

Cloud Based Attendance Tracker

Harshal Jadhav¹, Shubham Madne², Aniket Mane³, and Mrs.S.V.Shinkar⁴

^{1,2,3}Student, Department of Electronics and
Telecommunications Engineering
Pune Institute of Computer Technology
Pune, Maharashtra

⁴Assistant Professor, Department of Electronics and
Telecommunications Engineering
Pune Institute of Computer Technology
Pune, Maharashtra

Abstract—Abstract—Manual Attendance taken by teacher makes it cumbersome to manage and track student record. Taking Attendance in the class lecture session and keep the record of the attendance during lecture period is the task of subject teacher, since taking the attendance and maintaining the student's attendance frequently consume lecture time. also, it verifies number of student present in the ongoing classes. before, the tasks of marking attendance and recording the marks are handled manually by pen and paper system. This system consumes further time and adds further workload to the subject teacher and occasionally the false attendance may be got mark due to mortal error. To avoid these problems and reduce the unwanted of subject preceptors, we're going to make "Cloud Based Attendance Tracker" for student attendance and mark operation system. This System involves cloud computing by which we can not only track the attendance record of student but also inform their parents and teachers for penalties of it removing the error of false attendance by moral errors. The key part of it is Cloud which gives us ease of managing and accessing the data stored which makes it completely digital removing the use of paper which saves lots of trees. As no human interfere is there it is completely error free system which allows the student to mark attendance through mobile/laptop during lecture for stipulated time. A warning to the students with an alert message if not fulfilling the required percentage of attendance., It gives a warning to student as soon as their attendance goes below the specified percentage through an alert message on phone or email. The system consists of usage of the class controller which will track the attendance that attendance will be managed at cloud level for different services and the respective data of it will be fetched at user interface. This system may act as a business prototype for different companies which want to put there everything on cloud and makes a significant change. This system is substantially design for the tutoring faculties and other staff members of the association who maintain attendance and mark regularly. Using this system, the subject teacher or the authorities can see and maintain the number of

students present or absent in the class sessions.

Index Terms – Cloud Gateway, Cloud based attendance monitoring and tracking system, Mobile application based attendance management system.

1. Introduction

The proposed Cloud based attendance tracker deal with the maintenance of the student's attendance details. It is generating the attendance report of the student on basis of presence in class. The staff handling the particular subject to responsible to make the attendance for all students. Only if the student presents the particular date, the attendance will be calculated. The student attendance report based on monthly and consolidate will be generated.

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models.

1.1. Theoretical Background

In classroom sessions, utmost of the time is given to take the attendance and number of times it is not purely correct. Attendance taking is relatively delicate while taking in a huge strength of student or workers and it is laborious as well. However, it also increase the chances of mistakes, If the traditional process of attendance is being switched to online attendance it also increase the chances of personal errors. Targeting this problem and making the system automated with the preface of this technology will make the operation of attendance veritably effective as well as low-cost process. "Cloud base attendance monitoring and tracking system" is system developing for maintaining the attendance of the student on the daily basis in the collage.

Here the staffs, who are handling the subjects, will be responsible to mark the attendance of the students. Each staff will be given with a separate username and password based on the subject they handle. An accurate report based on the student attendance is generated here. This system will also help in valuating attendance eligibility criteria of a student. Report of the student’s attendance on weekly and monthly basis is generated.

1.2. Technical Approach

A Wi-Fi router for a classroom which works as an internet access point to whole class(Teacher and Student). The Wi-Fi router can give access to your WiFi network with integrated TCP/IP protocol stack. When a user attempts to access a website or system that requires authentication, they are typically required to provide some form of credentials, such as a username and password. The website or system then verifies the credentials to ensure that they are valid and match an authorized user. Here we have to check whether the student is inside the class or not so we are giving access to only those students for marking their attendance who are connected to the classroom Wi-Fi router for internet access.

Teacher who want to take attendance will setup a attendance session for a limited period of time. only within this stipulated time students can mark there attendance as present on the cloud using the web application. At the cloud side we are using MongoDB database as a service. MongoDB Atlas provides us the platform to use the MongoDB database at the cloud and manage the data.

2. Related Works

This section reviews the research works carried out by different researchers that are related to the proposed work. In general, the mobile application is developed using any one of the languages such as Java using software development kit (SDK). The data used for the application or processed by the application are stored in the data bases. The following mobile application developers succeed in developing the student attendance management system with the structured query language (SQL) data bases.

V. Somasundaram et al presented a mobile-based attendance system using visual basic .Net (VB.NET) and SQL server. This system is used to store, organize, find and manage the information of the students and helps to generate the reports of the student information [6]

The mobile application-based attendance management system is also employed in the organisations to mark the attendance of the employees. S.P. Avinaash Ram and J. Albert Mayan presented a mobile application for employee registration and mobile attendance. It is used to update the employee attendance regularly and track their attendance. Moreover, it is helpful to the staff and the authorities to take the attendance. This system is also used to know the number of employees easily and to monitor whether they are regular to the organisation. This system also provides the details of every employee or student.

3. System Design of Cloud based Attendance Tracker

In our system, subject teacher need connect to Wi-Fi through mobile for activation of link. Teacher can activate link by teacher credentials. Once URL link get activated then student can mark their attendance by their student login with stipulated time period. Once time get over the ESP8266 class controller send attendance to cloud server. There attendance going to be saved subject table wisely and will server generate attendance at end of the day.

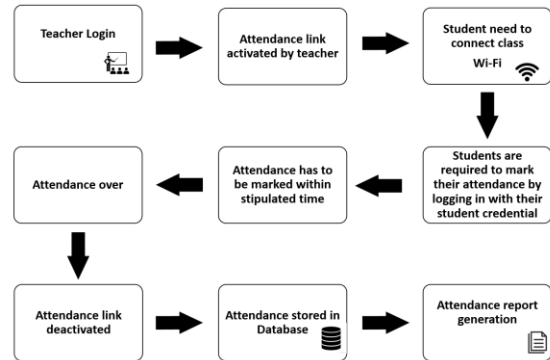


Figure 1. Flow Diagram of Proposed System

First teacher need to connect their mobile to class Wi-Fi in order to take subject attendance. Once webpage display on their screen then teacher can activate student attendance link by login through own teacher credentials. As soon as link gets activated, teacher can share link in student social groups for attendance. Then student need to connect class controller for attendance and mark own attendance via URL link within stipulated time. The student can mark attendance only through the intended classroom Wi-Fi router. Once attendance time get over then attendance saved to cloud server. In server, it save attendance in database and generate attendance report accordingly.

3.1. Block Diagram of Proposed System

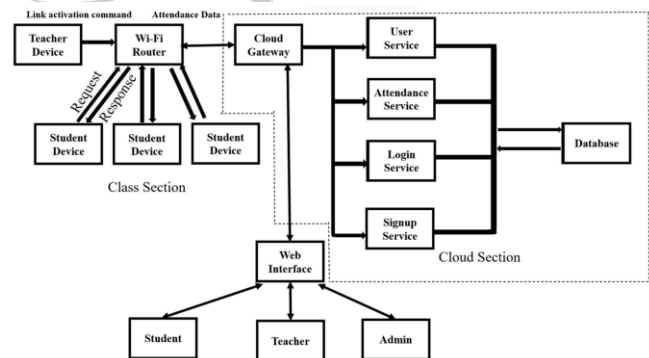


Figure 2. Block Diagram of Proposed System

Block diagram of cloud base attendance system divided into main three parts and they are following: 1. Class section 2. Cloud (server) section 3. User Interface section

1) **Class Section:** Class section consists of Teacher devices, student devices and Wi-Fi class controller which is the internet access point. The main function of this section is to mark attendance within stipulated time and send it to cloud server. Teacher device: First teacher needs to connect to class wi-fi router so that attendance link can be activated. Teacher can activate link by their login credential and set duration of link. Once link get activated teacher can tell students to mark their attendance. Student device: Student device nothing but smart phone or laptop. Once link get activated student can mark their attendance by student login with stipulated time. Classroom Wi-Fi router: Wi-Fi router is an internet access point connecting the whole network to the internet securely with authentication and is required to activate link and hosting web pages so that teacher and student can mark their attendance. After completion of attendance time, attendance is saved to the server by HTTP protocol.

2) **Cloud section:** Cloud section consists of cloud gateway and services and database. It is backbone of cloud base attendance system. Its function is to services to class section and user interface using different services. Cloud gateway: It route request to service base on type of request form client and return response. Services: There are many services in cloud system such as user service, attendance service, email service. According to type of request these services perform tasks and send response to cloud gateway. Database and Storage system: Database and storage system used to store students, teachers, subject and departments, information, and attendance of student in database. We are using MongoDB database which is NoSQL database.

3) **User Interface:** Students, subject teachers, and admin can interact and monitor attendance using website. Base on role they will see UI of website. It gives all in details information of attendance on dashboard of both student and teacher. All the three of them have different levels of authority. Admin can add or delete a student or teacher. A teacher can activate the link to get the attendance and can decide the time duration for which the link will remain active. A student can mark the attendance for his subject in the stipulated time if the link is activated by teacher.

3.2. System Design Components

1. **Application Programming Interfaces (APIs):** Application interface refers to the API's is method sending data between two devices or client sever over HTTP protocol. API's get data through different services. API design for login, signup, attendance, subject information, student information, teacher information.

2. **Server Connection Design:** We are implementing mono-lithic architecture, which is developing in Node JS, Express JS technology. Server consists of many services like user

service, attendance service, college service and email service. It also provides require data to UI section and client according to the request.

3. **Database Design:** It is important part of the system. It is used to store data in the form E-R relationship. All services get the data through database for their operations. Database privacy and security is must therefore we use MongoDB Atlas which is online database. As we have three sections to manage the attendance such as admin section, teacher section and student section. Each entity has various levels of authority. Admin only can create a new teacher or student using the form shown in figure 3. Teacher can take attendance by creating link and assigning the specific time. Student can only see the live attendance and mark the attendance.

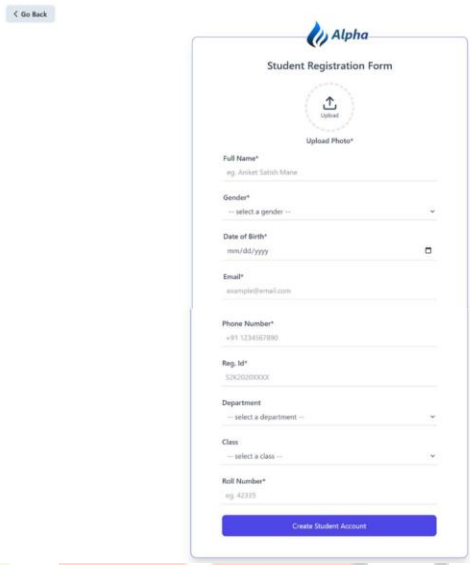


Figure 3. Student Creation by Admin

A same type of form is there under the control of admin section only for adding of new teacher as shown in figure 4. The corresponding data related to student and teacher get saved into the database which can then be used for validation purposes and for the login to student and teacher accounts.

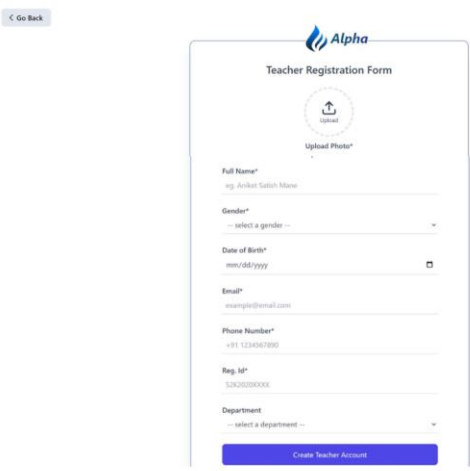


Figure 4. Teacher Creation by Admin

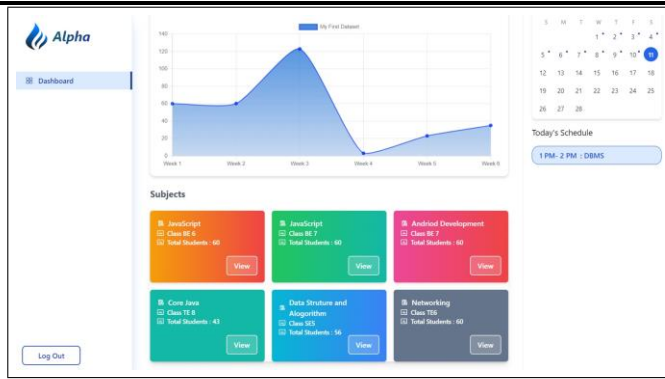


Figure 5. Teacher Section Dashboard of Proposed System

4. **Website Design:** Websites provide UI interface to teacher and student view their attendance information in detail. According to the role website will render different to end user. User will have only access to view their attendance, but teacher can modify attendance in case of issue. Website implement in React JS and Tailwind JS.

figure 5 shows the webpage designed for teacher as a dashboard, which shows the weekly attendance overview, a calendar with present day's schedule of the teacher and various subjects taught by the teacher. From this page, teacher can see status of subjects, classes and he can proceed to take attendance by activating link by enetering into the individual subject.

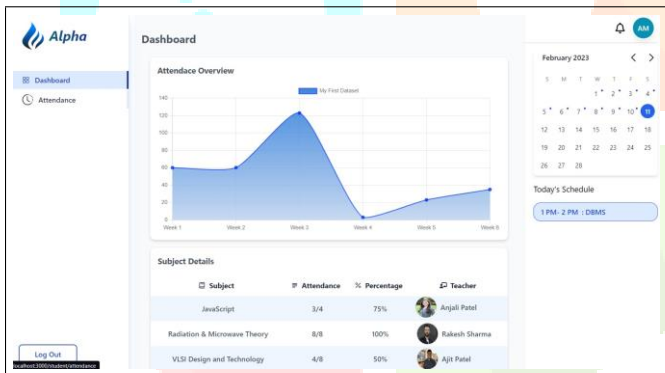


Figure 6. Studen Section Dashboard of Proposed System

After login to the proposed system, the student can see the Student Dashboard as shown in Figure 6. Student can see a graphical view of his weekly attendance with schedule of current day. Student can select the particular subject from the list of enrolled subjects to go for marking attendance after the link is activated by the teacher for the subject.

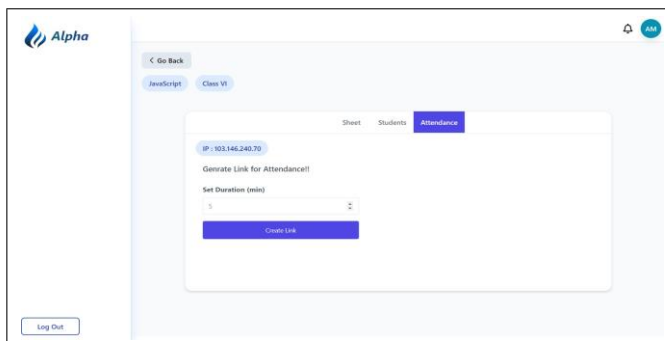


Figure 7. Link Activation by Teacher with Expire Timer



4. Results and Conclusion

In this paper, we proposed a cloud based attendance tracker system which can be used to taking and managing the attendance and to generate attendance reports easily. Our system gives 100% attendance accuracy and 98% performance. The students and teachers can access and view the attendance using website which build in React JS . Also used MongoDB document type NoSQL database for storing data in collections. In NoSQL, collection is equal to table in SQL. In NoSQL, we store data in the form of key-value pair.

Figure 7 shows the procedure to activate the link by teacher. Teacher can set the time duration for which the link is activated and, in that time, only student can mark his attendance by connecting to the same wi-fi router by his smartphone, tablet or laptop.

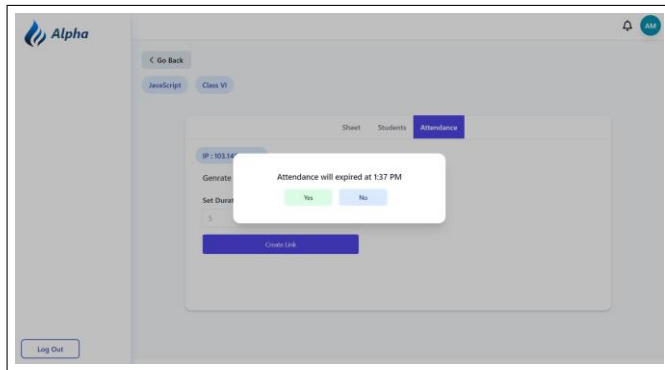


Figure 8. Link Activated by Teacher with Expire Timer

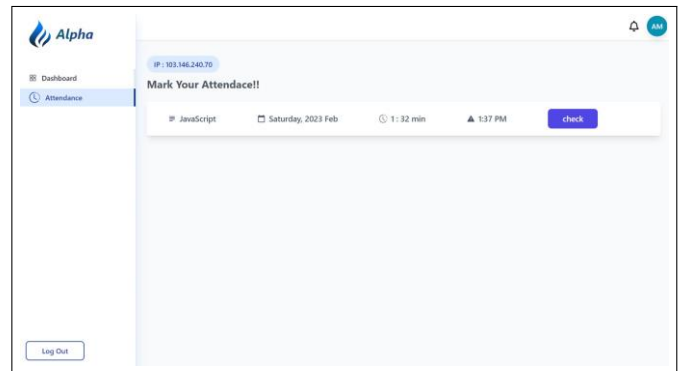
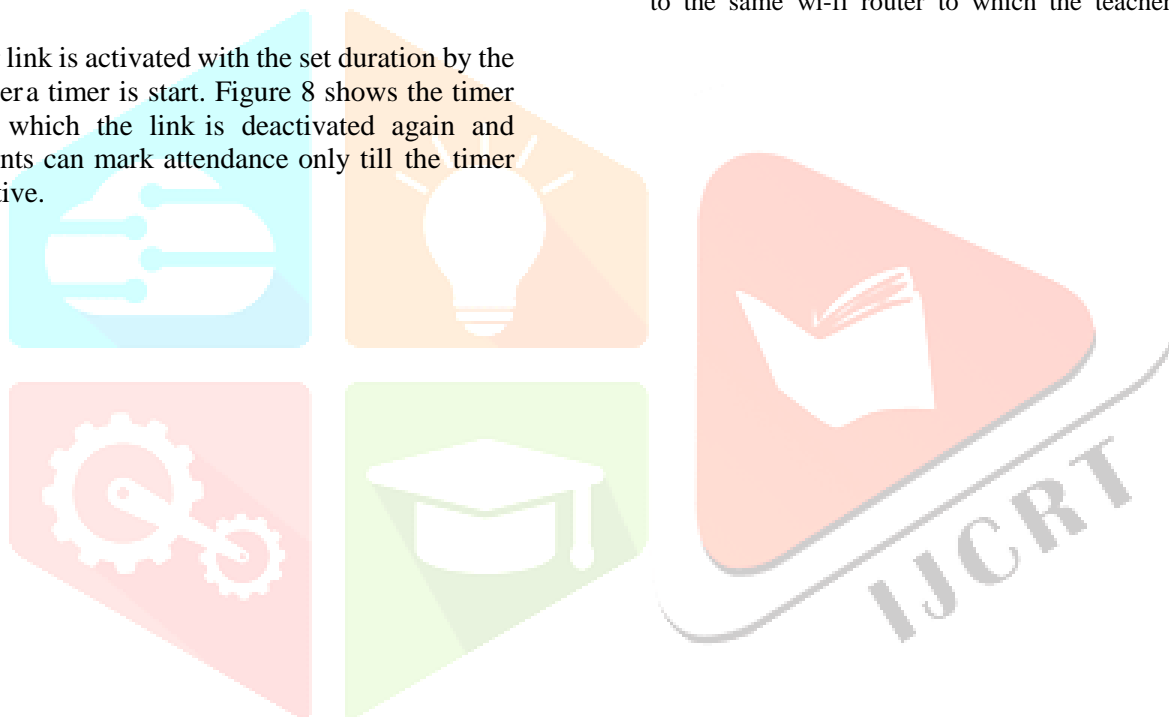


Figure 9. Student Ready to Mark Attendance

When link is activated by the teacher for a particular subject, if student is enrolled in that subject he can go to the subject from his dashboard to mark his attendance as shown in figure 9. To mark the attendance student should connected to the same wi-fi router to which the teachers device is

After link is activated with the set duration by the teacher a timer is start. Figure 8 shows the timer after which the link is deactivated again and students can mark attendance only till the timer is active.



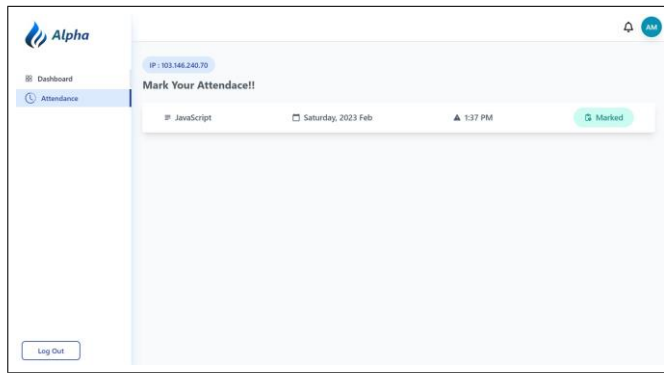


Figure 10. Attendance Marked by Student

connected so that the proxy attendance is avoided. Figure 10 shows that the attendance for that particular lecture is marked by the student.

Acknowledgments

The authors would like to express sincere thanks and appreciation to Department of Electronics and Telecommunication Engineering, Pune Institute of Computer Technology (PICT), Pune for supporting us with facilities that can make this system to be developed and studied further.

References

- [1] Anthony T. Velte Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", McGraw-Hill.
- [2] Michael Dobson, Douglas Ahlers and Bernie DiDario, "Attendance Tracking System", U. S. Patent 8,353,705 B2, Jan.15,2013
- [3] R. K. Kodali, R.V. Hemadri, "Attendance Management System", 2021 International Conference on Computer Communication and Informatics (ICCCI -2021), Jan. 27 – 29, 2021, Coimbatore, INDIA
- [4] Vikas Yadav, G. P. Bhole, "Cloud Based Smart Attendance System for Educational Institutions", 2019 International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (Com-IT-Con), India, 14th -16th Feb 2019
- [5] H. K. Nguyen¹, M. T. Chew², "Rfid-based Attendance Management System", 978-1- 5090-5541-8/17/\$31.00 ©2017 IEEE
- [6] Somasundaram, V., Kannan. M, Sriram, V., 2016, "Mobile based Attendance Management System", Indian Journal of Science and Technology, 9 (35), pp. 1-4.
- [7] S,Kadry; K.Smaili , "A Design and Implementation of A Wireless Iris Recognition Attendance Management System", ISSN 1392 – 124X Information Technology and Control, 2007, Vol.36, No.3
- [8] G.Talaviya; R.Ramteke; A.K.Shete, "Wireless Fingerprint Based College Attendance System Using Zigbee Technology", International Journal of Engineering and Advance Technology (IJEAT), ISSN: 2249-8958, Volume-2, Issue-3, February 2013.
- [9] M. K. P. Basheer, C. V. Raghu, "Fingerprint attendance system for classroom needs," in Proc. India Conference (INDICON), 2012 AnnualIEEE, pp. 433-438, 7-9 Dec. 2012.
- [10] T.S.Lim, S.C. Sim,M.M. Mansor, "RFID Based Attendance System", 2009 IEEE Symposium on Industrial Electronics and Applications (ISIEA 2009), October 4-6, 2009, Kuala Lumpur, Malaysia.

- [11] E.Haselsteiner, K. Breitfuß, "Security in Near Field Communication (NFC)", Philips Semiconductors Mikronweg 1, 8101 Gratkorn, Austria.
- [12] M.Ervasti, M.Isomursu, M.Kinnula, "Experiences from NFC Supported School Attendance Supervision for Children", 2009 Third International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies
- [13] T.R. Soomro, "Impact of Smartphones's on Society" College of Engineering Information Technology Al Ain University of Science Technology, Al Ain, United Arab. European Journal of Scientific Research 2013
- [14] O.K Kerem, V.COSKUN, N.Mehmet, B. OZDENIZCI, "Current Benefits and Future Directions of NFC Services", 2010 International Conference on Education and Management Technology ICEMT 2010
- [15] S. K. Jain, U. Joshi, B. K. Sharma, "Attendance Management System," Masters Project Report, Rajasthan Technical University,Kota