International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 04 | Apr 2021 www.irjet.net p-ISSN: 2395-0072

# Evolution of Campus Amalgamation with IOT and Artificial Intelligence

**Niketan Bothe[1], Priya Sudewad[2], Vaishnavi kasar[3]**

*[1]UG Scholar, Sandip University, Nashik, India*
*[2]Walchand College of Engineering, Sangli, India*
*[3]Sandip institute of engineering and management, Nashik, India*

---

**Abstract -** *Increasing demand for university education is putting pressure on campuses to make better use of their real estate resources. The current higher education landscape was facing multifaceted disruption due to a new digital student body. Then COVID-19 happened, making this transition even faster. These new students are expecting a more personalized and intuitive smart campus experience, just like they find on the web. With the growing concern about meeting enrolment goals, universities need to reshape how they move forward. They need to adopt technologies other industries have long grown accustomed to. This paper outlines our efforts to address classroom under- utilization in real university. So by instrumenting classrooms with IOT sensors to measure real-time usage, using AI to predict attendance in classrooms, Social distance monitoring, Crowd scanning and performing optimal allocation of rooms to courses so as to minimize space wastage.*

## 1.INTRODUCTION

The higher education landscape is at the crossroads of an amazing digital shift. Currently, universities seek to improve their educational models by adapting to the needs of their students. One way to do this is with the use of information and communication technologies (ICT) by adopting them as allies to respond to these needs. ICTs improve processes and manage large amounts of information that can be used by universities and gain knowledge to improve management and educational models [2]. Educational environments, like all sectors of society, seek to evolve, improve the services and experience of its members. This implies that several of the university campuses gradually become intelligent campuses [3]. Smart campuses are conducive environments where ICT and campus members interact with each other to create an ecosystem where all campus resources are focused on meeting the needs of members. One of these needs and the most important for smart campuses is how to improve student learning in a sustainable way [4].

The increasing ubiquity of IoT and its interconnections in higher education campuses creates a complex digital environ- ment where cyberattacks and vulnerabilities in one area can have a cascading effect on multiple areas and the consequences can go beyond the usual data loss, financial impact, and rep- utational damage risks. Our smart campus security approach enables higher education institutes to implement an integrated cyber risk management framework that provides structure to identify threats, vulnerabilities, and implement cyber solutions to manage risks. As part of our smart campus strategy with universities and colleges, we promote a collaborative focus to help campuses establish effective controls around sensitive assets and reduce risk while fostering efficiency. It's gener- ally prohibitive for IoT devices with restricted computation, memory, radio bandwidth, and battery resource to execute computational-intensive and latency-sensitive security tasks especially under heavy data streams [7]. Several methods are available to count the number of people in an indoor space, such as WiFi-based approach [12], camera image processing, thermal imaging, ultrasound imaging, and beam counters affixed to entryways [11]. Each method has its own pros and cons across various dimensions such as cost, power, communications, ease of deployment and operations, privacy, and accuracy. For example, using WiFi data and cameras endanger privacy, thermal and ultrasound imaging have low accuracy, and camera-based image processing is computationally expensive. Furthermore, a method that works well in a small room may not be as effective in a larger lecture theatre and cost/accuracy may also be impacted by the layout of the room, the number/width of doorways, and the availability of power and wired/wireless network connections. Hence understanding both benefits and challenges of various approaches in order to adopt the most suitable methods for the nature of the room is important for the real deployment of classroom occupancy monitoring system

## 2 LITERATURE SURVEY

This paper describes our experiences in adopting IoT to measure and AI to predict the attendance of lectures in courses at our University campus, and to use these to optimize the usage of lecture rooms. Our specific contributions are :

The main purpose of this paper is an original proposal of an application, platform and data independent model for creating the integrated information system that will improve educational and other processes at University level. The Number of students are increasing it causes necessity for more precise and efficient approaches of students' authentication and monitoring. Here the pro- posed method for students' identification is by using smart cards by considering affordability and efficiency. Institution/faculty ID, user ID, pass-word, grades etc can be stored the chip on a smart card for multiple identification factors of a specific

user. CMS is also used for providing environment, general information about the institution (university/faculties), public news and announcements (on the university/faculty level) etc. Moreover, every user needs to provide a valid authentication data in order to access e learning. In order to keep safe we need to protect content, services and personal data from outside intruders and also these systems carry a risk of privacy violation from inside staff (administers and educational staff). One of the solutions can be applying researches from Hippocratic Database (HDB) areas [1].

It is difficult to control for management to track everything happened when the campuses are spread over

fairly large area. Here author focuses on the need of adopting IoT technology in campus using secured smart system for campus academics. In order to give humans more comfort in this system sensors are enabled and network devices work continuously and collaboratively. The smart classroom collects information, stores it as digitalized data in a memory of e-campus platform. This platform is created for captivating learning by means of smart classroom surroundings and security for encamps. The paper mainly considers the security aspects leaving behind many other important features [5].

1)For prediction of classroom attendance we develop machine-learning models by using three algorithms namely multiple regression, random forest, and support vector regression (SVR).Here we employ quantile regression technique, allowing asymmetric penalties for under-prediction and overprediction of attendance. This models can predict attendance in advance with a root- mean-square error (RMSE) of less than 0.16. Our attendance dataset will be openly available to the research community.

2)A smart campus uses networked technologies such as IoT, cloud computing, data analysis and AI to facilitate collaboration, use resources more efficiently, enhance security, save money, and make campus more connected and enjoyable. All these technologies are pillar of the smart campus designed to identify or meet the needs of its members. For this, the campus must maintain a sustainable environment with nature. Each of the components enters into action and focuses on a specific task To achieve this goal. The IoT, through systems of sensors and actuators interacts with the members of the campus without the need of a person or a computer

3)Identify the time the student spends in class is possible since the time a student spends on campus that does not necessarily imply that he is receiving classes. Identifying these variables is possible thanks to facial recognition systems or tag readings of student identification.

4)There are also traditional computer systems that store information in transaction databases. Such as, there is the LMS, which serves as a repository and main assistant in the development of activities and review of resources. The LMS is also very helpful in identifying variables re- lated to the autonomous work that each student performs

5)Here we develop an optimization algorithm for allocating classes to rooms based on predicted attendance rather than static enrolments, and show potential saving of over 10% in room costs.

## 3. SMART CAMPUS INFRASTRUCTURE

One of the innovations that will be developed in UPY is Smart Campus. Infrastructure is the most important aspect that being considered in developing smart campus. It is the main key of the campus smart program. The information related to the campus can be accessed from mobile phone or others gadgets, If the infrastructure has been well developed. There are Some parameters that being adapted from smart city for the smart campus are:

a. Smart education consists of: eLearning, Personalized Learning, Virtual Classroom.
b. Smart parking, a parking system that provides the information about available parking lot and the information that the parking lot has been full.
c. Smart room, system that provides information related to the classroom that is being used vacant.
d. Smart Library access, students can check out books automatically.

## 4. PROPOSED WORK

### 4.1 Existing Condition

The existing condition has not covered a smart campus. Between spaces, there is no connection that provides information regarding the total amount of present students or vacant classrooms. The system of parking lot is still manual, no information regarding the available parking lot.

### 4.2 Proposed Method

Sample paragraph, the entire document should be in Cambria font. Type 3 fonts must not be used. Other font types may be used if needed for special purposes. The entire document should be in Cambria font. Type 3 fonts must not be used. Other font types may be used if needed for special purposes.

### 4.3 Prediction of Classroom Attendance:

The pattern of falling attending might ends up in under-utilization of lecture rooms. so as to boost the utilization, universities might want to dynamically re-allocate lecture {rooms school} prior to supported attending – if attending is far not up to the quantity of enrolments of a category then a smaller room might probably be allotted thereto, so saving

value. we'd wish to develop a face recognition system that may be used inside a category as Associate in Nursing attending system to mark presence of lecturers and students. we have a tendency to note that whereas our system is often helpful to get time period information, area planning relies on the anticipated attending from historical information and will be determined many weeks before actual categories. This entails a reasonably correct prediction of attending for all categories operated on field. it's vital to notice that underestimated prediction might result in category overflow (i.e., important discomfort for students), and overestimation would result in wasted capability and so not achieving best value reductions. for several college districts, pursuit the quantity of your time students pay at school is important for designing and funding. to boost security and increase attending rates, the Spring territorial division in Houston, American state has distributed RFID enabled ID badges to thirteen,500 of its thirty-six,000 students since Dec 2008. The technology replaces the manual attending pursuit that college antecedental had to perform for every category session and for every student. With RFID- enabled plastic ID card personalization and integration of digital ID camera image identification solutions, faculties will move from a written to an automatic approach. good access ID card solutions deliver a brand-new level of answerableness and social control which will facilitate cut back the quantity of tardiest. This wise investment of the college budget directly offers students additional in-class time, whereas saving body time and cash.

Contour Library Access and Inventory Management field libraries, printers and replica rooms ought to stay exclusive to students. With RFID ID card readers at the door, students getting into a library or copy area will use their student ID card to achieve access to the power. Students will then verify books mechanically, with all data recorded and loaded into the scholar info, eliminating the necessity for library checkout cards whereas additionally providing time period data on the standing of delinquent books. faculties will use this data to lock students out of privileges till they come the books or deduct the book value from the student's debit fund. Electronic Payment for Food, Beverages and Bookstores While on field, students not solely fill their minds, however conjointly their stomachs. Students will load their multi-use ID cards with meal credits, permitting the utilization of ID cards sort of a open-end credit, at marketing machines and in feeding halls. ID cards will embrace a pre-paid defrayment account that students will use to form purchases at student stores and food service locations, yet as in school events. oldsters and students will access accounts on-line to look at transactions, add funds and establish automatic allowances. the advantages extend well on the far side food and drink purchases. Students may use their sensible ID cards to get books, purchase temporary parking on field and resolve parking citations.

### 4.4 Smart Card Printing Technologies

All the access card technologies delineated during this paper, as well as barcode, RFID, tape, smart card, graphics and photograph safety features, is written on demand, were and whenever. change from pre-printed access cards, temporary ID cards and passes to on-demand ID card printing systems provides a right away profit by removing the concerns associated with managing and securing expensive materials.

A barcode is that the most generally used information storage format for security printing applications, and RFID is that the quickest growing one. Common linear barcodes simply meet most desires for secret writing traveller and worker ID cards. Two-dimensional (2-D) barcodes will cypher considerably additional text than linear codes and store digitized photos, graphics, fingerprint files and alternative biometric information. revolving credit RFID ID card printing solutions offer multiple secret writing and security technologies, as well as ID card holograms and magnetic stripes.

### 4.5 ID Card Printers

Digital plastic ID card printers provide the flexibility to form custom ID cards tailored to any application, at the purpose of supply. System directors will invalidate lost or taken cards and issue replacements at once. in contrast to ancient ID card systems that lacked customization and that needed time over- whelming photograph process, cutting and laminating, today's digital print-on-demand (POD) ID card systems modify utterly machine-driven production of extremely tailor-made, secure ID cards. Magnetic stripe ID cards carry additional information than normal barcodes however need media that prices additional. Card issuers will stock blank tape ID cards and cypher them on demand pro re nata. RFID enabled sensible cards will hold the foremost information of any medium, up to a hundred times over a tape ID card, and infrequently embrace a processor chip that allows multiple applications. Multifunction sensible ID cards provide many simple and value effective ways in which for campuses to lift the amount of protection and quality of education. Security potency and value Reduction

Just imagine: one ID card for everything! sensible cards will function the muse for a large vary of ID card security applications, providing opportunities to contour security and body tasks across a whole field. the method starts throughout student admission or once faculty/staff receive their new rent orientation. it's here that the college problems a sturdy, sensible ID card embedded with RFID technology.

### 4.6 System Design

In Fig 1 we have described that the system design of smart campus below limited on (1) Smart education that consists on: eLearning, Virtual classroom, (2) Smart parking, a parking system that provides information related to the available parking lot, and also provides information that parking lot is full or not. There are 3 parking lot. (3) Smart room: system that provides information related to the vacant room. (4) Smart attendance prediction: Information related attendance

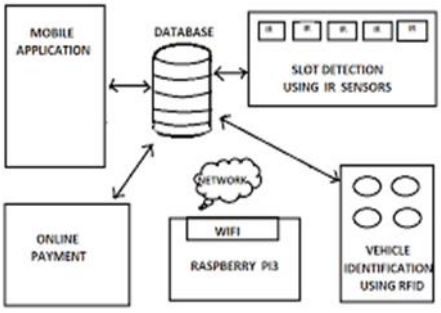



Figure 1. General scheme of system design.

a) Smart education: -

Through the e-Learning system learning process will be conducted, which will make it possible for students to be able to join learning from anywhere, anytime with the internet connection. Furthermore, virtual class feature will help students to solve problem in learning and can be used for practicum lessons.

b) Smart parking: -

This system will help in provide information related to the available parking lot, and also when the parking lot is full or not. If There are 3 parking lot. Sensor will put in the parking lot to scan the vehicle which will enter the parking lot. And the total amount of the vehicles which are in the parking lot will revealed on the board. Then the information will be provided to the users which is processed by the system about the available parking lot. The scheme is as described in Figure 2 below.

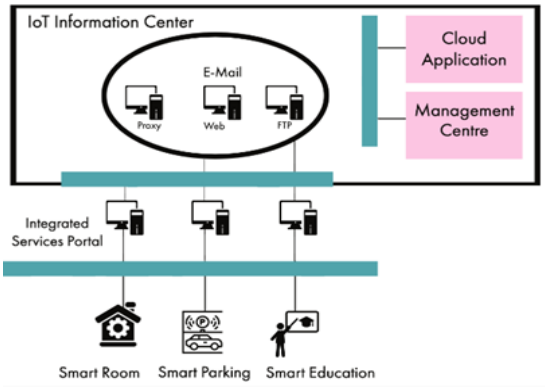


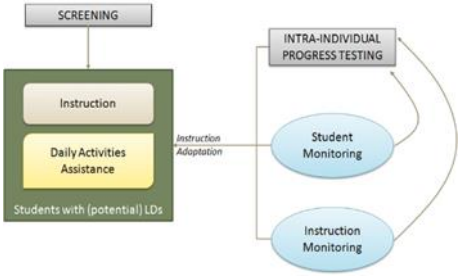

Fig 2. Scheme of Smart Parking

c) Smart Automation:

It consists of controlling, when we will turn ON or OFF the light and fans, here we are using PIR (passive infrared sensors) which is used for motion detection, PIR sensors can detect motion its range of 120 degrees and up to 7 meters. The sensors give logical high as its output When motion is detected and the fans and lights are turned on, once there is no motion logical zero output is obtained, fans and lights are turned OFF.

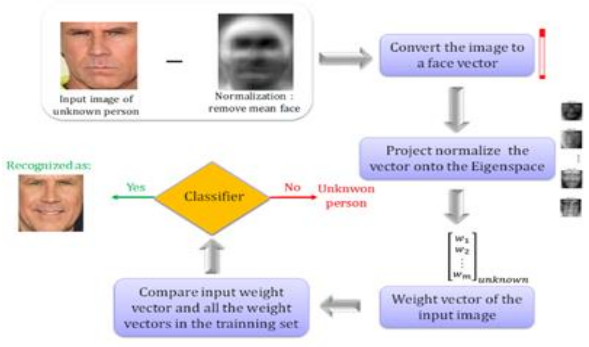
d) Smart attendance prediction:

Smart Identification is a part of the AI powered face recognition solution. By using Computer Vision and Machine Learning algorithms the attendance of the employees or students of the organization can be mark.

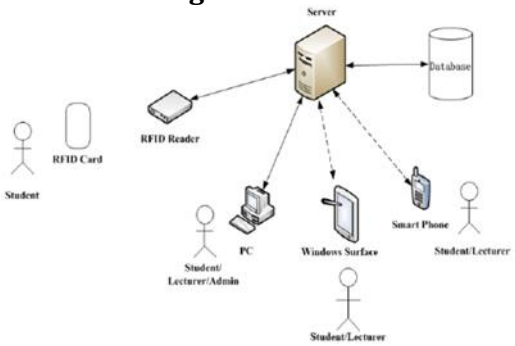



The system will work on face recognition where each student in the class will photographed and their details will be stored in a server. Then teacher can record the attendance by just clicking some pictures of the classroom. In this way, The system will recognize the faces and verify the presence or absence of each student.

### 4.7 Smart Access Cards What They Are, How They Work



### 4.7 The Intelligence of Embedded RFID




In education, business, and government applications The term "smart access cards" encompasses a good vary of technologies. Proximity cards primarily based solutions depend on embedded high-frequency (HF) RFID technology is the com- mon feature. mag tape technology is employed by the foremost contact kind ID cards, that during this context needs students to manually swipe their ID cards through AN ID card reader, fastness down student access and making bottlenecks within the flow of individuals getting into and exiting. Education access ID card applications will take pleasure in UHF info a pair of RFID's ID card long-read vary and quick identification capabilities. Colleges will eliminate single-file, one-at-a-time ID card reads. Mistreatment info a pair of RFID ID cards, and card readers, teams of scholars will move through the massive, open entry and exit points, instead of having to submit to slender doorways, gates or turnstiles Indian file

## 5. CONCLUSIONS

In any field IoT technology can be developed by Development of smart campus is one of this. Smart campus will be the emerging and challenging concept for the technology to make it in reality. The scheme for implementation of smart campus limited on smart education, smart parking and smart room has been created by the design of the system. In this paper we have described the study of the concept that will be helpful in building the smart campus limited on smart education, smart parking and smart room. In university campus these kinds of Systems are required as the area is very large and number of rooms are also large. forget to switch off the appliances when in no use and in this case, human can make mistakes, these systems will useful in order to increase the power efficiency. As a future of artificial intelligence, the system can be viewed. And it will be a powerful and dependable system. The goal of energy saving will help in achieving the efficient use of energy resources will be fulfil by it. We get a better option of Wi-Fi enabled processor instead of Bluetooth and ZigBee for communication by the study of various papers and also to process the sensor data. Here, it will become possible to make power efficient, cost efficient, fully automated system due to survey. And it will take a step forward towards the goal of increasing the technological advancement and Smart City.

## 6. REFERENCES

[1] Madhura Rao, Neetha, Rao Swathi, Sneha M, Shannon Kotian, Nagaraja Rao. "An IOT Based Secured Smart Campus system" International Journal of Scientific & Engineering Research Volume 9, Issue 4, April-2018 146 ISSN 2229-5518
[2] Kirkup, G.; Kirkwood, A. Information and communications technologies (ICT) in higher education teaching—A tale of gradualism rather than revolotion. Learn. Media Technol. 2005, 30, 185–199. [Google Scholar] [CrossRef]
[3] Popoola, S.I.; Atayero, A.A.; Badejo, J.A.; John, T.M.; Odukoya, J.A.; Omole, D.O. Learning analytics for smart campus: Data on academic performances of engineering undergraduates in Nigerian private university. Data Br. 2018, 17, 76–94. [Google Scholar] [CrossRef] [PubMed]
[4] Abdrabbah, S.B.; Ayachi, R.; Amor, N. Ben Social Activities Recommendation System for Students in Smart Campus. Smart Innov. Syst. Technol. 2015, 76, 461–470. [Google Scholar]
[5] Md Nahid Sultan, Emran Ali, Md Arshad Ali, Md Nadim, Md Ahsan Habib. "Smart Campus Using IoT with BangladeshnPerspective: A Possibility and Limitation" International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887 Volume 5 Issue VIII, August 2017
[6] Liu, M.; Li, L. The Construction of Smart Campus in Universities and the Practical Innovation of Student Work. In Proceedings of the International Conference on Information.
[7] Management Science, Chengdu, China, 24–26 August 2018. [Google Scholar] [CrossRef]
[8]J. Zhou, Z. Cao, X. Dong, and A. V. Vasilakos, "Security and privacy for cloud-based IoT: Challenges," IEEE Commun. Magazine, vol. 55, no. 1, pp. 26–33, Jan. 2017.
[8] Bellagente, P.; Ferrari, P.; Flammini, A.; Rinaldi, S. Adopting IoT framework for Energy Management of Smart Building: A real test-case. In Proceedings of the IEEE 1st International Forum on Research and Technologies for Society and Industry, Turin, Italy, 18 September 2015. [Google Scholar]
[9] Hannan, A.; Arshad, S.; Azam, M.A.; Loo, J.; Ahmed, S.H.; Majeed, M.F.; Shah, S.C. Disaster management system aided by named data network of things: Architecture, design, and analysis. Sensors 2018, 18, 2431. [Google Scholar] [CrossRef]
[10] Villegas-Ch, W.; Luján-Mora, S. Análisis de las herramientas de minería de datos para la mejora del E-learning en Plataformas LMS. In TIC Actualizadas para una Nueva Docencia Universitaria; McGraw-Hill: Madrid, Spain, 2016; pp. 761–774. ISBN 9788448612658. [Google Scholar]
[11]T. Sutjarittham et al., "Data-Driven Monitoring and Optimization of Classroom Usage in a Smart Campus," in Proc. ACM/IEEE IPSN, Porto, Portugal, 2018.
[12] I. P. Mohottige et al., "Estimating Room Occupancy in a Smart Campus Using WiFi Soft Sensors," in Proc. IEEE LCN, Chicago, USA, October 2018