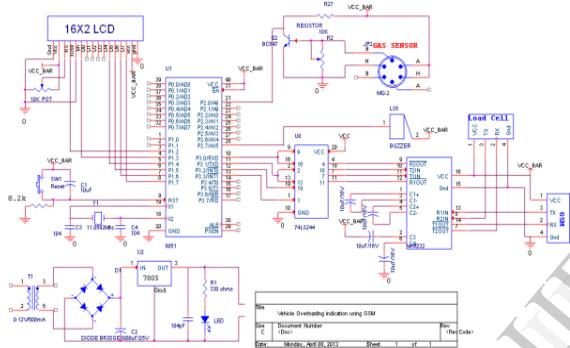
VII.WORKING PRINCIPLE AND IMPLEMENTATION

The project “IMPLEMENTATION OF METHOD FOR REAL TIME MONITORING DYNAMIC VEHICLE LOADING BASED ON MULTI SENSORS”, is very useful to industries. Monitoring of vehicle loading using multi sensors is a digital measurement system for checking the weight of product in vehicles as well as detects any gas leakage from the vehicle. Weight of the product is measured by using load cell and gas leakage is detected by using gas sensor. A load cell is a transducer that is

used to convert a force into electrical signal. Gas sensor is a device used to detect gas leakage from the vehicles. So, this project is used to measure the load on vehicles, leakage of gas from the vehicle and also send SMS through GSM module. In this Embedded Project; load cell measures the weight of the vehicle as well as weight of the product. The controller compares the measured load and predefined load. If the load is more than predefined load a message will be sent to authorised persons. If any gas is released from the vehicles the gas sensor detects it and that information also goes to the authorized persons by the SMS. The SMS will be sent through GSM module. By using AT commands we can activate the GSM module and send the information. Here we are using

89s52 micro controller to process the information. The entire set up requires a power supply of 5v which is provided by the regulated power supply. The connections that are to be made are shown in the schematic diagram.

SHEMATIC DIAGRAM



PHOTOCOPY OF THE PROJECT



VIII.CONCLUSION

The project “IMPLEMENTATION OF METHOD FOR REAL TIME MONITORING DYNAMIC VEHICLE LOADING BASED ON MULTI SENSORS”, has been successfully designed and tested. Monitoring of vehicle loading using multi sensors is a digital measurement system which is becoming increasingly important in large industries and cities. It is more secured than other systems. Now a day's accidents are rapidly increasing, with this we can have a good control in it. The vehicles with overload can be turned off by with a simple SMS. This setup can be made more interactive by adding a display to show some basic information about the load on the vehicle and also add emergency numbers which can be used in case of emergency. The advantages of this project are Low cost, easy to

implement, automated operation, and Low Power consumption. Upgrading this setup is very easy which makes it open to future requirements without the need of rebuilding everything from scratch, which also makes it more efficient.

REFERENCES

[1] Adler, R. B., A. C. Smith, and R. L. Longani: "Introduction to Semiconductor Physics," vol. 1, p. 78, Semiconductor Electronics Education Comitee, John Wiley & Sons, Inc., New York ,1964.

[2]Jacob Millman Christos C. Halkias: "Electronic Devices And Circuits", Tata McGraw-Hill Publishing Company Ltd. Sep, 2003.

[3] Schade, O. H.: "Analysis of Rectifier Operation", proc. IRE, vol.31, pp. 341-361, July, 1943.

[4] Stout, M. B.: "Analysis of Rectifier Circuits", Elec. Eng., vol. 54, September, 1935.

[5] The 8051 Microcontroller and Embedded Systems using Assembly and C by Muhammad Ali Mazidi.

[6] Wireless communication and netwoking –JonW.Mark and WeihuaZhqung,PHI,2005.

[7] "Power Electronics" by M D Singh and K B Khanchandan.

[8] "Linear Integrated Circuits" by D Roy Choudary&Shail Jain.

WEBSITES:

[1]http://en.wikipedia.org/wiki/Seven_segment_display

[2]<http://www.gsm-modem.de/>

[3]<http://www.datasheetsite.com/datasheet/MAX232>

[4]http://www.rentron.com/rf_remote_control.htm

[5]<http://www.atmel.com/dyn/resources/pro>