

DESIGN OF UNMANNED PETROL BUNK SYSTEM USING RFID TECHNOLOGY

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Abstract:

Today almost all petrol pumps have a microcontroller to control the electrical pump, drive the display, measure the flow & accordingly turn OFF the electrical pump. But still a person is required to collect the money. Our project is designed to eliminate this human interaction so that there is no need of workers to fill the petrol; In general, a smart card is an integrated circuit card with memory capable of making decisions. This project can be used for recording the attendance of an employee in an organization or a student in a class. The smart card contains an ARM7 microcontroller, a voltage regulator, serial cable connections, and an LED which glows whenever a card is inserted into the reader and also it glows whenever it issues any command or receives any command. The Smart Card Reader is interfaced with the microcontroller through serial interface.

Keywords: ARM 7 microcontroller, MAX232IC, RFID cards, Smart card reader.

1. INTRODUCTION

The 21st century is aptly known as the internet age because of the increasing use of internet in the day-to-day activities. Examples of these applications include online banking and brokerage, cash management, tax filling, computerized petrol pump, medical field. As far as computerized petrol pump is concerned, a lot has already been done in this field. Each and every data is being inserted with the help of the computers. But as far as safety of fuel pump is concerned, we are still behind in the world. Leakage of petrol or any oil leads to a blast and stealing of petrol may lead to a debacle. The aim of the system is to provide a new authentication to the user & control the opening or closing of the tank valve according to the amount demanded. We will use a Smart card module for this purpose. A smart card, chip card or integrated circuit card (ICC), is defined as any pocket-sized card with embedded integrated circuits which can process information. This implies that it can receive input which is processed by way of the ICC applications and deliver it as an output. In this project, we are using a contact smart card where the information inside the card is communicated with the card reader by inserting the card into the card reader. The card reader in this project is used as an SR-90SDK of 1KB memory size.

The main aim of this project is to implement the security system for filling petrol at the Petrol bunk by avoiding the involvement of human beings. The purpose of this project is to provide a security-based access system for filling petrol at the petrol bunk to avoid the risk of carrying money every time. And also provide the feature of prepaid recharge.

Now-a-days many petrol bunks are using the petrocard system for filling petrol in any vehicle. In this system every user is provided with a smart petrocard, with which one can access petrol at the petrol bunk. Before using this card we have to recharge it. Whenever we want to fill the tank then we have to place the Petrocard in the card reader, which is interfaced to the microcontroller with serial interfacing. The microcontroller reads the data from the

smart card reader and asks how many liters you require, which will be displayed on the LCD screen. Then we have to enter the required number of liters of petrol through keypad which acts as an input to the microcontroller. After reading this value the microcontroller will check for the available balance in the smart card, if it is sufficient then the petrol filling process will be started. After filling the required quantity, a buzzer will indicate the process of completion.

1.1 OBJECTIVE OF PAPER:

Security is a prime concern in our day-to-day life. Everyone wants to be as much secure as possible. An access control for petrol for a smart link in a security chain. The microcontroller-based unmanned petrol pump system is an access control system that allows only authorized persons to access a restricted area. The system is fully controlled by the 8-bit microcontroller which has a 2K bytes of ROM for the program memory. This project is designed and implemented by relay and Smart card module technology.

1.2 LIMITATIONS OF PROJECT

We want to make our main project something that will be useful in real life. We are all aware of the fact that there has been a sharp increase in criminal offences like theft, robberies, assaults, murders etc. in the recent past that is affecting our society and students on a large scale. So there is a requirement for a well-equipped electronic protection system is definitely on the rise. I want to utilize the electronic technology to build an integrated and fully customized protection system at a reasonable cost. Unmanned petrol station was required for years to fulfill the requirement of consumers over the wide. It is not limited to petrol but a availability of consumer's goods at remote area or distinct area. It makes the world more comfortable and safer.

1.3 ORGANISATION OF THE PROJECT

Process documentation is a method of concisely capturing and sharing critical project concepts, plans and

Information as they are developed, so that impacted parties can share this information, make in form ed decisions, and keep the project moving forward without having to revisit old discussions. The basic aim of process documentation (PD) is to learn from implementation experience and in the light of this modify the strategy and ultimately, policy of a program, project or organization. Documentation of processes helps in creating systematic information to articulate the intervention strategies and develop the flowchart of a program. This helps the project or organization to find out more about the needed field intervention methods, coordination, management requirements, financial management and human resource development policies. Most of the process-oriented methodologies are meant to record programs as they occur and feed the information back to managers, researchers and policymakers to help them understand the working of the project better. However, there are several other purposes, equally important, for which agencies undertake new and complex forms as part of expansion of programs, which need understanding about stakeholder participation. Such information is often needed to validate the approach/program and consequent policy formation. An important aspect of any process is the documentation that accompanies it, such as logging trouble calls, requesting system changes, or executing disaster recovery plans. Let us now discuss the methods and tools of process documentation.

2. LITERATURE SURVEY

2.1 EXISTING SYSTEM

Today the system which is in wide use involves the practice followed from many years. This involves the persons which they fill the petrol. This system involves many disadvantages which may lead to leakage of petrol at various instances while the filling the petrol. This happens due to easy tampering of sealed petrol and more human interference.

And the main disadvantage of the present system is still in the petrol bunk they need two persons one for filling the petrol and another to collect the cash. To avoid this an implementing unmanned petrol bunk system without the use of manpower only depending upon the machine power this technique is used.

2.2 DISADVANTAGES OF EXISTING SYSTEM

Just as compared with proposed system existing system have many disadvantages, a software random number generator should be designed to resist certain attacks. Exactly which attacks must be defended against depends on the system, but there are a few:

- But still TWO PERSONS are required.
-

To collect the CASH and to fill the Petrol in the vehicle tanks.

2.3 PROPOSED SYSTEM:

Unmanned Petrol Bunk System uses Smartcard known as 'PETROCARD'. Petrocard is provided with user verification code and it can be recharged at recharge points at the time of usage the users swap the petrocard and then the smartcard reader senses the amount in the card and based upon the information entered by the user the device operates to deliver the petrol, automatically the usage amount is deducted from the users account. Here we presented an LCD display to present the information regarding usage of credits in the users account. At the Petrol Pump, the driver swaps the card and the smartcard reader reads the amount in the card and will display it on the LCD. The driver then enters the quantity of petrol that has to be filled using a keypad. The corresponding amount is calculated & deducted from his petrocard. The electrical

pump is then turned ON according to the entered amount, fill the tank and automatically turns OFF.

The purpose of this project is to provide a security based access system for filling petrol at the petrol bunk to avoid the risk of carrying money every time. And also provides the feature of prepaid recharge.

A smartcard, chip card or integrated circuit card (ICC), is defined as a tiny pocket-sized card with embedded integrated circuits which can process information. This implies that it can receive input which is processed by way of the ICC applications and delivered as an output. In this project, we are using a contact smartcard where the information inside the card is communicated with the card reader by inserting card into the card reader. The card reader in this project used is an SR-90 SDK of 1KB memory size.

3. PROPOSED ARCHITECTURE

Initial stage of every electronic circuit is power supply system which provides required power to drive the whole system. The specification of power supply depends on the Power Requirement. And the requirement is determined by its rating. The main components used in supply system are:

- A. POWER SUPPLY
- B. ARM7 MICROCONTROLLER
- C. SMARTCARD MODULE
- D. MAX232 IC.
- E. KEYPAD
- F. LCD DISPLAY
- G. DRIVER CIRCUIT.
- H. BUZZER
- I. MOTOR

3.1 SOFTWARE REQUIREMENT

In our project "unmanned petrol bunk system" there are number of software's we can use but we choose three of them one is for writing code, second is for designing components internally and last one is for dumping the code in hardware.

- a) Keil Microvision IDE for developing and editing the source code.
- b) Flash magic for burning the hex code onto the development board
- c) Proteus.

3.2 HARDWARE REQUIREMENT

A. Power Supply:

Power supply is a reference to a source of electrical power. A device or system that supplies electrical energy to other types of energy to an output load or group of loads is called power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

B. ARM 7 Microcontroller:

Pin Configurations

PDIP			
(T2) P1.0	1	40	VCC
(T2 EX) P1.1	2	39	P0.0 (AD0)
P1.2	3	38	P0.1 (AD1)
P1.3	4	37	P0.2 (AD2)
P1.4	5	36	P0.3 (AD3)
(MOSI) P1.5	6	35	P0.4 (AD4)
(MISO) P1.6	7	34	P0.5 (AD5)
(SCK) P1.7	8	33	P0.6 (AD6)
RST	9	32	P0.7 (AD7)
(RXD) P3.0	10	31	EA/VPP
(TXD) P3.1	11	30	ALE/PROG
(INT0) P3.2	12	29	PSEN
(INT1) P3.3	13	28	P2.7 (A15)
(T0) P3.4	14	27	P2.6 (A14)
(T1) P3.5	15	26	P2.5 (A13)
(WR) P3.6	16	25	P2.4 (A12)
(RD) P3.7	17	24	P2.3 (A11)
XTAL2	18	23	P2.2 (A10)
XTAL1	19	22	P2.1 (A9)
GND	20	21	P2.0 (A8)

The ARM7 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 ARM7 microcontroller. 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 ARM7 is a powerful microcontroller, which provides a highly flexible and cost-effective solution to many embedded control applications.

The ARM7 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the ARM7 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

C. Smart Card Module:

A smart card, chip card, or integrated circuit card (ICC), is defined as a pocket-sized card with embedded integrated circuits which can process information. This implies that it can receive input which is processed by way of the ICC applications and delivered as an output. There are two broad categories of ICCs. Memory cards contain only non-volatile memory storage components, and perhaps some specific security logic. Microprocessor cards contain volatile memory and microprocessor components. The card is made of plastic, generally PVC, but sometimes ABS. The card may embed a hologram to avoid counterfeiting. Using smart cards also is a form of strong security authentication for single sign-on within large companies and organizations. A "smartcard" is also characterized as follows: Dimensions are normally credit card size. The ID-1 of ISO/IEC 7810 standard defines them as 85.60 × 53.98 mm. Another popular size is ID 000 which is 25 × 15 mm. Both are .76 mm thick. Contains a security system with tamper-resistant properties (e.g. a secure cryptoprocessor, secure file system, human readable features) and is capable of providing security services (e.g. confidentiality of information in the memory). Asset managed by way of a central administration system which interchanges information and configuration settings with the card through the security system. The latter includes card hot-listing, updates for application data. Card data is transferred to the central administration system through card reading devices, such as ticket readers, ATM etc. Smartcards provide a means of effecting business transactions in a flexible, secure, standard way with minimal human intervention. Smartcard can provide strong authentication for single sign-on or enterprise single sign-on to computers, laptops, data with encryption, enterprise resource planning platforms such as SAP, etc.

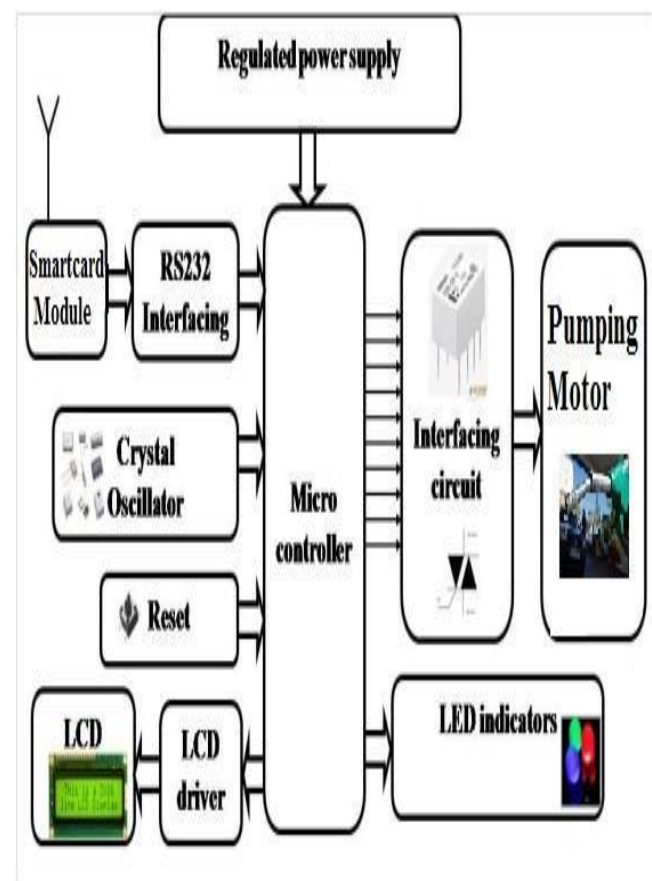
D. MAX232 IC:

A standard serial interface for PC, RS232C, requires negative logic, i.e., logic 1 is -3V to -12V and logic 0 is +3V to +12V. To convert TTL logic, say, Tx and Rx pins of the microcontroller thus need a converter chip. The MAX232 chip has long been used in many microcontroller boards. It is a dual RS232 receiver/transmitter that meets all RS232 specifications while using only +5V power supply. It has two on-board charge pump voltage converters which generate +10V to -10V power supplies from a single 5V supply.

4. EXPERIMENTAL ANALYSIS

Here the purpose of the microcontroller is to control the devices corresponding to the input coming from the Smartcard module. The microcontroller is connected to the smartcard module and it will continuously check the status of the switched circuit whether it is ON/OFF and update it to the card. Then the module informs the controller the operation to be performed. Here RS232 is used for communication between the smartcard module and controller. The MAX232 is a driver for RS-232 communication. Relay is a switch to operate the devices. Advantages are power saving, easy to operate. Applications are industrial automation, hotel environments, office environments etc. After assembling the basic Arduino circuit, we started to build upon it by adding the different sensors and relays. You can see here a relay attached to support the appliances switching. Once I understood the values the Arduino would receive from each sensor, we were becoming more confident that this project would actually work.

BLOCK DIAGRAM



An unmanned petrol bunk system is a device which has an electronic control assembly attached to it. They are provided with an access control system. This system allows the user to fill the petrol without an password. The password is entered by making use of a keypad. The user can also set this password to ensure better protection. The major components include are a keypad, LCD, and microcontroller. This article describes the making of an electronic code lock using the ARM7 microcontroller.

A 4x3 matrix keypad and a 16x2 LCD have been used here. Keypad and LCD are very commonly used input & output devices, respectively. Smart card module is used to swipe the card if sufficient amount is present in user's card then the user can enter how much amount of petrol that he/she wants to fill is entered by using keypad then the smart card module reads the instructions by using ARM7 microcontroller. Then the amount of petrol is filled and automatically the motor will stop. For example, a user does not have sufficient amount of money to fill petrol in their smart card. In such a scenario, if the user is known to designated balance, the balance may provide their smart card and password in combination with the extant factor of the user.

Unmanned petrol station was required for years to fulfil requirement of consumers over the wide. It is not limited to petrol but availability of consumer's goods at remote area or distinct area. It makes the world more comfortable and safer. This project can be used for recording the attendance of an employee in an organization or a student in a class.

All the instructions which the user was performing that will be displayed on the LCD display which is directly connected to the ARM7 microcontroller. The LCD display reads the instructions automatically without any disclaimers.

RESULT

To unlock, the user needs to 'swipe the card' through the smart card module. Again the microcontroller is scanned for the card and corresponding digits are identified. The instructions are displayed on the LCD screen. After the amount is entered, then the sufficient balance is present in user's card. LCD displays 'FILL THE PETROL' and the clock output goes high. If the insufficient balance is there then, 'insufficient balance please recharge' is sent to be displayed on the LCD.



Fig2. Process of petrocard

5. CONCLUSION

This project is meant for security systems whose access is only for respected authorities. Using a microcontroller the petrol pump is equipped with a smart card reader/writer. At the Petrol Pump, the driver swaps the card and the smart card reader reads the amount in the card and will display it on the LCD. The driver then enters the quantity of petrol that has to be filled using a keypad. The corresponding amount is calculated & deducted from his petrocard. The electrical pump is then turned ON according to the entered amount, fills the tank and automatically turns OFF. Our electronics system performed as expected. We were able to implement all the functions specified in our proposal. The biggest hurdle we had to overcome with this project was interfacing the microcontroller with the hardware components. We felt that this electronics system is very marketable because it is easy to use, comparatively inexpensive due to low power consumption, and highly reliable. By using this project one can design a secured system for filling petrol to vehicles at the petrol bunk using Smart Card based Accessing System.

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