

RESEARCH ARTICLE



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## TRACKING STUDENT MOVEMENT USING PASSIVE RFID AND ATTENDANCE MONITORING SYSTEM

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**ABSTRACT**

RFID plays a predominant role in wireless communication. It is mainly used for identification purpose. Prior scrutiny and development for indoor localization includes infrared, wireless LAN etc. These technologies suffer from the inadequate accuracy and deficient of the infrastructure. So RFID technology is implemented in my paper. Nowadays mobiles phone are prohibited in most of the institutions, so detecting a human being in big institutions is much difficult. This paper provides a way to identify the human beings by providing passive RFID as their ID card. So management can easily identify the respective one where they are. RFID technology is often leveraged to realize staff/student location in a level-headed, power efficient and user friendly manner. Indoor location tracking system allows you to track the location with an ease of RFID tag, RFID reader. Another one is, sending mail to parents regarding their children absence in the college. College management and parents is more beneficiary.

Key words: RFID, Students Attendance, Mail, Tracking. Passive RFID.

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**I. INTRODUCTION**

RFID is given to the students instead of ID card. Using bio metric attendance system, students should give attendance i.e. students should read their RFID tag along with fingerprint scanning. If you failed to give anyone of the above, students should be marked as absent and the absentees record is send to respective parents through mail. Within the college campus, mobile is prohibited. So detecting students in college campus is difficult. To rectify this problem, by using passive RFID. The readers should be placed everywhere in the college campus. While crossing those areas, students' details should be recorded and viewed by management.

**II. RFID TAG AND READER**

An RFID tag is a microchip combined with an antenna in a compact package; the packaging is structured to allow the RFID tag to be attached to an object to be tracked. "RFID" stands for Radio Frequency Identification. The basic premise behind RFID systems is that you mark items with tags. These tags contain transponders that emit messages readable by specialized RFID readers. Most RFID tags store some sort of identification number; for example a customer number or product SKU (stock keeping unit) code. A reader retrieves information about the ID number from a database, and acts upon it accordingly. RFID tags can also contain writable memory, which can store information for transfer to various RFID readers in different

locations. This information can track the movement of the tagged item, making that information available to each reader. RFID tags fall into two general categories, active and passive, depending on their source of electrical power. Active RFID tags contain their own power source, usually an on-board battery. Passive tags obtain power from the signal of an external reader.

**III. PASSIVE TAGS**

Passive tags, on the other hand, are cheap; they can cost as little as 20 cents apiece, and new technologies are constantly making them cheaper to integrate into common materials and products. In addition to their low cost, passive tags can also be quite small. Current antenna technology limits the smallest useful passive tag to about the size of a quarter. The larger the tag, the larger the read range. Currently, passive RFID tags contain about 2 Kbits of memory. This is too small to hold much more complex information than identification and history information. The technology behind RFID is constantly improving, so the amount of information and capabilities of RFID tags will increase over time, allowing RFID tags to eventually contain and transmit much more information. A passive-tag reader can constantly broadcast its signal or broadcast it on demand. When a tag comes within the reader's range, it receives an electromagnetic signal from the reader through the tag's antenna. The tag then stores the energy from the signal in an on-board capacitor, a process called inductive coupling. When the capacitor has built up enough charge, it can power the tag's circuitry, which transmits a modulated signal to the reader. That return signal contains the information stored in the tag. Passive tags typically operate at frequencies of 128 KHz, 13.6 MHz, 915 MHz, or 2.45 GHz, and have read ranges of a few inches to 30 feet. Frequency choice depends on the system's environment, what material the signal must travel through, and the system's required read range. RFID tags can be encased in many materials. Plastics are a very common material for RFID, forming identification cards for building access, credit cards, or bus fares. In short, Passive tags,

- a) Do not require power – Draws from Interrogator Field
- b) Lower storage capacities (few bits to 1 KB)

- c) Shorter read ranges (4 inches to 15 feet)
- d) Usually Write-Once-Read-Many/Read-Only tags
- e) Cost around 25 cents to few dollars.

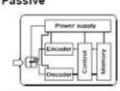
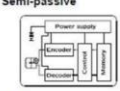
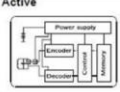
Classification of RFID tags	
<p><b>Passive</b></p> 	<ul style="list-style-type: none"> <li>- also called 'pure passive', 'reflective' or 'beam powered'</li> <li>- obtains operating power from the reader</li> <li>- the reader sends electromagnetic waves that induce current in the tag's antenna, the tag reflects the RF signal transmitted and adds information by modulating the reflected signal</li> </ul>
<p><b>Semi-passive</b></p> 	<ul style="list-style-type: none"> <li>- uses a battery to maintain memory in the tag or power the electronics that enable the tag to modulate the reflected signal</li> <li>- communicates in the same method, as the other passive tags</li> </ul>
<p><b>Active</b></p> 	<ul style="list-style-type: none"> <li>- powered by an internal battery, used to run the microchip's circuitry and to broadcast a signal to the reader</li> <li>- generally ensures a longer read range than passive tags</li> <li>- more expensive than passive tags (especially because usually are read/write)</li> <li>- the batteries must be replaced periodically</li> </ul>

Fig. 1 classification of RFID tags

**IV. DESIGN**

The below image shows an attendance monitoring system which is placed in the smart classrooms for reducing the timings of manual attendance system and also it helps us to avoid proxy(s).

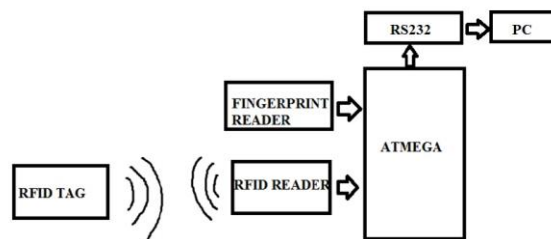


Fig. 2 attendance monitoring system

The location tracking of students is done by passive RFID where the mobile is prohibited. The information is displayed in the LCD and its recorded in the excel sheet as database.

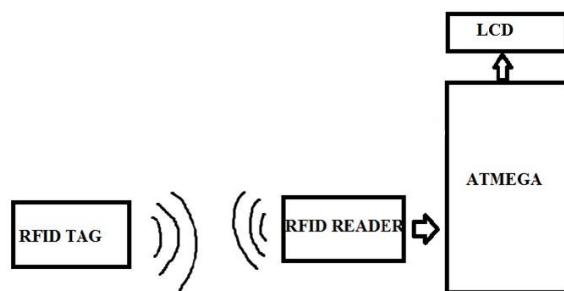


Fig. 3 location tracking

The general layout of the location tracking process is given below.

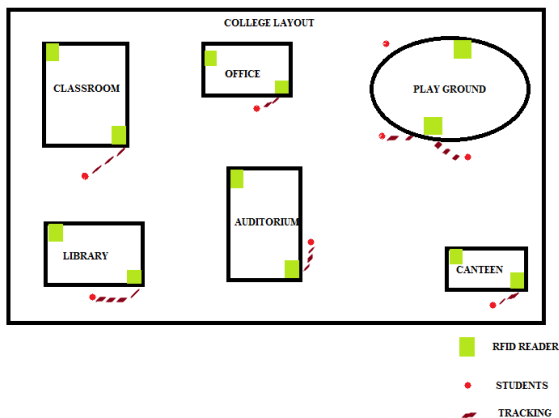


Fig. 4 layout

The students with tag wherever roaming inside the college campus, they can be tracked easily.

**V. DIFFERENCE- RFID AND BARCODE**

Tab. 1 comparison between RFID and barcode

PARAMETER	BAR CODE	RFID
Frequency used for tag	Optical frequencies	Radio frequencies
Reading		
Type of communication	Line of sight communication	Non -line of sight communication
Data Volume	Physical limitations exist. It is very difficult to read a very long barcode.	Can carry relatively large volume of data.
Range of data readability	Very limited range, less than a foot or two.	Can be read up several feet.
Cost	Cheap	Expensive, but likely to cost less as more industries adopt the technology.

**VI. COMMUNICATION BETWEEN RFID READER & TAG**

The communication between the reader and passive tag uses one of two methods to modulate the ID signal. Low-frequency (less than 100 MHz) tags pass information by releasing energy from the capacitor to the tag coils in varying strengths over time, which affects the radio frequency emitted by the tag. The reader detects these varying waves and can use these variances to demodulate the code. In higher-frequency (greater than 100 MHz) tags, the tag transmits the signal using backscatter, in which the tag's circuit changes the resistance of the tag's antenna. This change in resistance causes a transmission of RF waves, which the reader can pick up and demodulate.



Fig. 5 RFID tag

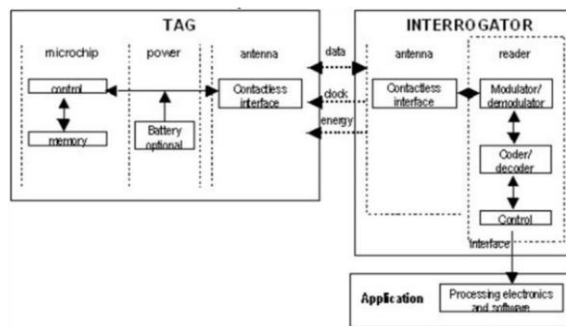


Fig. 6 Reader and tag communication

**VII. BIO METRIC- FINGERPRINT**

A fingerprint is the pattern of ridges and valleys on the surface of a fingertip. The end points and crossing points of ridges are called minutiae. It is a widely accepted assumption that the minutiae pattern of each finger is unique and does not change during one's life. Ridge endings are the points where the ridge curve terminates, and bifurcations are where a ridge splits from a single path to two paths at a Y-junction. Below figure illustrates an example of a ridge ending and a bifurcation. In this example, the black pixels correspond to the ridges, and the white pixels correspond to the valleys.

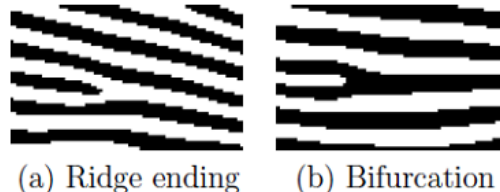


Fig. 7 fingerprint

When human fingerprint experts determine if two fingerprints are from the same finger, the matching degree between two minutiae pattern is one of the most important factors. Thanks to the similarity to the way of human fingerprint experts and compactness of templates, the minutiae-based matching method is the most widely studied matching method.

**VIII. FUNDAMENTAL PRINCIPLES**

Three fundamental principles:

- A Fingerprint is an individual characteristic (this helps to explain why the term "fingerprint"
- A Fingerprint will remain unchanged during an individual's lifetime.
- Fingerprints have general ridge patterns that can be systematically classified.

Three classes of fingerprints: loops, whorls, and arches.

A. LOOPS:

- 60-65% of the population has loops
- Must have one or more ridges entering from one side of the print, curving and exiting from the same side
- Loop opening toward little finger: ulnar loop (As the ulna is the medial bone)
- Loop opening toward thumb: radial loop (As the radius is the lateral bone)
- Type lines are ridges that diverge (separate)
- Deltas are located at the point of divergence. All loops must have one delta
- The core is the center of the loop

B. WHORLS:

- 30-35% of the population has whorls
- All whorl patterns must have type lines and two deltas
- Four major types: plain, central pocket, double loop, accidental
- Plain whorls must have at least one ridge that makes a complete circuit, and an imaginary line from one delta to the other must touch a whorl ridge
- Central pocket whorls must have at least one ridge that makes a complete circuit, and an imaginary line from one delta to the other cannot touch a whorl ridge
- Double loop is two loops combined to make one whorl
- Any other types not in the three categories are called accidentals (generally, they have a whorl type pattern, which is why they are in the whorl grouping)

C. ARCHES:

- Only 5 percent of the population has arches
  - Arch ridges tend to enter from one side of the print and leave out the other side
  - Two distinct types-- plain arches and tented arches
  - Plain arches tend to show a wave like pattern
  - Tented arches show a sharp spike at the center of the arch
  - Arches do not have type line, deltas or cores
- Using the above information here are some examples of each of the major fingerprint types:

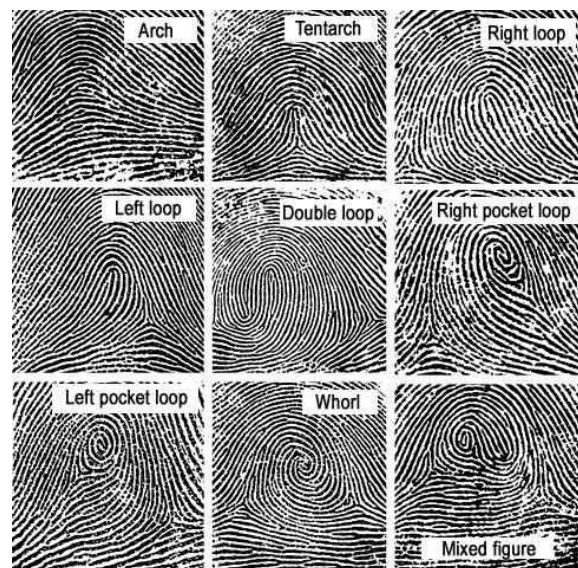


Fig. 8 classification of fingerprint

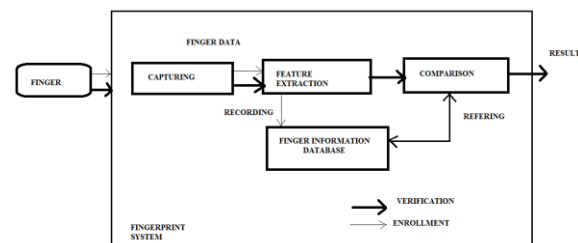


Fig. 9 typical finger print system

IX. METHODOLOGY

- Segmentation.
- Normalization.
- Binarization.
- Thinning.

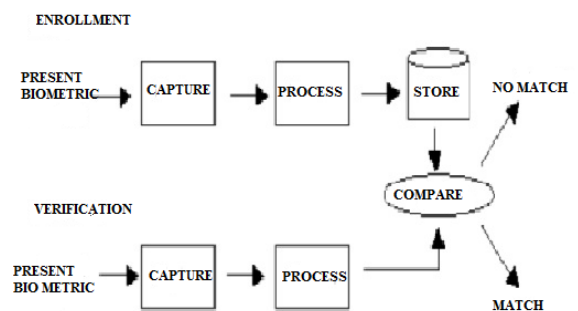


Fig. 10 working principle of fingerprint

X. ATTENDANCE MONITORING AND LOCATION TRACKING

The passive RFID tag is should be given to students as ID card. In the classrooms, the biometric attendance module is placed in their benches. So while taking attendance, students should punch their tag and should give fingerprint scanning. If you

failed to give anyone of the above, the student should be marked as absent and mail is sent to particular student parent's mail id along with these we can sent fees details and remarks also. The students can be easily tracked by using passive RFID tag instead of mobile phones. If the student is bunking the classes, they can be easily tracked by the tracking module, which is placed in the college campus like canteen, library, playground, in the desired places. While crossing that range, they can be tracked and displayed in LCD as well as recorded in the excel sheet as database.

#### XI. CONCLUSION

RFID and biometric plays a vital role in digital world. As the RFID technology evolves, more sophisticated applications will use the capability of RFID to receive, store and forward data to a remote sink source. RFID has many applications as can be imagined. In this project, we have utilized the versatility of RFID in implementing functional and automatic attendance management system and fingerprint identification system. This paper will reduce the timings of the staff and students. Parents can easily know information about the student and fees payment details. Students can be tracked with low cost model in mobile prohibited area and proxy is also avoided. So it might be useful for the society.

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