

Wireless Electronic Monitoring System for Securing Milk from Farm to Processor

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Abstract - The current manual methods of securing milk are paper intensive and prone to errors. The bulk milk transportation sector requires a security enhancement that will both reduce recording errors and enable normal transport activities to occur while providing security against unauthorized access. Milk transportation companies currently use voluntary seal programs that utilize plastic, numbered seals on milk transport tank openings. Our group has developed a Milk Transport Security System which is an electromechanical access control and communication system that assures the secure transport of milk, milk samples, milk data, and security data between locations and specifically between dairy farms, transfer stations, receiving stations, and milk plants. It includes a security monitoring system installed on the milk transport tank, a hand held device, optional printers, data server, and security evaluation software. The system operates automatically and requires minimal or no attention by the bulk milk hauler/sampler. The system is compatible with existing milk transport infrastructure, and has the support of the milk producers, milk transportation companies, milk marketing agencies, and dairy processors. The security protocol developed is applicable for transport of other bulk foods both nationally and internationally. This system adds significantly to the national security infrastructure for bulk food transport. We are currently demonstrating the system in central Kentucky and will report on the results of the demonstration

Key Words: security, avoid unauthorised access, transport, enhancement.

1. INTRODUCTION

Bulk milk transporters currently used utilize plastic, number seal on tanker openings. Seal number identifiers are recorded as they are applied to opening as seal are broken during routine transportation activities, seal number are accumulated. Some companies require that broken seals be maintained. These sealing systems are problematic in that they are prone to record keeping errors and maintaining a broken seals is burdensome. It is not uncommon to have numerous broken seals for a single load of milk.

Current bulk milk records are primarily handwritten. The level of detail associated with record maintained of bills of loading. For each tanker or load of milk is inconsistent and prone to inaccuracies. The maintenance of records is critical

to provide for adequate trace back of milk pertinent information related to each dairy is maintain within these records. Similar to the seal information, these records are error prone and legibility is often a concern. Recording mistakes, mathematical errors and misplaced tickets are common place. Our project is applicable mainly in liquid transportation industries.

1.1. Methodology

Firstly the details of dealer must register in farm. Passwords are provided to all dealers who take milk from farm. The milk is transported from main farm to multiple dealers via tanker. Dealers take milk as per their requirement from tanker using specific password given by farm. The project set up is place on tanker. The various devices used in our project like Microcontroller, Wi-Fi module, Flow sensor, DC valve etc. Above figure shows the block diagram of project.

1.2 WIFI Module



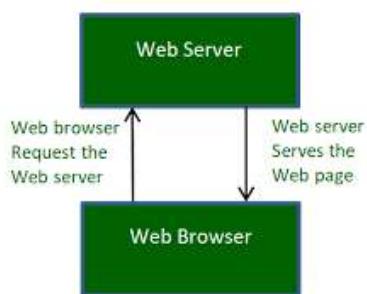
It employs a 32-bit RISC CPU based on the Tensilica Xtensa L106 running at 80 MHz (or over clocked to 160 MHz). It has a 64 KB boot ROM, 64 KB instruction RAM and 96 KB data RAM. External flash memory can be accessed through SPI.

ESP8266 module is low cost standalone wireless transceiver that can be used for end-point IoT developments. To communicate with the ESP8266 module, microcontroller needs to use set of AT commands. Microcontroller communicates with ESP8266-01 module using UART having specified Baud rate. The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network.

The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

The quantity of milk taken by dealer and other details are transferred to web server using Wi-Fi. In our system Wi-Fi is provided by Wi-Fi module.

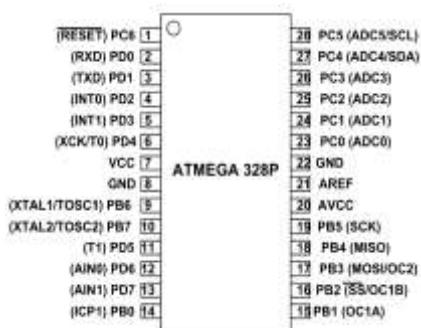
1.3 Web Server



The primary function of a web server is to store, process and deliver web pages to clients.^[2] The communication between client and server takes place using the Hypertext Transfer Protocol (HTTP). Pages delivered are most frequently HTML documents, which may include images, sheets and scripts in addition to the text content..

The details of customer or dealers and password given by main farm are saved in web server when tanker reach the customer, they enters the given password and quantity of milk they required. The controller compare password and information saved in web server. Quantity of milk taken by customer in all over month is saved in web server. hence calculation get easy for billing purpose.

1.4 ATmega328p



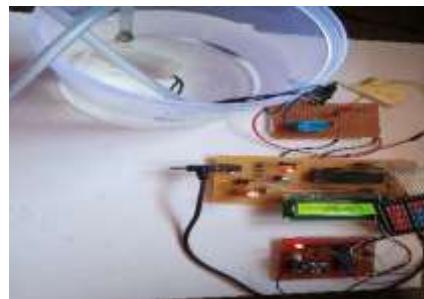
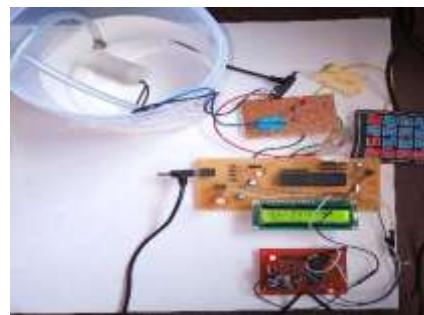
The **ATmega328** is a single-chip microcontroller created by Atmel in the megaAVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core

The high-performance Microchip picoPower 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-write capabilities, 1024B EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, a 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts.

By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

2. System Overview

Following fig shows steps of our project in first photo customer enter the password. In next customer enter the quantity of milk .In last details of customer and quantity of milk this data saved on web server.



When tanker is reached to dealer's dairy, password and quantity of milk is entered using keypad by the dealers. This data displayed on LCD. This data compared with data saved in microcontroller of that particular dealer. If entered password is correct then signal is provided to DC valve and Flow sensor. If password is wrong then DC valve is closed and milk will not provide to the dealers. In our project using this keypad dealer will enter their password and quantity of milk as per the requirement the password and quantity of milk entered by dealer is display on LCD.. The quantity of milk taken by dealer and other details are transferred to web server using Wi-Fi. In our system Wi-Fi is provided by Wi-Fi module. All details like quantity of milk taken by dealer, milk remain in tanker,

3. CONCLUSIONS

In our project details of customers or dairies to whom milk supply provided by the farm are require to registered in main farm. Specific password is provided to the each customer. The details of customer are saving on the web server of the farm.

Daily record of quantity of milk taken by customer, how much milk is remain in tanker and total bill of that customer etc. This all data updated and save on the web server of the main farm.

Our project is useful for milk transportation and security. Also useful for other liquid transportation like petrol, diesel. Illegal activities related with milk are avoided in our project hence security is high. Transparency is maintain between dealers and main farm, means how much milk is distributed among dealers and how much milk is remained in the tanker. Also reduces manual work related with maintaining records, calculation etc.

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