ADVANCE PETROL & DIESEL BILLING SYSTEM

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Abstract: **Presently the fuel stations are manually operated. In our project we are presenting a system which can automatically deduct the amount of petrol distributed from customer voucher card. In our project all vehicle drivers would have a voucher card with a specific customer ID, which can be purchased by some recharge points. The customer requiring petrol/diesel enter customer id and after verification enters required quantity. The electrical pump is turned on if nozzle is inside the petrol tank and after filling tank it automatically turned off. This system has nozzle sensor to detect the nozzle inside tank and the system keeps electrical pump OFF in any case nozzle is out of tank. The system also has fuel sensor to make electrical pump off, if tank is full and entered petrol quantity is more than tank capacity.**

Keywords – Customer ID, petrol dispensing system, automotive petrol control, Nozzle sensor, fuel sensor.

I. INTRODUCTION

The Petroleum products are one of the huge and phenomenal manifestations of the nature. The most ideal utilization and circulation of these products is mandatory for survival of these items. Fuel stations are the facility to sell fuels like petrol, diesel, CNG into vehicles and calculate the total financial cost of the product thus dispensed. These Petrol and Diesel stations are operated manually and distribute fuel to particular client's vehicle by utilizing manpower and are massively reliant upon the reliability of the individual doing this activity. To upgrade market we need a dispenser that is reliable, user-friendly and ready to increase our profitability. [1]

A large portion of the fuel stations today work at the same time as regular stores which raises security concerns exponentially. This dissemination framework has a great deal of drawbacks, for example, robbery of the fuel, ill-conceived fuel offering and wastage of manpower. Today all petrol or diesel pumps have a micro-controller based control unit which controls the electrical pump, drives the display, measure the quantity of the fuel and accordingly turn on or off the electrical pump. Yet at the same time a man is required to deliver the fuel (petrol or diesel) and gather the cash. At some fuel filling stations there is theft of some fuel by petrol delivery man while delivering petrol to each customer. Unmanned petrol or diesel stations are developing in prominence to a great extent to the way that they give petrol or diesel at lessened costs. We comprehend that theft and fraud are a developing worry for the present retailers.

The purpose of our project is to automate the petrol or diesel station and eliminate the need of human interaction so that there is no need of workers to fill the petrol or diesel. In our project all vehicle drivers would have a smart card with a specific customer ID, which can be purchased by some recharge points. The petrol pump is equipped with a keypad for the entry of customer ID which reads the amount in that customer ID and will display it on the LCD. The required petrol or diesel quantity is entered by the user. The electrical pump is then turned on if nozzle is inside the petrol tank, fills the tank and automatically turned off. This system has nozzle sensor to detect the nozzle inside tank and the system keeps electrical pump OFF in any case nozzle is out of tank. On completion of petrol filling, amount is deducted from card and the remaining balance is updated in the card. When there is low balance in the card, transaction cannot be complete and respective message is displayed on LCD.

The rest of this paper is organized as follows. Section II presents the Background of Fueling stations, Section III presents System Design, Description of each module and their working is presented in Section IV, complete experimental setup in Section V, finally results are presented in section VI and Section VII presents the conclusion.

II. LITERATURE SURVEY

The utilization of oil has been expanded enormously in both industries and transport area. For economic advancement of any nation these two sectors are much important. The increasing demand of fossil fuels day by day leads to exhaust of petroleum products in near future. So the time has come to distinguish elective fills for diesel with the end goal that they may fill in as non-renewable energy sources, which are draining at considerably speedier rate than anticipated.

The petroleum industry is divided into three streams like upstream, midstream and downstream. The upstream essentially covers investigation and production of unrefined petroleum and gas, midstream covers transfer of materials through pipelines and marketing of petroleum products through retail outlets is covered under downstream. In general the Selling of petroleum products through outlets is known as Petro-retailing business. Petro-retailing is the substance of oil advertising organizations and offers items/benefits straightforwardly to the clients. The retail fuel industry is capital profound and general demand has been static for a long time.

From starting many changes have arrived in Petrol retail outlets [2], these are:

1 Manual Control

 In Manual control operation, the control and automations are done by Manual Operation. The main drawback of manual control is that Human Errors may affect the quality of the end product.

2 Hard Wired Logic Control

 To achieve desired level of automation Contractors and Relays together with timer and counters were used in this type of control. This type of control logic involves bulky and complex wiring, and requires lot of rework to make any type of changes in control logic. We can start work only when it is fully defined which leads to longer project time.

3 Electronics Control with Logic Gates

 In this control logic, logic gates and electronics timer in control circuits has replaced Contractors and Relays together with timers and counters. This type of control logic is energy saving, requires less maintenance, has greater reliability and has reduced spare requirement. Implementation of changes in the control logic and also reducing project lead-time was not possible in this type of control.

4 Programmable Logic Control

 In this control, desired control and automation is not achieved through physical wiring of control devices, rather it is achieved through program say software. It is Energy Saving, require less Space, Modular replacement, Easy investigating and Error Diagnostics developer. But on the other hand it is Expensive, requires Third parties license, Bulky to convey and Expert individual is required. Above procedures are utilized for computerization from a very long while as there innovations were created.

III. SYSTEM ANALYSIS

To establish the scope of the project in terms of the major functions, performance issues and technical constraints. This planning has been proposed. The arrangement will give an estimate of the product size, the effort required and the duration. The arrangement will likewise talk the detailed schedule of different subtasks within the project and furthermore the resources needed to fulfill them.

Presently our system is divided into three sections. The first section is the customer section, second section is the database section and third and last section is sensor section. In customer section the user enters his customer id and required petrol quantity to fill in his vehicle. The database section matches customer id with its database and when matched fills petrol and update balance in its database. While filling petrol the sensor section senses whether the nozzle is inside the petrol tank or not and IR sensor measures tank overflow condition.

A. Customer Section

The customer who wants to use unmanned petrol pump, has to purchase prepaid voucher card of different amounts (100, 200, 500 or 1000 Rs.) with different customer id's from the market. Customer requiring fuel from petroleum industry has to first come to the petrol station and on key station he has to press a code '*' to enter in petrol/diesel entry mode. The system then asks him to enter his customer id. When the customer enters his customer id, the system matches this id with its database and when matched it response with the balance available in that customer id. In the case customer id didn't matched the system response with "customer id not matched".

When customer id matched the system asks user to enter required quantity from 0 to 10 liter. According to the quantity entered by user the system calculates the charges for that quantity and update balance in that customer id by deducting that petrol cost from balance. In the case when customer id has not sufficient balance, system responses with "Insufficient Balance" and make customer out of the system. When there is sufficient balance the system checks for the nozzle entered in tank and if nozzle is inside the petrol tank it fills the petrol according to required quantity.

B. Database Section

The data base section contains different customer ids with their accounts summary (balance). When customer fills petrol the remaining balance is updated in his customer id and a detail of transaction is send on serial port using RS 232 where it can be print.

C. Sensor Section

In the sensor section the first sensor is the tank sensor which will sense whether the nozzle is entered in the petrol tank or not. When nozzle is inside petrol tank then only the system fills the petrol. While filling petrol if accidentally nozzle comes out of the tank, system automatically stop filling petrol till nozzle is not put inside the petrol tank. The level sensor continuously monitor petrol level in the petrol tank, If the level goes up above a certain level say maximum level the system stops filling petrol and avoid chances of overflow of the tank.

IV. DESIGN AND IMPLEMENTATION

The system consists of Keypad of switches to enter in petrol/diesel filling mode, to enter customer id and required petrol quantity. The keypad is a 4*4 matrix of switches which is connected to FSK converter block which detects every key pressed and

provide its binary logic to micro-controller so that it can be process further
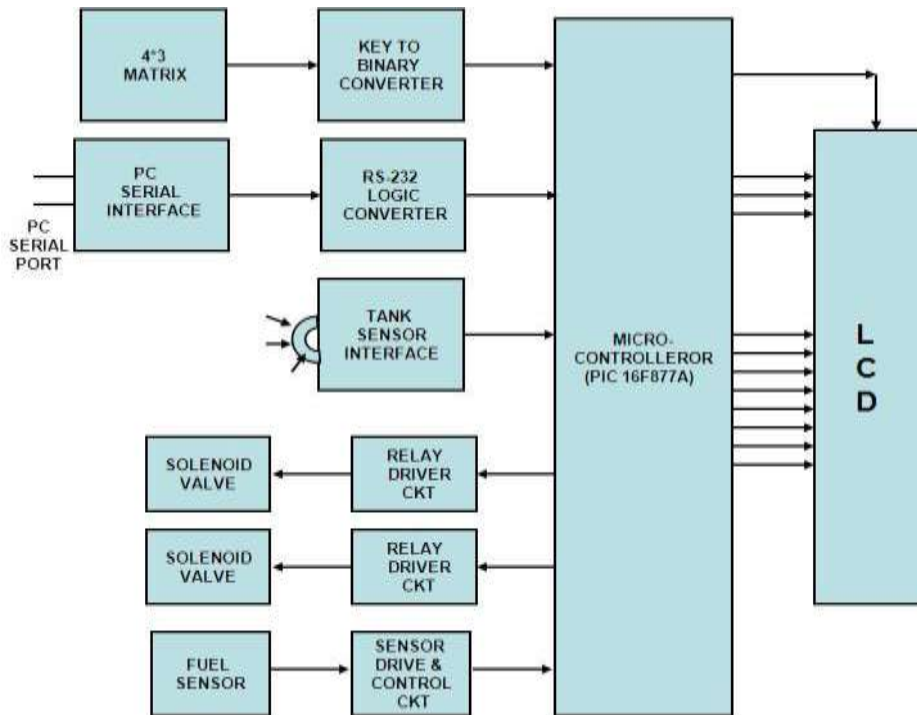

Fig. 1. System Block Diagram.

The customer purchase prepaid voucher card of different amounts (100, 200, 500 or 1000 Rs.) from the market. On petrol pump at key station he press a code '*' to enter in petrol/diesel entry mode and then enter his customer id. When the customer id matched it response with the balance available in that id and asks to enter required quantity from 0 to 10 liter. According to the quantity the balance is updated and petrol is filled.

The RS 232 interface is a serial interface which provide interface between PC and micro-controller. When customer fills petrol the remaining balance is updated in his customer id and a detail of transaction is send on serial port using RS 232 where it can be print.

The tank sensor is a photo sensor which detects dark in the tank and provides logic accordingly. The tank sensor sense nozzle and fill petrol only when nozzle is inside the petrol tank.

The fuel sensor is an IR Trans receive circuit which detects fuel level. The level sensor continuously monitor petrol level in the petrol tank, If the level goes up above a certain level say maximum level the system stops filling petrol and avoid chances of overflow of the tank.

Relay driver circuit is used to make relay ON or OFF. When user enters desired quantity on the keypad the micro controller activates the relay driver circuit for that particular time period which is decided according to the time required to fill 1 lt. petrol. Relay output is directly connected to petrol pump motor. So it draws the petrol according to the required quantity entered in the keypad. The cost of the petrol is shown on the LCD display.

The system consists a PIC Micro-controller (PIC 16F877A) which is the main control unit and all control operation like reading data from keypad, taking decision, reading sensors and filling petrol all decision are taken by micro-controller and data is displayed on LCD Display.
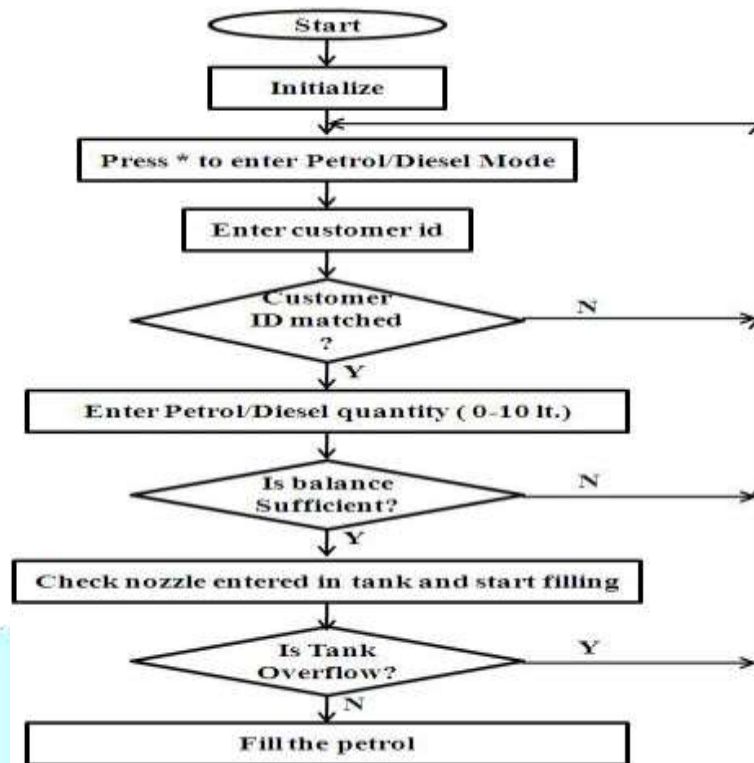
Fig. 2. System flow chart

In our project we have used MPLAB X IDE to create applications for Microchip microcontroller (PIC 16F877A). The flow chart of the system is shown in figure below. System flowchart is a method for showing how information streams in a framework and how decisions are made to control events.

V. EXPERIMENTAL SETUP

The complete hardware module and power supply unit is shown in figure 3 below. The system operates on very less power supply i.e. from 5V and 12V only which is easily available.

Fig. 3. Complete Experimental Setup

VI. RESULT

The complete filling process is shown in figure 4. When the customer enters he need to press '*' to enter in 'Petrol/Diesel Entry mode'. When customer press * system ask him to enter his customer ID i.e. 2222 in this case. The system reply with balance available in that customer ID, which is Rs.200 here. Then system asks for required quantity and displays cost of petrol and remaining balance available in his ID. After checking nozzle sensor and Fuel sensor it start petrol filling and when complete display message " Petrol Filling Complete". The complete working process is shown in figure 4 below.

Fig. 4. Complete Filling Process

VII. CONCLUSION

To make secure the distribution of fuel and keeping record of the same fuel with approval of client, it is important to develop the new technology in the world of electronics. Our project or proposed system is one thought which can change the substance of the present manual arrangement of conveyance and information keeping. The total central access of all these activities give the right approach toward security and economical need of the businesses since industry itself can control dispersion and also keep the record of same fuel from a huge number of miles situated in office.

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