

RFID Based Student Attendance Management and Student Performance Analysis

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Abstract- We propose a new model for parent alerting and automatic attendance marking using of RFID (Radiofrequency Identification) and GSM (Global System for Mobile Communication). This system will enable automated and reliable attendance, informing parents and school administration about the same. For implementing this system each student and professor will be having a unique RFID card. Most educational institutions' administrators are concerned about student irregular attendance which can affect student overall academic performance. The conventional method of taking attendance by calling names or signing on paper is very time consuming and insecure, hence inefficient. Radio Frequency Identification (RFID) based attendance system is one of the solutions to address this problem. Its ability to uniquely identify each person based on their RFID tag type of ID card make the process of taking the attendance easier, faster and secure as compared to conventional method. With real time clock capability of the system, attendance taken will be more accurate since the time for the attendance taken will be recorded. Almost every university has their own management system to manage the students' records. Thus, this project proposes a system named Student performance analysis system to keep track of students' result in the college. The proposed system offers student performance prediction through the rules generated via data mining technique. The data mining technique used in this project is classification, which classifies the students based on students' grade

Index Terms- Radio Frequency Identification (RFID); GSM (Global System for Mobile Communication); Integrated Circuits (ICs); Polyethylene Terephthalate (PET)

1. INTRODUCTION

RFID is a form of wireless communication that uses radio waves to identify and track objects. RFID takes the barcoding concept and digitizes it for the modern world providing the ability to:

- Uniquely identify an individual item beyond just its product type
- Identify items without direct line-of-sight
- Identify many items (up to 1,000s) simultaneously
- Identify items within a vicinity of between a few centimeters to several meters

An RFID system has *readers* and *tags* that communicate with each other by radio. RFID tags are so small and require so little power that they don't even need a battery to store information and exchange data with readers. This makes it easy and cheap to apply tags to all kinds of things that people would like to identify or track. RFID can tell you what an object is, where it is, and even its condition, which is why it is integral to the development of the Internet of Things—a globally interconnected web of objects allowing the physical world itself to become an information system, automatically sensing what is happening, sharing related data, and responding.

RFID use is increasing rapidly with the capability to “tag” any item with an inexpensive communications chip and then read that tag with a

reader. Endless applications range from supply chain management to asset tracking to authentication of frequently counterfeited pharmaceuticals. Applications are limited, in fact, only by the imagination of the user.

2. RELATED TECHNOLOGY

Global System for Mobile (GSM Module)

GSM (Global System for Mobile Communications, originally *Groupe Spécial Mobile*) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones, first deployed in Finland in December 1991. As of 2014 it has become the de facto global standard for mobile communications – with over 90% market share, operating in over 219 countries and territories.

GSM is a cellular network, which means that cell phones connect to it by searching for cells in the immediate vicinity. There are five different cell sizes in a GSM network—macro, micro, pico, femto, and umbrella cells. The coverage area of each cell varies according to the implementation environment. The longest distance the GSM specification supports in practical use is 35 kilometers (22 mi). GSM uses

General Packet Radio Service (GPRS) for data transmissions like browsing the web

2.1.1. Macro Cells

Macro cells can be regarded as cells where the base station antenna is installed on a mast or a building above average rooftop level.

2.1.2. Micro cells

Micro cells are cells whose antenna height is under average rooftop level; they are typically used in urban areas.

2.1.3. Pico cells

Pico cells are small cells whose coverage diameter is a few dozen meters; they are mainly used indoors.

2.1.4. Femto cells

Femto cells are cells designed for use in residential or small business environments and connect to the service provider's network via a broadband internet connection.

2.1.5. Umbrella cells

Umbrella cells are used to cover shadowed regions of smaller cells and fill in gaps in coverage between those cells.

2.1. RFID Tags

An RFID tag is comprised of an integrated circuit (called an IC or chip) attached to an antenna that has been printed, etched, stamped or vapor-deposited onto a mount which is often a paper substrate or Polyethylene Terephthalate (PET). The chip and antenna combo, called an inlay, is then converted or sandwiched between a printed label and its adhesive backing or inserted into a more durable structure.

2.2. RFID Reader

An RFID reader, also known as an interrogator, is a device that provides the connection between the tag data and the enterprise system software that needs the information. The reader communicates with tags that are within its field of operation, performing any number of tasks including simple continuous inventorying, filtering (searching for tags that meet certain criteria), writing (or encoding) to select tags, etc.

2.3. RS-232

RS-232 is a standard for serial communication transmission of data. It formally defines the signals connecting between a *DTE* (data terminal equipment) such as a computer terminal, and a *DCE* (data circuit-terminating equipment or data communication

equipment), such as a modem. The RS-232 standard is commonly used in computer serial ports. The standard defines the electrical characteristics and timing of signals, the meaning of signals, and the physical size and pin out of connectors. The current version of the standard is *TIA-232-F Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange*.

3. MODULES

Module.1. DATABASE CREATION

The database is created by using SQL server. The tables generated are in normalized form therefore there is no data redundancy. The details of the students are stored in the database which includes the students name, RFID number, parents email id and parents contact number for alerting about the student presence in the college.

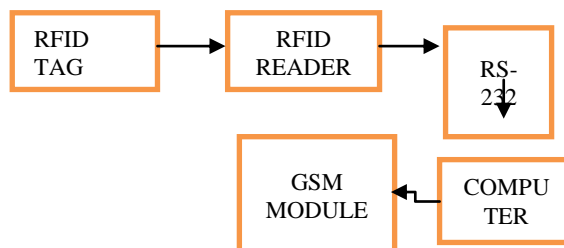
Module.2. READING THE RFID USING SERIAL PORT

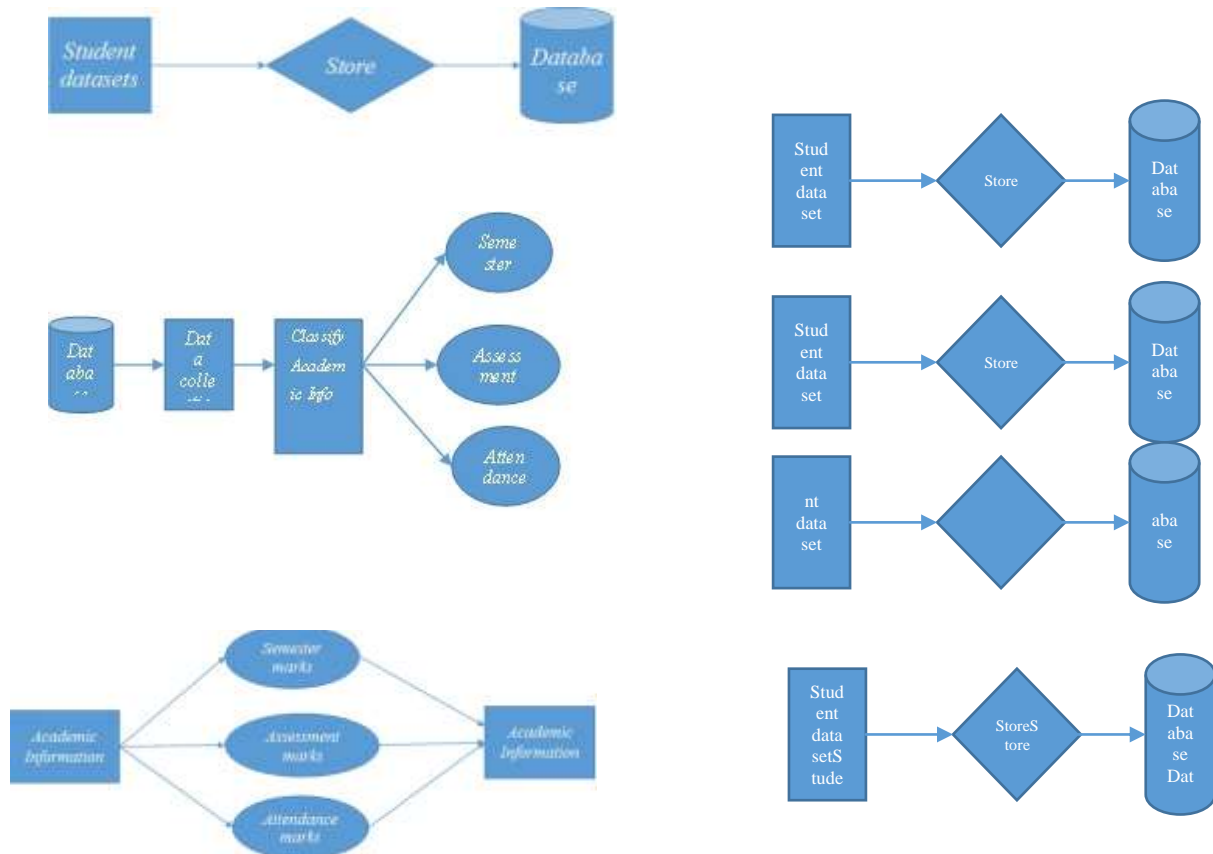
The RFID reader is connected to the computer using a RS-232 cable serial port. The drivers needed for the RFID reader and the RS-232 are installed. The program for reading the RFID, tracking the entry and exit time of the student and sending alert mails about the student attendance is done using C#.

Module.3. CONNECTING THE GSM TO THE COMPUTER

The GSM module is connected to the computer to send SMS alerts to the parents. The GSM module is connected using RS-232 cable serial port. The drivers needed are installed and the program for sending SMS is done in PYTHON.

4. FIGURES





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