INTELLIGENT STUDENT TRACKING AND MONITORING FOR COLLEGE INFRASTRUCTURE BY USING RFID

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ABSTRACT:-This project is developed by using Radio Frequency Identification (RFID) system and student card to get student attendance. There were a lot of problems when using as student attendance such as cheating. The project system was running by get the code of card student to compare with the database in Access. Graphical User Interface (GUI) was developed using Embedded C to make the database easier to access. This part is important because we need the information in this part to use in the next interface. After the reader was ready, process to get attendant will started. Students need to swap their card on the reader and the code from the card will use to compare with database in Access. When the code is match with database, the student information like name and ID number will show on interface and that information will trigger into a list. This list will use as a student attendance. This project will help lecturer taking the student attendance more easily and automatically. As the conclusion, RFID technology can be used in student attendance application.

1. INTRODUCTION

This embedded system for monitoring and controlling the student is based on measuring the humidity and temperature by sensor that located at different places. The sensors sense the change and the microcontroller reads this from the data at its input ports after being converted to a digital form by the ADC. The microcontroller then performs the needed actions by employing relays until the strayed-out parameter has been brought back to its optimum level.

As the system also employs an LCD display for continuously alerting the user about the condition inside the student, the entire set-up becomes user friendly. Thus, this system eliminates the drawbacks of the existing set-ups and is designed as an easy to maintain, flexible and low cost solution.

Student monitoring system is technical intransitive in which the control of student environment continuous monitoring and recording of these environmental variables gives information to the grower better understand. The monitoring method can be implemented in various situations such as monitoring qualities. Wireless sensor network (WSN) can form a useful part of the automation system architecture in modern students.

2. SYSTEM ANALYSIS

2.1 Existing System

RFID is an automated identification and data collection technology, that ensures more accurate and timely data entry. RFID combines radio frequency and microchip technologies to create a smart system that can be used to identify, monitor, secure and do object inventory. To present an intelligent RFID based lecture attendance access control and management system.

Drawback in existing System

1. Insufficient budget available, complexity of technology and systems.

2. Cost still very high for providers Prohibitive costs and Privacy concerns.

2.2 Proposed System

By incorporating a facial recognition application that would serve to further increase the biometric security of the system against impersonation by erring students. Usage of High Frequency (HF) active RFID tags against passive Low frequency (LF) RFID tags for better performance and flexibility of users Performance evaluation of combination of thumbprint, facial recognition and RFID technology to students' attendance monitoring problem.

3. SYSTEM SPECIFICATION

3.1 HARDWARE REQUIREMENTS

- Microcontroller

- LM 35 Temperature sensor

- Humidity sensor
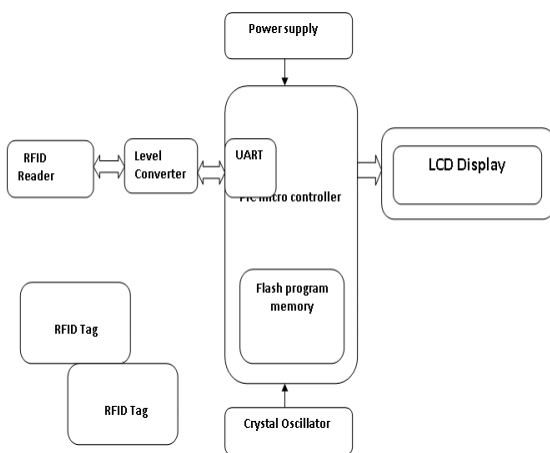
- Light sensor

- GSM

- Relay

- Dc motor

- Transformer

- Diode

- Resistor

- Capacitor

3.2 SOFTWARE REQUIREMENTS

- Keil Compiler
- Language: Basic Embedded C

4. MODULES AND DESCRIPTION

4.1 Block diagram

4.2 Radio Frequency Identification Device (RFID)

RFID is Radio Frequency Identification Device. It is a fast, affordable and automatic identification technology that uses radio frequency (RF) to transfer data between a RFID reader and a RFID tag. RFID tags contain antennas to enable them to receive and respond to radio-frequency queries from an RFID transceiver.

1) 4.2.1 Modules of RFID

The RFID system basically consists of three components:

- A RFID tag (Transponder)

- An Interrogator or a tag reader

- Computer or Processor

RFID tags:

An RFID tag is a small object that can be attached to or incorporated into a product. RFID tags contain antennae to

enable them to receive and respond to radio-frequency queries from the interrogator.

Transponders (tags) can be classified in to two

- Active tags -With internal power supply
- Passive tags -Without internal power supply

Active tags

Active RFID tags, on the other hand, must have a power source, and may have longer ranges and larger memories than passive tags, as well as the ability to store additional information sent by the transceiver. The advantage is that tag is not dependent on the strength of, the carrier from the interrogator to provide the power it needs.
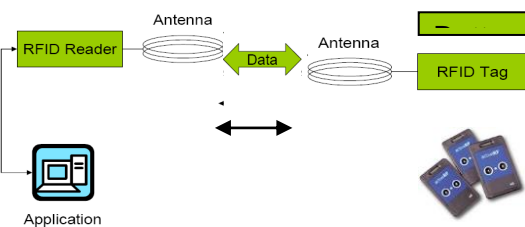
Components of active RFID System

Passive tags

Passive RFID tags do not have their own power supply. The minute electrical current induced in the antenna by the incoming radio-frequency scan provides enough power for the tag to send a response. This system also communicates through a reader which broadcasts a signal through an antenna. When a transponder enters the antenna field, it receives the signal and energy from the reader. The tag is "charged" with enough power to send back a unique ID to the reader.
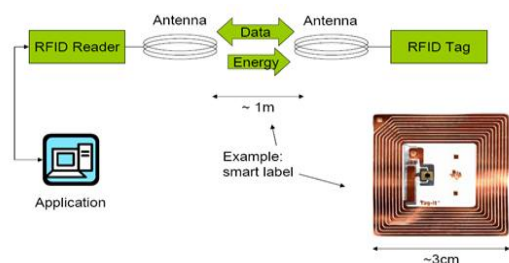
Components of a passive RFID system

RFID performance criterion

The performance of a Read/Write RFID system is dictated by the following criteria:

- Memory Capacity,

- Data Transfer Speed,

- Operating Range,

- Read/Write Speed,

- Operating Temperatures,

- RFID System Connectivity.

Memory Capacity:

The amount of memory available on Read Only Tags is 20 bits of information. Active Read/Write Tags vary from 64 Bytes to 32KB, meaning that several pages of type-written text can be stored in a Read/Write   Tag. The memory of Passive Read/Write Tags ranges from 48 Bytes to736 Bytes and provides many distinct benefits over Active Systems.

Data Transfer Speed

Speed is an important factor for most data capture systems. With today's decreasing production cycle times, the amount of time needed to access or update the RFID identification system systems can operate at high speeds.

Read Only Speed

The speed of a Read Only RFID system is dictated by the length of the code, the speed of data transfer from the Tag, the range at which they will operate, the RF carrier frequency of the Tag to Antenna Link, and the modulation technique used to transfer data.

Passive Read/Write Speed

The speed of a Passive Read/Write RFID system is based on the same criteria as Read Only systems, except now one must consider the speed of data transfer both to and from the Tag. Speed will again vary according to the specific products used in each application.

Active Read/Write Speed

The speed of an Active Read/Write system is based on the same criteria as a Passive Read/Write system, unless the Passive system relies on charging a capacitor in the fag to enable Communication. Importantly, a typical low-frequency Read/Write system will operate at speeds of only 100 or 200 bytes transferred per second'.

Operating Range

The Read/Write range for presently available systems varies from less than one inch to over 29 inches; increased Read/Write ranges of up to eight feet using low frequency 13.56 MHz.

Operating Temperatures

EMS is considered the foremost expert on high-temperature RFID applications, and has numerous high-temperature installations throughout the world. Designed to survive up to 401°F (240°C), in addition to sub-freezing levels of -40°F (-40°C).

RFID System Connectivity:

As an extension of an automation system, RFID must be able to integrate with both existing and developing automation technologies. This connectivity allows EMS to provide RFID systems that are flexible and easy to integrate in a diverse set of industries.

Current uses of RFID

Low –frequency RFID tags are commonly used for animal identification beer keg tracking, and automobile key-and-lock, anti-theft systems. In the United States, two RFID frequencies are used: 125 kHz   (the original standard) and 134.5 kHz, the international standard.

RFID tags are used in library book or bookstore tracking, pallet tracking, building access control, airline baggage tracking, and apparel item tracking. High-frequency tags are widely used in identification badges, replacing earlier magnetic stripe cards.

UHF RFID tags are commonly used commercially in pallet and container tracking, and truck and trailer tracking in shipping yards.

5. HARDWARE DESCRIPTION

MICROCONTROLLER

Microcontroller is a single chip microcomputer made through VLSI fabrication. A microcontroller also called an embedded controller because the microcontroller and its support circuits are often built into, or embedded in, the devices they control.

The 8051 Microcontroller is a Microcontroller designed by Intel in 1980's.

Microcontroller 8051 has two buses for program and data. It has an 8 bit processing unit and 8 bit accumulator. It also has some other 8 bit and 16 bit registers. Microcontroller 8051 has a built in RAM for internal processing.

LM 35 TEMPERATURE SENSOR

Temperature is the most often-measured environmental quantity. Temperature is one of the most

commonly measured variables and it is therefore not surprising that there are many ways of sensing it. There are a wide variety of temperature sensors on the market today, including Thermocouples, Resistance Temperature Detectors (RTDs), Thermistors, Infrared, and Semiconductor Sensors.
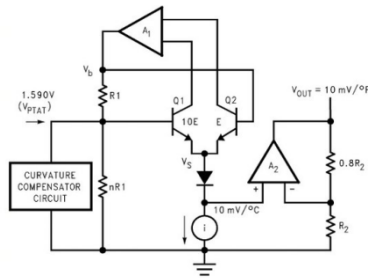

Figure: Functional Block Diagram

Humidity sensor:

A humidity sensor (or hygrometer) senses, measures and reports the relative humidity in the air. Electrical capacity is the ability of two nearby electrical conductors to create an electrical field between them. The sensor is composed of two metal plates and contains a non-conductive polymer film between them. These voltage changes are converted into digital readings showing the level of moisture in the air.

Light sensor

A light sensor is an electronic device used to detect light. There are several types of light sensors. A photocell or photo resistor is a small sensor which changes its resistance when light shines on it.

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation.
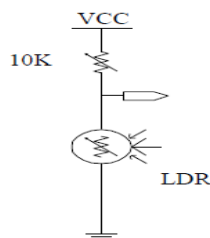

Figure: Circuit Diagram of LDR

GSM MODEM

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection.

GSM is the most popular standard for mobile phones in the world. GSM differs from its predecessors in that both signaling and speech channels are digital, and thus is considered a second generation (2G) mobile phone system.

RELAY

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another.

Figure: Relay Connection Diagram

DC Motor

A motor is an electrical machine which converts electrical energy into mechanical energy. The direction of this force is given by Fleming's left hand rule and it's magnitude is given by $F = BIL$. Where, B = magnetic flux density, I = current and L = length of the conductor within the magnetic field.
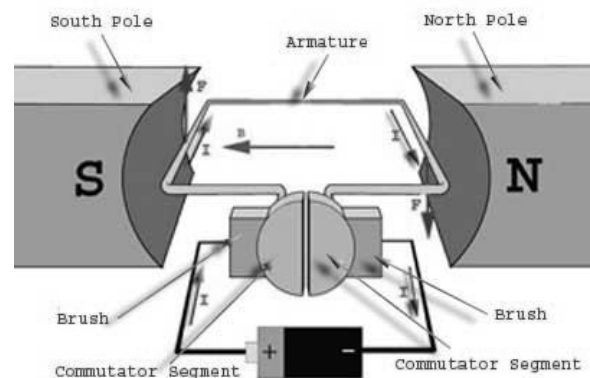

Figure: Working principle of dc motor
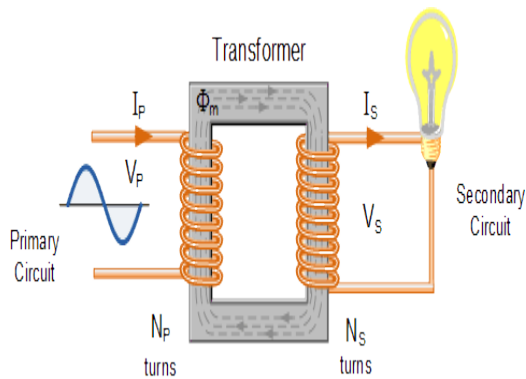
TRANSFORMER

Figure: Transformer working diagram

A transformer can be defined as a static device which helps in the transformation of electric power in one circuit to electric power of the same frequency in another circuit. The voltage can be raised or lowered in a circuit, but with a proportional increase or decrease in the current ratings.

Most of the alternating flux developed by this coil is linked with the other coil and thus produces the mutual induced electro-motive force.

DIODES

A diode is a device which only allows unidirectional flow of current operated within a rated specified voltage level. The diode acts as a valve in the electrical and electronic circuit. So a particular arrangement of **diodes** can convert AC to pulsating DC, and hence, it is sometimes also called as a rectifier. The name diode is derived from "diode" which means a device having two electrodes.

Symbol of Diode

Figure: Symbol of Diode

RESISTORS

Figure: Symbol of Resistors

This also is further categorized into two – conductors and insulators. Conductors allow the flow of electrons, while insulators do not. But the amount of electricity that we want to pass through them depends on the resistors.

CAPACITOR

A small device used to store huge amount of electric charge in a small room is called capacitor. Take an insulated metal plate A. Charge the plate to its maximum potential. Now take another insulated plate B. Take the plate B nearer to plate A.
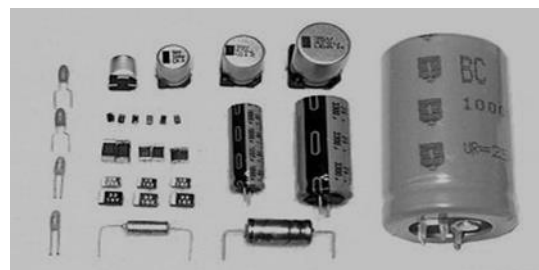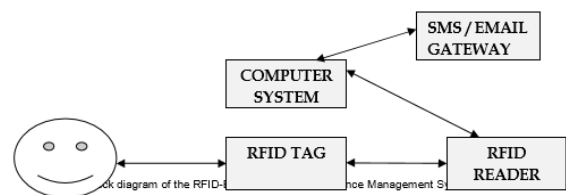

Figure: Capacitor

A capacitor is a passive two-terminal electrical component used to store electrical energy temporarily in an electric field.

6. SYSTEM DESIGN

6.1 SYSTEM ARCHITECTURE

7. CONCLUSION

In this system, Smart Attendance System utilizing RFID can support the manual framework that change of data can be convey effortlessly. The system is successfully built and run in reality based on Technology Acceptance Modeling. After development is finished, test for sensor's work is done and device is working properly. The testing that has done shows that condition in datasheet of sensor and in system is appropriate. Despite the fact that there are distinctive strategies for following understudy yet our framework is anything but difficult to handle and extremely advantages for college level.

8. FUTURE ENHANCEMENT

In this system, we can replace the manual system that transformation of information can be delivered without a hitch. This system will ease is college to monitor the student .The system can reduces manpower, Although there are different methods of tracking student but out system is very easy to handle and very convenient for college level. This system gives time savings, easy control and reliability.

In future, we can add voice announcement system to this project, so whenever the user logs in, we can announce message like, Your attendance has been logged in, so please come forward and we can implement GSM technology.

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