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SMART MONITORING SYSTEM IN LABORATORIES FOR STUDENTS

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Abstract: *In educational institutions, the laboratories play a major role to provide hands on skills for the students. Students learning process includes identifying the work tables for doing their experiments, submit the records and observation notebooks to get approval from the concerned faculty for the completed experiment and the preparatory work of the present experiment. Presence of the students in the laboratory is to be recorded for attendance calculation purpose. Students are to be monitored while doing their experiment inside the laboratory. Currently all this process is done manually. This proposed system automates the activities inside the laboratory using a mobile robot. The mobile robot is a programmed moving vehicle equipped with a Bar Code Scanner, RFID Reader and Camera. The mobile robot tracks the activities by moving around the set track. This robot identifies the submission of records and observation notebooks by scanning the bar code pasted on each notebook. The presence of students for the attendance calculation is done using the RFID reader, by sensing RFID tag worn by the students. Once the lab session is started, the mobile Robot performs the scanning process of observations and records for the set time. Then it moves and monitors the student's performance in the work table by using GPS module. The robot initiates the video recording process with the help of camera to inspect the execution of their experiments. At the same time the RFID reader module in the robot scans the RFID tags for the attendance. After the complete monitoring of all the work tables occupied by the students, the robot comes to the initial position with help of GPS module. These data are transmitted to the web page and to the cloud storage through the Wi-Fi module. The monitoring is done through a web page and also by a mobile using an android application.*

Keywords: RFID, Arduino, GSM, Mobile Robot

I. EXISTING AND PROPOSED SYSTEMS

Normally, the educational Institutions adopts the manual procedure for maintaining the records. It has drawbacks of maintaining hard copy of attendance records and it is time consuming one. Moreover, Parents may not be able to get any information about attendance of their children, control measures, data sharing etc. The proposed system consists of RFID tag, RFID reader, Camera Module with inbuilt Wi-Fi, Barcode scanner, Microcontroller, GSM Module, Bluetooth Module, mobile robot, personal computer. The RFID tag is worn by the students and RFID reader and barcode scanner are fixed in the mobile robot which is in the laboratory to be monitored. When students enter the laboratory and after they seated in their seats the RFID reader in the mobile robot reads the tag and send the signal to Arduino and the barcode scanner reads the barcode attached in the students record notebook which is kept in the table and sends signal to the Arduino. The Arduino identifies the RFID of students is being matched with the Barcode of the concerned students record notebook. Thus the Arduino sends signal to Wi-Fi module and register the presence of the concerned student in the web page. The web page is used to communicate the

presence and absence of the student to the pc and mobile phone of the administrators of the institution through the internet. The attendances of the students are stored in the attendance data base which is an automated to store in the cloud. Communication to mobile and personal computer is done through GSM module which must be connected to a network. The Camera Module with inbuilt Wi-Fi is used to transfer the live streaming of the video of the laboratory and the video is stored in an SD card and can be viewed in future.

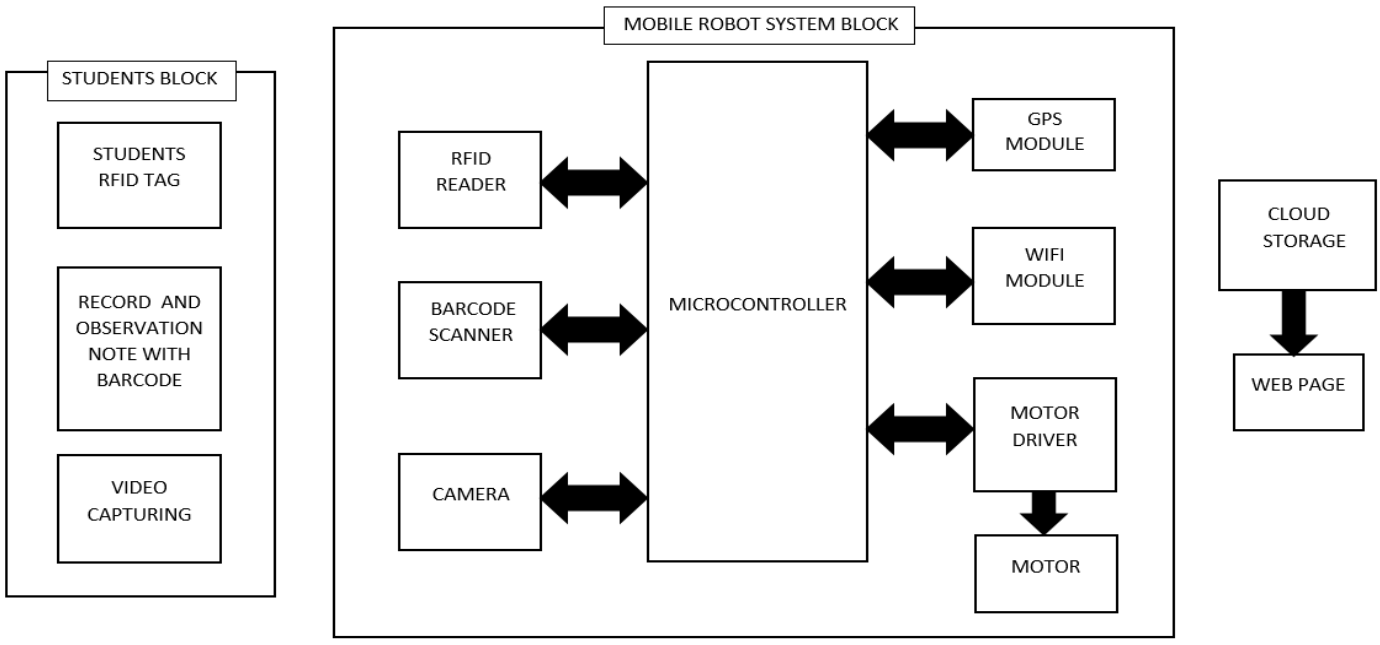

Fig 1. Block Diagram

II. CIRCUIT DESCRIPTION

This system consists of two circuits namely the Mobile Robot system circuit and the Attendance system circuit. Arduino microcontrollers used are Arduino Mega which is used for Attendance system and another is Arduino UNO which is used for Mobile robot system. A single power supply is used to power both the Arduino Microcontroller board which is nothing but a Power Bank.

The mobile robot system consists of components such as Arduino Microcontroller, L298N Motor Driver, Bluetooth module, 4 Motors and the IR Sensor.The interfacing and connection along with their circuit diagram of the Mobile Robot System.

The attendance system consists of components such as Arduino Microcontroller, RFID Reader, Barcode Scanner & Bluetooth, GSM module and Camera with Wi-Fi inbuilt.

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FLOW DIAGRAM

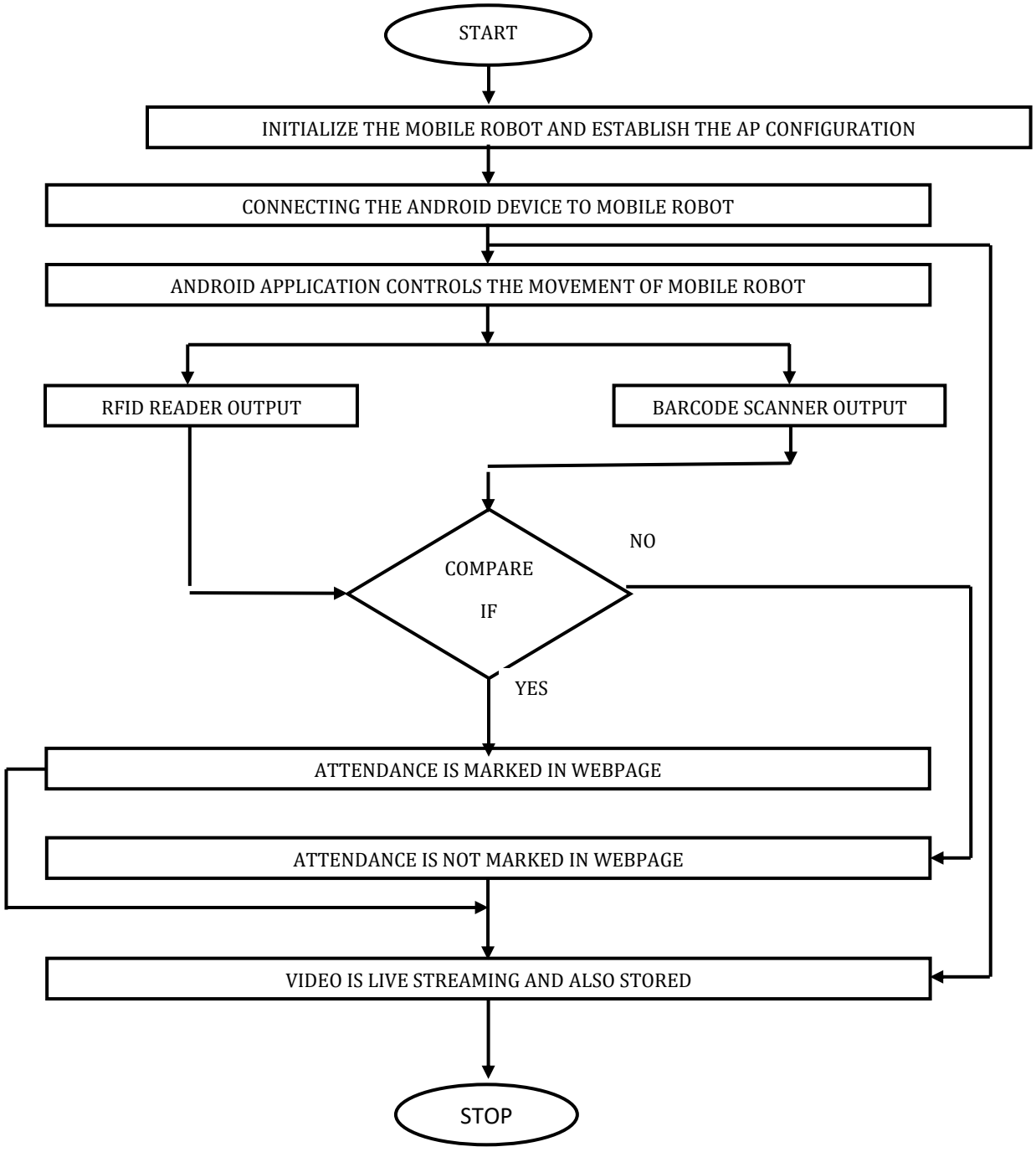

Fig. 2. Flow Diagram

III. OUTPUT AND RESULT ANALYSIS

The result and output of the project is divided into three parts i.e. the output of mobile robot, the output of attendance system and the output of the monitoring system. The output of mobile robot includes the successful running according to the instructions provided. The output of the attendance system includes the marking of the attendance of the student for the respective hours after the identification of the RFID tags by the RFID reader and the Barcode scanner. The output of the monitoring system includes the live video streaming and video storage. **Working Sequence**

1. The Mobile Robot is given supply from the power source and it starts to establish the Bluetooth of Mobile Robot which is used as a medium to connect to the android application named as "Arduino_car_control". This application is used to control the position of the Mobile Robot.
2. The Wi-Fi setup starts to establish Access Point (AP) for connecting the android application to view the live streaming video of the Laboratory and the Bluetooth for Barcode Scanner starts to initialize and connected to the Barcode Android Application.
3. The Android Mobile or Personal Computer which is used for viewing the video live streaming is connected to the Mobile Robot Camera Module by using Wi-Fi medium and the live streaming video of the Laboratory is get ready to view and it is also starts to store in SD-card.
4. By using the android application"Arduino_car_control" the Mobile Robot moves closer to the students, who wears the RFID tag based Identification Cards. The RFID reader in the Mobile Robot reads the tags available with the students and send the data to the microcontroller.
5. At the time when the RFID reader senses the tags, the Barcode Scanner Scans the Barcode provided in the record notes of the students. The scanned Barcode output is transmitted to the microcontroller by the Bluetooth HC-05 module.
6. Now in the Microcontroller the received data of RFID and Barcode Scanner is compared. If the RFID and Barcode data is matched perfectly, the microcontroller sends the data through the GSM module to the webpage where the attendance is marked.

MOBILE ROBOT HARDWARE

The Mobile robot is the main part which carries the entire system in it. The Mobile Robot is equipped with a RFID reader module, Barcode reader module and a camera module mainly. The mobile robot is first connected with an Android application through a Bluetooth module. The mobile Robot is programmed to move around the laboratory by following the commands which is given from the Android Application.

RFID OUTPUT

The RFID system is used for Attendance calculation purpose. The RFID reader is fixed in the Mobile Robot, when it gets closer to a student who is wearing the tag it senses the RFID and reads it. The RFID output is given to the Arduino

Microcontroller and it is compared with the barcode module output later. The compared output is transmitted to the webpage through a GSM module, where the attendance is marked.

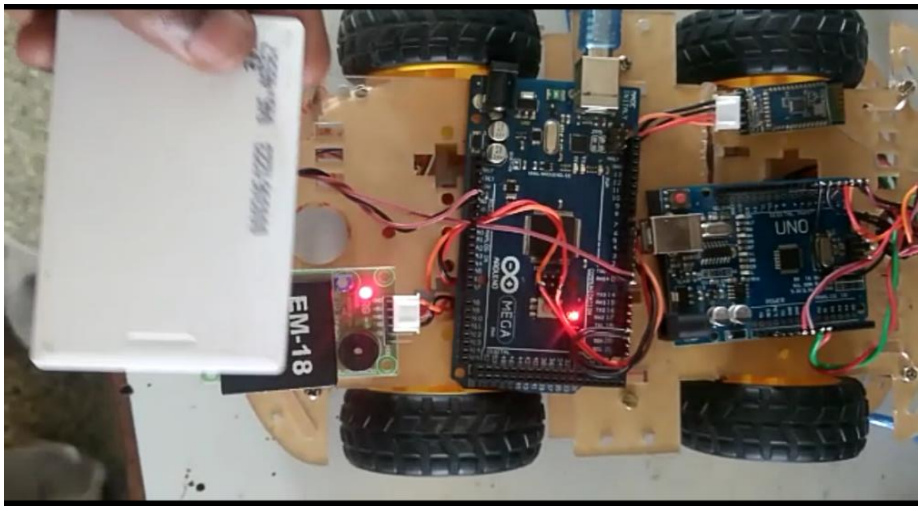

Fig. 3 Scanning of RFID Tag

BARCODE SCANNER OUTPUT

The Barcode Module is designed as an Android Application in Mobile. The Bluetooth of the mobile phone sends the Barcode output scanned by the camera of the mobile to the Bluetooth module connected in the Arduino Microcontroller .The output is compared with the RFID output and transmitted to the webpage for attendance marking.

Steps for Barcode Scanning

- STEP – 1: Open the android application named as "Barcode_scanner".
- STEP – 2: On the screen, there is a BLUETOOTH symbol.
- STEP – 3: Click that symbol and it navigate to page 2 that have a list of paired Bluetooth devices.
- STEP – 4: Click the device.
- STEP – 5: Now the device is connected to the Bluetooth Module in the Mobile Robot.
- STEP – 6: Finally the Scanner screen appears on the Android Mobile.
- STEP – 7: Place the Barcode of Record Notebook in the centre of the screen which indicated as in a box structure.

ATTENDANCE SYSTEM OUTPUT

A webpage is designed using webpage maker IDE software for attendance calculation purpose. In this page the attendance is marked for a student roll number by comparing the RFID and Barcode output received in the Arduino Microcontroller. The webpage consists of the Home Page and followed by the respective pages of each year. The Home Page is shown.

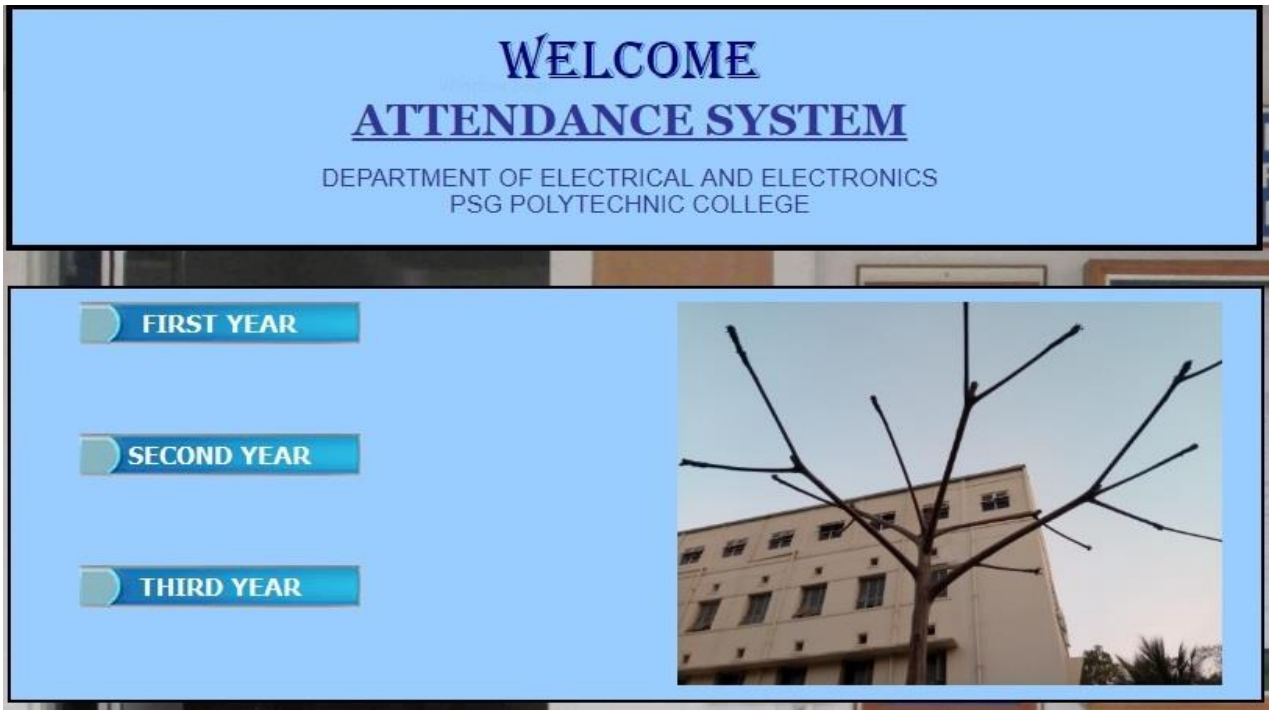

Fig 5. Home Page of Attendance System Webpage

The webpage of the Third Year consist of the welcome notes and department name and also the Attendance tabular column. This table has serial number, Registered Roll No, Name of the student and finally the Period Hours.

CAMERA MODULE OUTPUT

A Wi-Fi camera module is used for monitoring and video Recording purpose. The camera module is connected through Wi-Fi in the mobile application where it is controlled and the video is lively telecasts and also stored in SD card or Cloud Storage for later use.

Table 1 Output Result Analysis

S.NO.	SCANNING PARAMETERS	TIME TAKEN(in s)	
		TRIAL 1	TRIAL 2
1.	RFID reader Scanning RFID tag	2.53	1.70
2.	Barcode Scanner scanning Barcode	5.6	3.79
3.	Data send to webpage	12.43*	15.09*
4.	Webpage refreshing rate	8.7	8.7

*According to the network range the time taken will change.

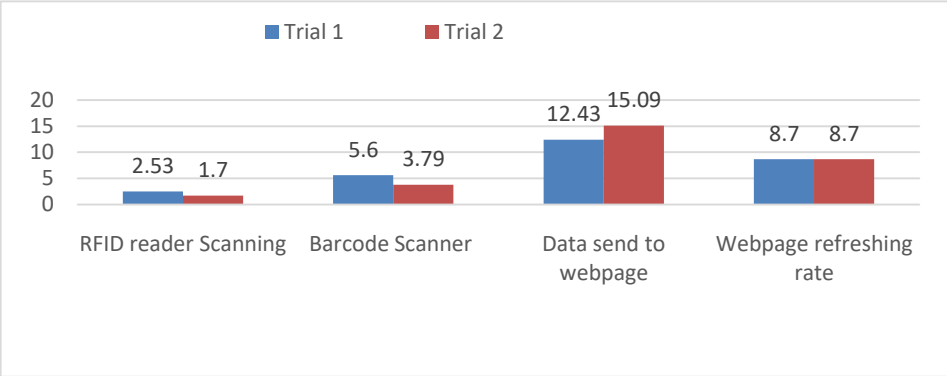

Fig. 6 Graphical Output Result Analysis

The above Fig 6. shows the result analysis of this project in the graphical view. This graph illustrates the time taken by the RFID reader, Barcode scanner to identify the RFID tag and Barcode in the record notebook and also the time taken to send the identified data to webpage.

Table 2 RFID Output Result Analysis

S.NO.	NUMBER OF STUDENTS (RFID)	SCANNING TIME (in s)
1.	1	2.53
2.	3	7.29
3.	5	12.45
4.	10	24.30

Table 3 Barcode Output Result Analysis

S.NO.	NUMBER OF RECORD NOTE (BARCODE)	SCANNING TIME (in s)
1.	1	3.79
2.	3	11.37
3.	5	18.95
4.	10	37.97

The activities inside the laboratory includes attendance monitoring and submission status of Record Notebooks verification. It consumes less time compared to manual process and also helpful in time saving for doing the laboratory activities and can lead for effective learning process.

Table 4 Output Result Analysis

S.NO.	SCANNING PARAMETERS	TIME TAKEN (in s)	
		TRIAL 1	TRIAL 2
1.	RFID reader Scanning RFID tag	2.53	1.70
2.	Barcode Scanner scanning Barcode	5.6	3.79
3.	Data send to webpage	12.43*	15.09*

IV. CONCLUSION

This sytem is designed and developed to automate the attendance and students monitoring purpose inside a laboratory premises. This system automates the attendance tracking process with record notes verification and students monitoring with the help of a RFID reader, a Barcode scanner and a Camera module. This model can be implemented in educational institutions, where it provides a better solution for student tracking and monitoring. This will be really helpful to staff in knowing the students activities from anywhere. This system can also be implemented in Hospitals and can be used for surveillance purpose. It avoids the human involvement where it ease off human activities

V. BIBLIOGRAPHY

1. Mehta, L., Sharma, P., 2014, June. SPY Night Vision Robot with Moving Wireless Video Camera & Ultrasonic Sensor. International Journal of Research in Engineering Technology and Management, IJRETM-2014-SP-033.
2. Balakrishnan, M., Gowthaman, S., Jaya Kumaran, S.P., Sabhapathy, G.R., 2015, March. A Smart Spy Robot Charged and Controlled by Wireless Systems. In proceedings of 2015 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), 2015 IEEE Xplore.
3. Shaikh Shoeb, Mir Ibrahim, Ansari Asagr Ali, Khan Sufiyan, Kalpana Bodke. Wireless Video Surveillance Robot Controlled Using Android Mobile Device. International Journal Of Advance Research In Computer Science, Volume April-2015
4. Abhilash Kale, Neil Sharma,Behara Manoj Kumar, Ajay Patil, pp 318-322 volume 6 International Journal Computer Technology & Applications 2015
5. PranaliShirude, MayuriShelar, ManishaThete, VarshaJundare “Student Tracking And Attendance Monitoring System Using Mifare Technology” Volume 1 special issue International Journal of Advance Foundation And Research In Science & Engineering 2015.