FUEL MONITORING AND COST OPTIMIZATION IN CELLULAR NETWORKS (FMCO)

Project Advisor
(Mam Warda Hussain)

Submitted **by:**

(Sajid Ullah khan - 091420302)
(Hafiz Khadam Ali - 091420344)
(Muhammad Imran - 091420318)

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Project Report submitted to the Department of School of Engineering, University of Management and Technology In partial fulfilment of the requirement for the degree of Bachelor of Science in Electrical Engineering

Advisor Name: - Mam Warda Hussain

Signatures of Advisor: _____

Sajid Ullah khan – 091420302

Hafiz Khadam Ali - 091420344

Muhammad Imran - 091420318

Abstract

This project is about to design such a system which is based Fuel Monitoring System. As we know that fuel corruption is the main problem for all the telecom operators as much of the time the load shading is occurring and they are force to run their equipment on generator, which is very costly, and mostly they also suffer from fuel corruption b/c fuel is not used completely by the company and the operator they have hired for site use it for personal purpose instead of putting it into the generator due to which company pays a lot of funds for the fuel. This project provides the facility to telecom operators to use the fuel usefully. Another problem to the telecom operators is that they don't have any information whether the generator is loaded/unloaded and which time the WAPDA power has been disconnected and which time the generator power is supplied to the equipment which is the critical case b/c if a person switched on the generator and there is no power outage, then the generator is unloaded which fuel consumption is less than the normal loaded condition, and they show that they have switched on the generator but company have no information about the generator loaded/unloaded condition, so, our project also provide this facility to the telecom operators and other main organizations, Universities, Schools, Colleges etc. who has generator provided on different sites, sub-branched, campuses and the fuel is provided by the main branch or if the main branch want to have the record of all the branched then this project is very useful for the company. Another problem the companies is that mostly their sites down due to power shortage and they have no information of fuel level in order to provide on time fuel delivery, this project also tells the companies the fuel level of the generator tank.

The main components of this project are: microcontroller, GSM, Sensors, LCD Display, Database and GUI, Power supply, Load.

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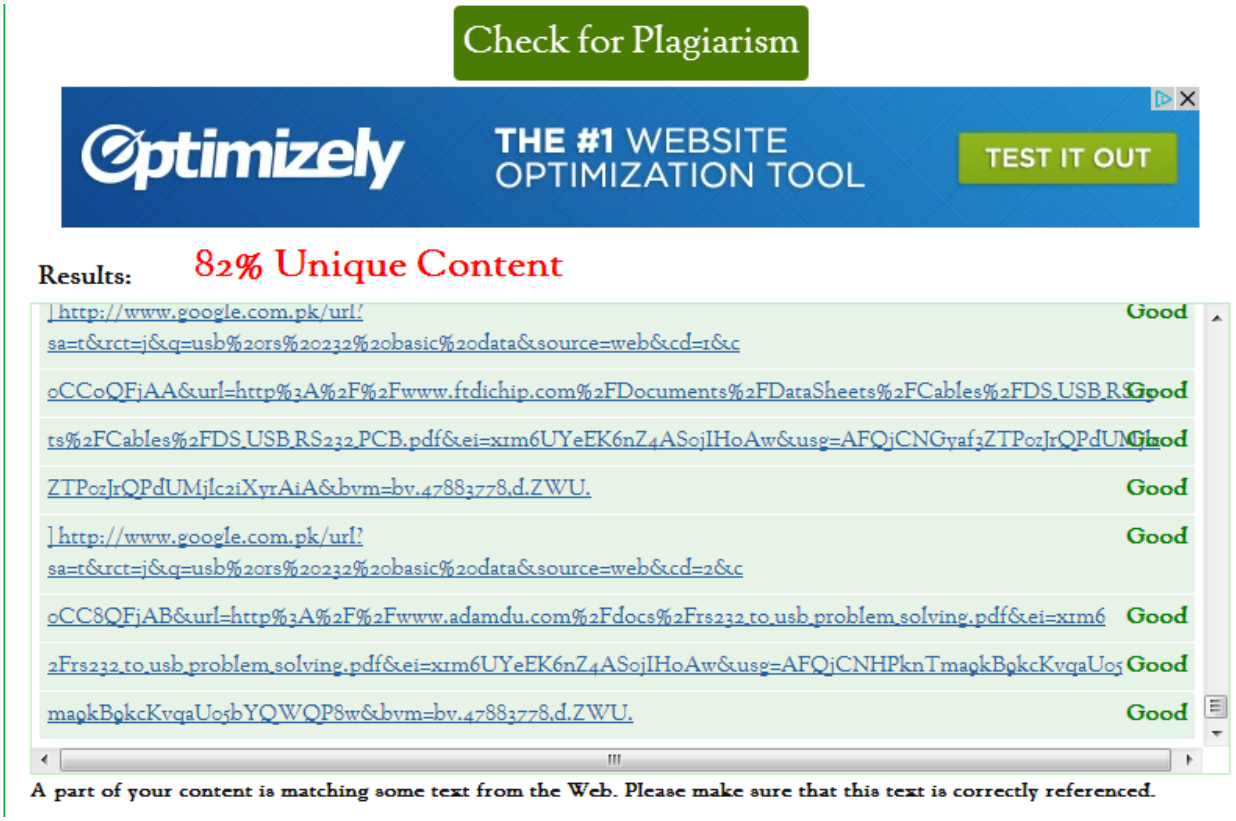

Figure 1: Plagiarism Check

Name of Adviser: Mam Warda Hussain Signature:

Acknowledgement

First of all we are highly grateful to Almighty God who provided us not only the opportunity but also the knowledge, skills and abilities for the successful completion of our project.

I have a very long list to offer my gratitude, but if I spell out all, this page of "Acknowledgements" would become a thick "Who's Who". Thanks to all those who made this project a success.

I begin with the name of my Project Supervisor, Sir Basit Shahab and Mam Warda Hussain for giving me directions, moral support, motivation and advice and help every time I needed. You are not only a very good supervisor but a very good human too who is always kind to others and understands the problems/limitations of the students. It is only with your support and suggestions that I achieved fruitful results in time.

We will fail our duty if we do not thank our best teacher sir mohsin (Lab Engineer) and sir Jawad Ullah for supporting and sharing knowledge in the simulation, programming and implementation of the project who has taught us the microcontroller lab in the 6^{th} Semester.

It has been declared that this project is not done by anyone and isn't copied from anywhere.

Dedication

This project has been dedicated to our helpful and faith teachers
And to our parents, brothers, and sisters whose moral& financial supports
And prayers make us able to complete this project in the partial fulfilment of
B.Sc. Electrical Engineering, Degree.

List of Abbreviations

- A/D — Analogue to Digital Convertor
- AC — Alternating Current
- ALU — Arithmetic Logic Unit
- AT Commands — Attention Commands
- BASIC — Beginner's All-purpose Symbolic Instruction Code
- BTS — Base Transceiver Station
- BTS — Base Transceiver Station
- CISC — Complicated Instruction Set Computer Architecture
- CMOS — Complementary Metal Oxide Semiconductor
- CRT — Cathode Ray Tube
- DC — Direct Current
- DOS — Disk Operating System
- FMCO — Fuel Monitoring and Cost Optimization
- GSM — Global System for Mobile communication
- GUI — Graphical User Interface
- IC — Integrated Circuit
- KB — Kilo Byte
- LCD — Liquid Crystal Display
- mA — mili-Ampere
- µF — micro-Farad
- LCs — Liquid Crystals
- MCU — Micro-Controller Unit
- MMS — Multimedia Message Service
- MODEM — Modulation and Demodulation
- OOP — Object Oriented Programming
- PC — Personal Computer (Desktop/Laptop etc.)
- PIN — Personal Identification Number
- PROTEUS — Processor for Text Easy to Use
- RAM — Random Access Memory

- RISC Reduced Instruction Set Computer Architecture
- ROM Read Only Memory
- SIM Subscriber Identity Module
- SMS Short Message Service
- TTL Transistor-Transistor Logic
- VB Visual BASIC
- WAPDA Water & Power Distribution Association

List of Symbols

A	*Ampere (**volts/Ω**)*
Ohm	*Ω (**voltage/current**)*
Farad	*F (**charge/volt**)*
V	*Volt (**Ampere* Ohm**)*

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Chapter-1: INTRODUCTION

1.1.INTRODUCTION

As we know that with the growth of human and technology, the mobile system is the need of the today world, and the services are provided by the different Telecom Operators (the company which provide the services), but unfortunately we have load-shading problem in Pakistan due to low Power Production than the need, that is , the margin b/w the production (generation of) Power and Uses of Power is very high which arise the power outage, so the telecom operators have provided the generator sets on each site, which run on the Diesel i.e. Diesel Generator Sets. And unfortunately the corruption rate in Pakistan is very high due to which mostly of the fuel is not utilize for the right purpose and the company pays a lot for fuel which is loss to them, and our designed project provides the solution to these problem and to provide on time fuel delivery to the sites. Our project has mainly 3 parts of which it is based/made:

1- GSM MODEM
2- MICROCONTROLLER
3- LCD

One side of GSM MODEM is connected to BTS wirelessly and other side is connected to microcontroller by serial interface. The LCD is connected to microcontroller pins by wires. The function of GSM MODEM is simply modulation and demodulation in GSM band frequency and the baud rate (bits/sec) of GSM is 9600 for GSM-900. In microcontroller we burn the programming of the project where it control the whole circuit and it forward the data to the centre where the receiver side of our project has been implemented and the received SMS can be seen on the Computer Screen Using GUI and at the sender side the data is also shown on the LCD which also tells the operator of the BTS the status, fuel level. SMS is sent from cell phone and received by GSM MODEM where modulation occurs after that in microcontroller validation of condition occurs and after that the result is shown on the LCD and is send to the Receiver side.

1.2.Parts (Components) of the Projects

The Following are the components used in the project, and little bit information about it.

1.2.1. GSM Network

GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. Mobile services based on GSM technology were first launched in Finland in 1991.Today, more than 690 mobile networks provide GSM services across 213 countries and GSM represents 82.4% of all global mobile connections. According to GSM World, there are now more than 2 billion GSM mobile phone users worldwide. GSM World references China as "the largest single GSM market, with more than 370 million users, followed by Russia with 145 million, India with 83 million and the USA with 78 million users.

In Pakistan GSM system is a common system and this system present his coverage in all over Pakistan and Pakistani people used GSM system for personal communication mostly. In Pakistan the user of GSM system are 100 million. All these are the reasons for using GSM system networking in our project for Fuel Monitoring of GSM Network's to overcome the problems in the Abstract by just sending an SMS from home(Local) BTS to the Centre of the Company.

1.2.2. SMS Based Fuel Monitoring System

SMS (short message service) is actually a paging service which is provided by GSM system. SMS is actually text form message which is length of 1836 words provided by any GSM Network company. Our project is based on SMS in which the information about the loaded/unloaded condition, ON/OFF time &Fuel Level via SMS from the site where the sender side of the module is installed to the receiver module side and SMS is a very common communication service of GSM system.

1.2.3. Automatic Detection& Operation of the system

This project provides automatic detection of all the conditions by using sensors, and sends all the data to the main centre of GSM Network Company or cellular company providing services. This allows overcoming the corruption up to some great extent. The

fuel sensor is also available already in the generator tank which shows the tank fuel level, but the problem is that the fuel can't be seen from the main centre and they don't know the level until they contact the person, they have hired for it, so the fuel level sensor of the tank output is connected to the microcontroller and it converts this analogue data to digital by A\D convertor. And then send to the centre. And also for the loaded/unloaded condition transformer is used and variable resistor control its output voltage and send to microcontroller which in turn send it to the main centre and also the time is sent with this and for the ON/OFF sensing the output of generator is connected to the microcontroller by converting the AC to DC Voltage compatible with the microcontroller (5 Volts) and feed this to the microcontroller and send it to the receiver, every time the condition is changed, it send the SMS not continuously and when the Generator is OFF, the output of generator becomes zero volts, i.e. condition change and the microcontroller will send the SMS to the centre providing the current fuel, load level and time of switched OFF to the Receiver side and will be stored there in the log window button and can be seen from the log window.

1.3. Components Used

MAX232
AT89S52
GSM Modules
Voltage Regulator
Switches
Power Supplies
Transformer
GUI
ON/OFF Sensor
Fuel Level Sensor
Loaded/Unloaded Condition Sensors

1.4. Software Used

- Proteus 7 Professional
- Keil vision 4 C51 v 9.02a Portable
- VB.Net