Design for Unmanned Milk Vending Machine Using RFID Card System

Satya Manoj.S[1] Mr. Manikandaswamy.S[2]
[1]Electronics And Communication Engineering SRM University Chennai, India
[2]Electronics And Communication Engineering SRM University Chennai, India

ABSTRACT: *In this modern world, everything becomes computerized. The need of human in various scenarios were overcome by machines. This leads to evolve an idea to propose a project, where the human interaction is fully eliminated by RFID card system. In this project, the milk vending design the PIC and RFID plays a vital role to eliminate the need of human interaction. The PIC micro controller is used to control the flow measure and turns OFF accordingly. RFID tags has to be recharged and placed on the RFID reader then the required milk can be vended.*

Index terms: *RFID reader, RFID tags, GSM modem, Ultrasonic Level sensor.*

I. INTRODUCTION

In the present day everyone using cards to pay the money in the hotels, shopping malls thus avoiding carrying the money and waiting time. In the milk centers there will be a big queue to collect milk because milk has to be measured and has to receive the cash. So, to avoid the waiting time and paying money through hand a micro controller with RFID reader can be used in milk centers. Even though the micro controller can measure the flow accordingly to the user, but a person is still required to collect the money. To eliminate the human interaction a card system is used for vending the milk. The card system means it has RFID reader and RFID tags which are used by the customers for the milk centers which has to be recharge. Using this tags milk can be vended without human interaction.

Existing and Related Work

Currently micro controller is used to control the electrical pump, drive the display, measure the flow and accordingly turn OFF the electric pump. But a person is still required to collect the money in the area where micro controllers are used. Considering the milk centers there are micro controllers to measure the flow and accordingly turn off when the required milk is vended. There should be a human being to collect the money from the customers. This human interaction can be avoided by this project.

Literature review

The use of RFID traffic control is to avoid problems especially those related to image processing and beam interruption techniques are discussed. Each vehicle is equipped with a RFID tag. When it comes in the range of RFID reader, it will send the message to the police control room. The RFID reader will track how many vehicles have passed through for a specific period and determines the congestion volume [1].

Effective City Petrol Supply Management System (CPSMS) could not only provide petrol filling services, but also decrease the waiting time of each user. In order to adapt the dynamically changing situations, Autonomous Decentralized System (ADS) was proposed. Each subsystem of ADS gathers vehicles waiting time information from the nearby petrol bunks, it autonomously judges the vehicles to move to the other petrol bunks having less waiting time. In this architecture, each node (petrol station) could estimate the length of vehicles waiting in queue and calculate the waiting time of the last vehicle [2].

Proposed Block Diagram

In the proposed system every user is provided with a RFID tag, with which one can access milk at the milk centers. Before using this card, we have to recharge it. To vendor the milk card has to be placed on the RFID reader, which is interfaced to the PIC16F877A micro controller with serial interfacing. The micro controller reads the data from the reader and asks how many liters does it required, which will be displayed on the LCD screen. Then enter the required number of liters through keypad which act as an input to the micro controller. After reading the value the micro controller will check for the existing balance in the smart card, if it is sufficient then

the milk will be pumped. If there is no money in the card the buzzer will ON. By using the level sensor whenever the milk level is going to empty it will send Short Message Service (SMS) to the Manager.

A. RFID reader

RFID is Radio Frequency Identification Device. It is fast, affordable and automatic identification technology that uses Radio Frequency (RF) to transfer data between RFID reader and RFID tag. It holds a small amount of unique data – a serial number or other unique characteristic of the item. The data can be read from a distance – no contact or even line of sight necessary RFID technology uses RFID tags. RFID tags contain antennas to enable them to receive and respond to radio-frequency questions from an RFID transceiver.
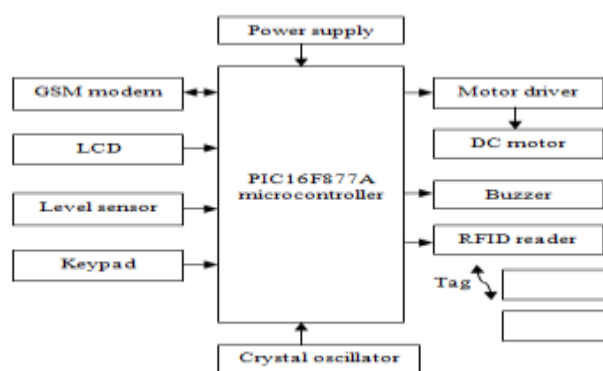

Fig 1 Unmanned milk vending proposed block diagram

B. RFID Tag

A RFID tag is a small object, such as a glue sticker, that can be attached to or integrated into a product. The tag is generally made of an Integrated Circuit (IC). The IC will include memory and some form of processing capability. The memory may be only read or read/write, the type selected will depend on the application. Transponders (tags) can be classified into two types one is active tags which has internal power supply and other one is passive tags which do not have internal power supply.

C. liquid Crystal Display(LCD)

A liquid crystal display (LCD) is an electro-optical amplitude modulator realized as a thin and flat display device made up of any number of colors or monochrome pixels arrayed in front of a light source or reflector. In recent years the LCD is finding widespread use replacing Light-emitting Diodes (LED) such as seven-segment LEDs or multi segment LEDs. This is due to the following reasons:

- The declining prices of LCDs.
- The ability to display numbers, characters and graphics.
- Incorporation of a refreshing controller into the LCD, thereby relieving CPU to the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.
- Ease of programming for characters and graphics.

D. GSM modem

A Global System for Mobile Communications (GSM) modem is a wireless network. A GSM modem can be an external device or Personal Computer (PC) Card. It should be inserted into one of the PC Card slots of a laptop or computer. Like a GSM mobile phone, a GSM modem requires a Subscriber Identity Module (SIM) card from wireless carrier in order to work.

E. Crystal Oscillator

A crystal oscillator is an electronic circuit that uses mechanical resonance of a pulsating crystal of piezoelectric material to create an electrical signal with very exact frequency. This frequency is commonly used to keep time tracking (as in quartz wristwatches) to provide a stable clock signal and to provide stable frequencies for radio transmitters/receivers.

F. DC motor

In any electric motor, operation is based on simple electromagnetism. A current carrying conductor generates magnetic field when this is placed in an external magnetic field, it will experience a force proportional to the current in the conductor and to the strength of the external magnetic field.

G. *Ultrasonic level sensor*

An ultrasonic level sensor circuit is used to monitor the level in the milk tank. The micro controller contains an Analog to Digital Converter (ADC) which converts voltage output of the sensor circuit at appropriate time.

II.   FLOWCHART

The flowchart represents that the milk vending machine will be started by displaying the milk vending process is activated when the key F is pressed on the keypad. Then the card has to be placed on the RFID reader, if the card is accessed and having sufficient amount then enter the number of liters required. If card is not accessed, milk will not be pumped and buzzer will ON. After entering the number of liters required if there is no milk SMS will be send to the manager through GSM modem. The milk required is available then the milk will be pumped. Then the system will be stop.
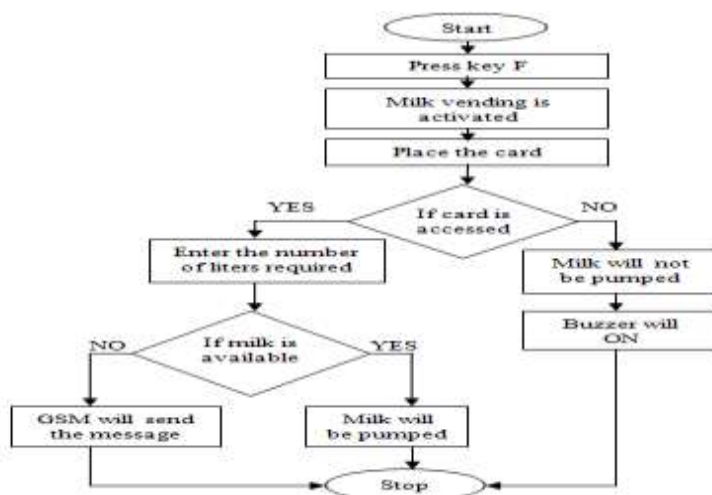

Fig 2 Flowchart of unmanned milk vending machine

III.   EXPERIMENTAL RESULTS

After carrying out experimentation, favorable results are obtained by using the following hardware components. The components include RFID reader, PIC Controller, GSM Module, Keypad and LCD Display.
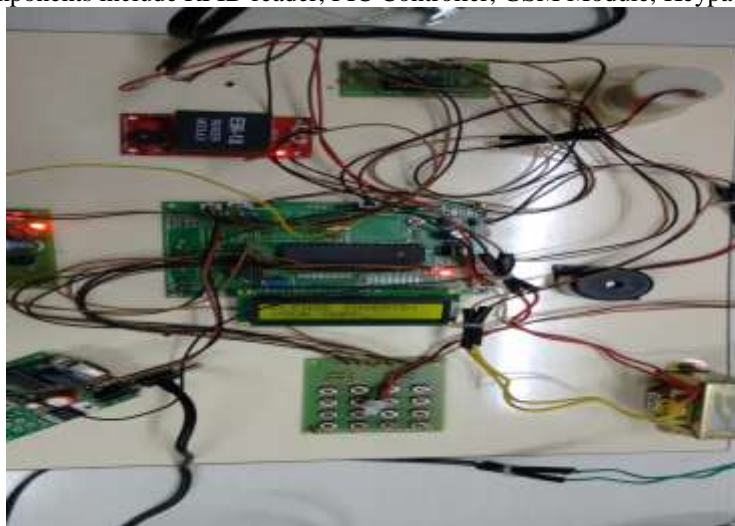

Fig 3 Hardware prototype setup

IV.   CONCLUSION AND FUTURE SCOPE

Thus this paper enumerates the importance of unmanned milk vending and detailed operation of unmanned milk vending process by using RFID card system and to calculate the level of the milk in the tank. The future scope of this paper deals with the security issues to RFID tags and interference related to it.

ACKNOWLEDGMENT

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