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RFID Based Object and Location Identification Tool

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Abstract: A common problem that employer/management of big organization/institutes with several floors, corridors and departments facing today is to locate the students/employees inside or within a specific area. The problem gets even worse when there is increase in number of students/employees. Hence, here we consider a typical case of campus/premises of an academic institute where students and faculty could need to be identified and also to be localized. A possibility for solving this problem is to provide the campus with an intelligent system to identify and to locate students/employees. In addition this strategy would allow to find and locate the people (students/employee) inside the building and to carry out an individual search if it were necessary. We are developing a complete system for object (student/faculty/employee) object and location identification in this scenario using RFID technology.

Keywords: RFID,Tracking,Location,Tag;

I. INTRODUCTION

As the number of institutions as well as the number of students/employees in each institution is increasing it is harder to monitor/track the presence of students/employees in big campus during the working hours. The tools in inventory system may also need to be tracked and localized in godown.Here each and every student, employees/tools is assigned with different RFID tags with individual tags numbers and the RFID reader are placed in campus at different locations which identifies the students, employees moving from place to place automatically by reading tag numbers of the students/tools and intimates to the central server about their status.

Proposed work overcomes the drawback of existing system by introducing RFID enabled Tags. This is a type of tags which sends the location information wirelessly.The sending of signals from remote places in campus to a central system is accomplished by using active RFID tags and ZIGBEE protocol. Because of the active RFID tags, the reader can read tags from distant place and the ZIGBEE which is connected to reader sends the data to central system.

This paper proposes the system that remotely locates and tracks a tag holding person/tool which is either moving or static. The reader spread across many points in campus premises to read the tags.

II. RELATED WORKS

Intelligent campus security tracking system (iCST) [1] was outlined and executed in based on RFID and ZigBee network. iCST reads the RFID labels information through RFID & ZigBee node, and after that sends it to PC node. PC node gives comparing cautioning. At the point when the notice happens, client can logon the web framework to get the real-time tracking for resources (with implanted slave RFID); where the unauthorised device arrives any one entrance control node, it would be blocked. Client can likewise deal with his own particular assets, for example, giving and recuperation operation through the Web administrator focus.

Conventional systems for observing generation in endeavours by people on location are not able to meet the desires for effectiveness, precision and cost as item lifecycles are abbreviated consistently. Setting up a RFID and ZigBee based assembling tracking framework [2] is a decent way to deal with enhance observing proficiency to enhance administration effectiveness in organizations. RFID innovation has been utilized to give a more effective approach to distinguish and track things at the different stages all through the inventory network [3] in extensive retail industry. Real time traceability utilizing

RFID innovation on Lego Robot reproduction environment and LabVIEW interface was produced that can be correspondingly actualized in little and medium scale (SMI) industry. Gives a diagram of distinctive administrations sent in intra-organizational RFID [4] frameworks and analyses framework architectures working today. We additionally analyse developing measures grew by the EPC worldwide group that plan to institutionalize framework interfaces and reader conventions in RFID deployment. RFID and ZigBee based framework structural architecture at the network level for tracking the vehicle data [5] which has been sent to the brought together server will be developed. The point is to give a basic and simple answer for track the area of the moving vehicle. Contrasted with the old frameworks, ZigBee based network modelling has the capacity give data about the vehicle precisely. The vehicle will be having a novel RFID label (Radio Frequency Identification). The RFID reader is set particular places. For the advantageous elements of RFID, we incorporate RFID readers into the Vehicle tracking Information System. A data security framework [6] (named PC-gatekeeper) utilizing frameworks building and RFID innovation. The login confirmation code can be informed ahead of time by utilizing the PC-watch framework on the grounds that each PC client having their own Auto-tag will be checked

with PC RFID reader. The data in the PC will be ensured with RFID and the vibration sensor as the PC be turned on and be attacked. A Digital Campus Security System (DCST) [7] has been outlined and executed base on the RFID, ZigBee and GSM network. DCST reads the RFID labels and sends data to PC node through ZigBee network and gives cautions through GSM network. In the event that any invalid RFID (Thief) data comes into PC, client will logon the web framework to get the real-time tracking for resources. RFID based participation framework [8] is one of the answer for diminishing the understudy's general scholastic execution since taking participation by calling names or marking on paper is extremely time expending and wasteful. This framework can naturally catch student's participation by having their card near RFID reader and spare information in the PC.

In the proposed paper, the students/employee will be continuously monitored for their presence in the Campus during the working hours.

III. SYSTEM MODEL

Proposed workflow explains theRfid Based Object and Location Identification Tool as shown below.

Step 1: Develop a middleware application for data acquisition and data storage.
Step 2: Program readers with ID.
Step 3: Install RFID readers in the campus.
Step 4: Connect RFID readers to the system.
Step 5: Maintain database of the tag holders in the system.
Step 6: Program Electronic product code in tags.
Step 7: Test the system.
Step 8: The tag is activated when it passes through a radio frequency field, which has been generated by an antenna and reader.
Step 9: The tag sends out a programmed response.
Step 10: The antenna that generated the field originally and is attached to the reader detects that response.
Step 11: The transceiver (or reader) sends the data to the middleware.
Step 12: The middleware sends the information contained in the tags to whatever systems need that information.

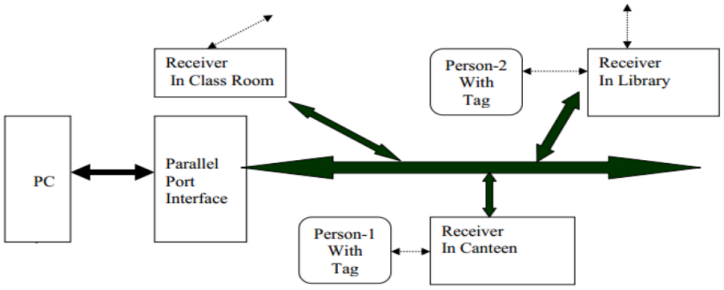

Fig 1: RFID Based Object and Location Identification Tool System Architecture

IV. IMPLEMENTATION

Implementation of RFID Based Object and Location Identification Tool is accomplished by using microcontroller. The heart of our system is the microcontroller. Microcontroller controls our system and it ensures the proper working of our system.

The proposed system is implemented using following components:

(i) Atmega48 Controller
(ii) RFID Readers – NSK 125 Series
(iii) ZigBee Trans receivers – CC2500
(iv) PC Node

4.1 Atmega 48:

Figure 2 shows the outlook of Atmega 48 microcontroller, keeping in view many factors that governed the correct implementation of our project the Atmega48 microcontroller from Atmel Corporation's AVR microcontroller family was chosen. Few crucial reasons may be cited so as to justify our choice of this microcontroller. The first being, that all AVR microcontrollers are designed to deliver more performance. The Atmega48 microcontroller has execution speeds of up to one MIPS per MHz of clock frequency [11]. Elucidating the specifications of the CPU of the AVR, it is an 8 bit microcontroller with advanced RISC architecture. The CPU is designed for the stellar combination of parallelism and performance. Thus the CPU uses the Harvard architecture (separate memories and buses for program and data). The CPU also accommodates a 32 general purpose 8-bit registers.The Atmega48 is as demonstrated in beneath figure2.

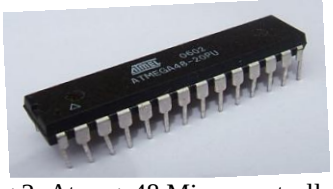

Fig 2: Atmega48 Micro controller

4.2 CC2500 Transceiver:

The CC2500 is a minimal effort 2.4 GHz transceiver [9] intended for low-control remote applications. The circuit is proposed for the 2400- 2483.5 MHz ISM (Industrial, Scientific and Medical) and SRD (Short Range Device) frequency band. The RF transceiver is incorporated with a profoundly configurable baseband modem. The modem supports different modulation formats and has a configurable data rate up to 500 kBaud. CC2500 gives broad equipment support to packet handling, data buffering, burst transmissions, clear channel appraisal, link quality evidence, and wake-on-radio.CC2500 is as demonstrated in beneath figure 3.

Fig 3: CC2500 Transceiver

4.3 NSK 125 series RFID Readers

Figure 4 shows the NSK 125 series RFID reader module. The NSK125 series RFID Proximity OEM Reader Module [10] has an implicit antenna in minimizedform factor. It is intended to work on business standard transporter frequency of 125 kHz. The RF reader module with an internal or an external antenna encourages communication with Read- only transponders—sort UNIQUE or TK5530 through the air interface. The tag information is sent to the host frameworks through the wired communication interface with a convention chose from the module Both TTl and Wiegend Protocol. The RF module is most appropriate for applications in Access Control, Time and Attendance, Asset Administration, Handheld Readers, Immobilizers, and other RFID empowered applications. The RFID Reader is as demonstrated in beneath figure.

Fig 4: RFID Reader Module

4.5 Sequence of operation

The sequential flow of system operations are described in following steps

1:When student/employee enters the campus with his RFID card in any location, the RFID reads sends the RFID Information to the microcontroller

2: Microcontroller then process the RFID information, adds up the location ID and sends it to PC through ZigBee wireless network

3: The application in PC receives the RFID location information, date and time of presence and save data in database.

4: If student is present in any location, the administrator can retrieved corresponding location history and present location reports from database.

V. RESULT AND DISCUSSION

After completing implementation design at section III, management gets a complete control to track real time location data remotely usingactive RFID tags , readers and smart application as shown in the below snapshots.

Step1: Program RFID Reader and tags.

Step2: Initiate application at central system. (Fig 5)

Step 3: connect wireless receiver to COM Port (Fig 6)

Step 4: Add tags name and save.

Step 5: Receive tag information upon receiving location info from device (Fig 7).

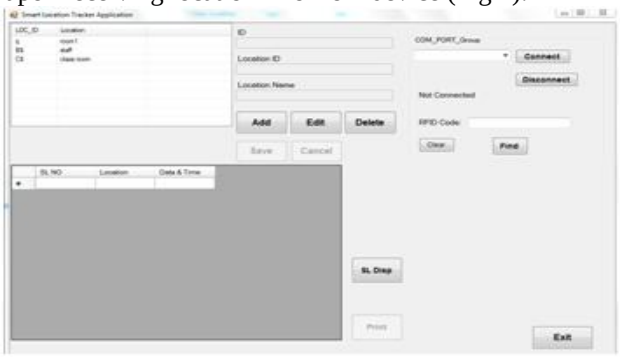

Fig 5: Application at central system

Fig 5 is the application software screen, which comprises of adding, edit added tag, and delete existed tag. The com port selection is dropped down when the CC2500 is connected to host pc, where the administrator need to select the appropriate Com port from dropped down list of com port.

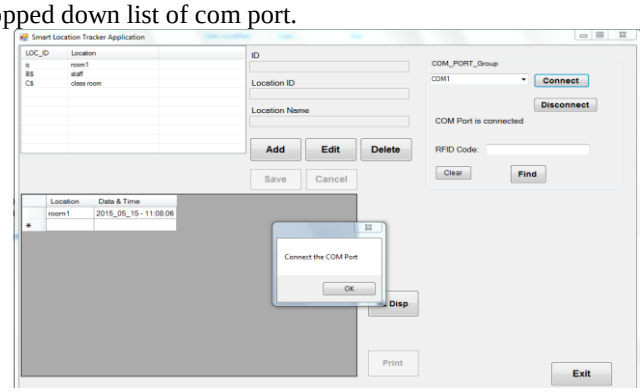

Fig 6: COM port connection

Fig 6 which depicts the Com port selection functions from drop down list. Upon successful selection of com port the CC2500 transceiver is connected to host pc and wait for the signal from RFID readers.

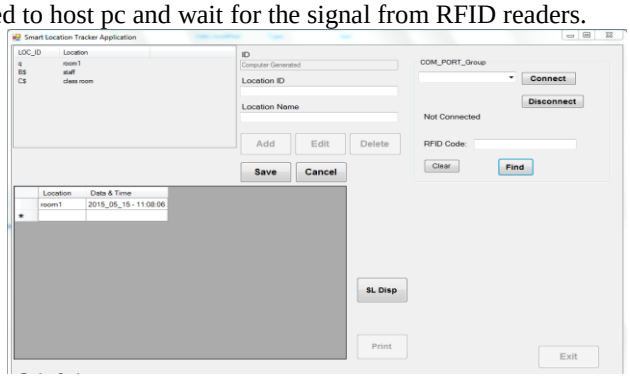

Fig 7:output screen of received tag information from mobile RFID tag

Fig 7 is the output screen of received tag information from mobile RFID tag. The output shows the location, date and time of tag present at particular location.

VI. CONCLUSION

In conclusion, the objective to build an RFID based object and location identification tool is to design a system based on RFID technology that will not only change the hectic manual locating procedure but also automates the system without any human intervention. The final design of the project will accomplish the idea of multi-node environment which is responsible for automatic identification and locating objects according to the personalized profile of the RFID card holder.

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