Engineering and Technology Journal e-ISSN: 2456-3358
Volume 07 Issue 07 July-2022, Page No.-1383-1391
DOI: 10.47191/etj/v7i7.09, I.F. – 6.484

Hostel Management System Using Image Recognition

Yaw A. Mensah[1], Odekunle Olasubomi[2], Ogbonnaya-Orji Chinatu-N[3], Olaobaju Judah[4], Joshua, Jonah[5]
[1,2,3,4,5] Department of Software Engineering, School of Computing and Engineering Sciences, Babcock University, Ogun State, Ilishan-Remo 121103, Nigeria

ABSTRACT: Hostel management system is an advanced system that makes organizing the affairs of the hostel quicker, simpler, and more efficient. The normal procedure of allocating hostels at Babcock University involves selecting the preferred hostel online via the UMIS (University management information system) portal while the procedure for selecting rooms involves students showing up physically in school with their evidence of school fees payment. Due to these, it is undeniable that it is extremely time-consuming with an unreliable method of storing relevant documents and requires a lot of human resources. This proposed hostel management system is a web application developed using C# programming language. This application includes a module that finds missing items, a module for hostel registration and also a module for giving feedback. In conclusion the model has made managing the affairs of the hostel easy.

KEYWORDS: Cloudinary, web development, hostel management system (HMS), item management, item detection, hostel registration, and feedback.

1. INTRODUCTION

It is undeniable that most tertiary institution in Nigeria allocates rooms and hostels to students manually and using this method of allocation becomes stressful to students and hall admins. The normal procedure of allocating hostels at Babcock University involves selecting the preferred hostel online via the UMIS (University management information system) portal while the procedure for selecting rooms involves students showing up physically in school with their evidence of school fees payment. The advancement of technology in this 21st century doesn't make it good enough as it is extremely time-consuming with an unreliable method of storing relevant documents and requires a lot of human resources.

The purposed hostel allocation and management system is a relief to the school management, its students, and its staff. It was developed to;

1. Allocate rooms to students online at the discretion of the student.
2. Record student items via photo in the event of theft.

A hostel allocation system is a system that handles, stores, and retrieves students' data. This system can be used to retrieve students reports, and allocate rooms for students. Hostel management is a necessity in every tertiary institution because it provides a platform for students to registers for their accommodation.

Accommodation is one of the most important needs for students in universities. Accommodations in tertiary institutions are an affordable way for a student to live in the School environment which makes it easy for students to arrive early for lectures and socialize with their peers.[1]

The item management system is a necessity in every hostel because this system helps to reduce theft in the hostel. The system requires students to upload unique information such as the serial number and an image of the item they wish to bring to school, this makes it easier for the securities to find stolen items as it helps them filter their search for a missing item.

2. LITERATURE REVIEW

This section briefly gives an insight to the radio frequency identification mode of operation and how effective it is. Section 2.2 gives a detail summary of closely related works and the research gaps that exist in each.

2.1 Overview of hostel management systems in Nigeria

Based on research done, the current hostel management systems in use in various popular universities here in Nigeria do not differ too much. They are majorly based on selecting hostels based on price and availability. This segment contains information gathered on five Nigerian universities, namely;
1.Babcock University, Ilishan-Remo, Ogun.

We shall begin this segment by exploring the existing hostel management system of Babcock University.

2.2.1 Babcock University hostel management system

The Babcock University hostel management system is primarily based on the University Management Information System, UMIS which Babcock University uses as its online platform for semester registration, result checking, online

examination, hostel registration, and much more. To select a hall of residence for a new semester at Babcock University, you log on to umis.babcock.edu.ng, put in your students' credentials, and then select login. Student registration begins by selecting a meal type, worship center, and then hall of residence. For this segment, we shall make use of a male undergraduate student of Babcock University as a case study to adequately illustrate the registration process. There are seven available halls of residence for the male students namely; Gideon Troopers Hall, Winslow Hall, Bethel Splendor

Hall, Samuel Akande Hall, Nelson Mandela Hall, Neil Wilson Hall, and Welch Hall. These halls are classified into two classes based on cost and comfort, namely; Premium halls and Classic halls. The classic halls are the more expensive and comfortable halls while the premium halls are less expensive, and therefore less comfortable than the classic halls. To register in a certain hall, you select your preferred hall of residence under the "Hall of residence" section during registration. If your preferred hall of residence is fully booked, an error message appears upon selection of that hall. Once your registration is complete and financial approval has been given, a receipt would be generated for the now-registered student and he is to print that receipt and present it upon the day of resumption. On arrival on the school campus, the receipt is presented to the porter of the hall of residence and that is where the physical registration begins. The physical registration includes; retrieving your file from your previous hall of residence (in the event in which a student switches halls), and then you are allocated a room by the hall administrator. Figure 2.1 shows the screenshot of the page for selecting the hall of residence on the Babcock University student portal.

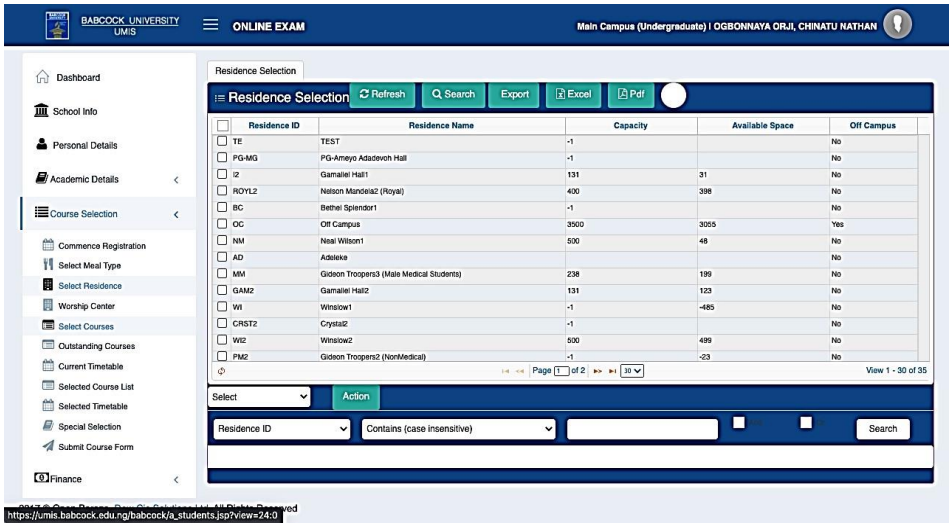

Figure 2.1 Babcock university online portal (Babcock University, 2021).

2.3 Related works

[2] Published a project on a hostel management system that was aimed at being developed to keep records and display information about or in a hostel. In this proposed system, the warden is the administrator of the system. The system is also able to notify the user of the available and unavailable rooms in the hostel as well as the number of people in a particular room. This system is also intended to have a feature to provide information on the students that have paid and those that are still yet to pay. Through this system, the administrator can view a comprehensive summary of the students that have paid and those that are yet to pay. The proposed system is developed using PHP and MySQL servers.

[3] Published a study on the Design and Implementation of Hostel Management System (HOMASY): LASU as Case Study. Through the use of PHP computer programming language and MySQL database application, a hostel management system was built to give a computerized procedure that is stress-free, dependable, and rapid to both students and employees in charge of the registration and hostel management operations. HTML was used at the front-end of this system which directly interacts with the user and MySQL at the back-end to streamline the data storage processes. The current method of filing being practiced in Lagos State University (LASU) involves has been appraised for efficiency, economy, and time management. E-registration in Lagos State University (LASU) is aimed at reducing paperwork and redundancy, resulting in increased productivity and a reduction in the cost of printing and purchasing registration materials on an annual basis, aiding the school in the management of data and the integration of student profiles, improving student record retrieval turnaround time, and provide statistics to the school management on the urgent needs of the students.

[4] Published a study titled "Hostel in Out Management and Monitoring System Using RFID, Face and Thumb Recognition" in the International Journal of Innovative Research in Science, Engineering and Technology. In this proposed system, the system is intended to automatically monitor the entry and exit of every student from the hostel

and send an automated SMS to the parent of the student for security purposes. This system requires that every student register their fingerprint database, unique RFID card number, and photograph with their parent's mobile phone number. The system depends on the ARM 11 microcontroller, fingerprint scanner, camera, GSM module, RFID reader, and passive RFID card. The system is aimed at improving the security of students who reside in hostels and alerting their parents on their entry and exit time.

[5] Published an article on Hostel Management System in the International Journal of Trend in Scientific Research and Development (IJTSRD). The authors of this article indicate that this project is intended to limit human involvement and simplify the entire hostel room allocation process for both the student and the hostel administrator. The proposed web application is "naturally select the student from the waiting list and mess billing, out pass generation, complaint registration and so forth.". The system shall advise and inform guardians on the whereabouts of their wards with regards to the hostel and their parents are made aware of their curriculum in just "one touch". The system is an online site that is developed using HTML and CSS for the front-end and Java and PHP for the backend.

[6] Published an article on a Hostel Automation System in the International Journal of Computer Science and Mobile Computing. The integrated hostel automation system is being proposed to allocate rooms and maintain the changes of rooms as these are currently very stressful and time-consuming tasks. In the proposed system, the details of the students who are staying in the university hostels are stored on the database of the system. The development process of this system is done with the .net technology as a development framework and SQL Server as the backend database server.

[7] published a study on Hostel Management systems using Ensemble Learning in the International Research Journal of Engineering and Technology (IRJET), Volume 07, Issue 03 March 2020. The proposed system is aimed at automating the administrative processes involved in hostel management and reducing the stress involved in student record keeping or retrieval. The system possesses a feature that calculates bills and issues updates to students. The system is also able to generate disciplinary letters to students who are not following the hostel rules and regulations. The system uses a "monocentral database to address the complexities of management of the student hostels and all admin functions". The owners of this study describe the system as a "user-friendly technology kit specially designed to simplify, organize and take care of all hostel management processes.". The algorithms for this proposed system were developed using Visual Basic and the database was developed using Microsoft Access.

[8] published an article on Hostel Management System Using Service Now in the European Journal of Molecular and Clinical Medicine. The proposed system is more efficient and overcomes the shortcomings of existing hotel management techniques. It also has a few advantages while the system is generating, such as high security, avoiding data redundancy, data consistency, easy handling, stored records, data updating, less laborious work, and reduced human error. The proposed system is a portal that would allow students to register and book rooms in the hostels as well as provide updates on any event or relevant information to students. By making use of the Service Now technology administrative processes are automated thereby making hostel management easier.

[9] Published an article on Implementation of Blockchain-based technique to a Hostel-Room Booking System: Practical Aspects in the International Journal for Research in Applied Science & Engineering Technology (IJRASET). The proposed system makes use of a blockchain-based technique to create a real-time application for users to book rooms in commercial hostel accommodation. The hostel booking system is implemented with Ethereum cryptocurrency with a smart contract on solidity language. Finding the status of rooms in the hostel would be made easier due to use of the blockchain-based booking.

3. THE DESIGN AND WORKING OF THE HOSTEL MANAGEMENT SYSTEM

The Software process model that is used for this project is the Iterative the hybrid process model was selected because it is a combination of an incremental and iterative process model which makes it easy for us to continuously deliver software that meets the customer needs [10].

This research spotlights how to manage the affairs of the hostel and help curb the theft of items. To archive this, the following methodology was followed to build a hostel management system.

1. Gather analysis on the hostel management system. The researcher interacts with the existing system and has a role-play session to gain an understanding of how various parts of the existing system works. The researcher compared the architecture used in the literature. Also, a critical review of the existing architectural models was done to come up with an adaptive architectural model. The reviewed model was scrutinized for strengths and weaknesses in an attempt to build a more efficient model.
2. Designing a web-based system that manages affairs of the hostel and items. The item management section requires students to upload their item details such as the name of the item, the color, the category, and the serial number.
3. The web application was developed using Hypertext Mark-up Language (HTML), Cascading Style Sheets (CSS), JavaScript, and C#. The client-side was built using Hypertext Mark-up Language (HTML), Cascading

Style Sheets (CSS), and JavaScript. The server-side was built using C#.

4. The database used to store students' records was designed using the SQL server database.
5. The camera footage that requires insights is uploaded to Cloudinary.
6. Develop an image recognition system that detects objects in video and shows a timestamp of the detected items in the video. The system uses an Azure video analyzer to give detailed insights from footage from the camera.

Figure 3.1 presents the architecture of the hostel management system, showing all its components and how they are interrelated. The proposed model is designed as a hybrid architecture that comprises hardware (camera), software (frontend, backend, SQL Server an,d cloudinary).

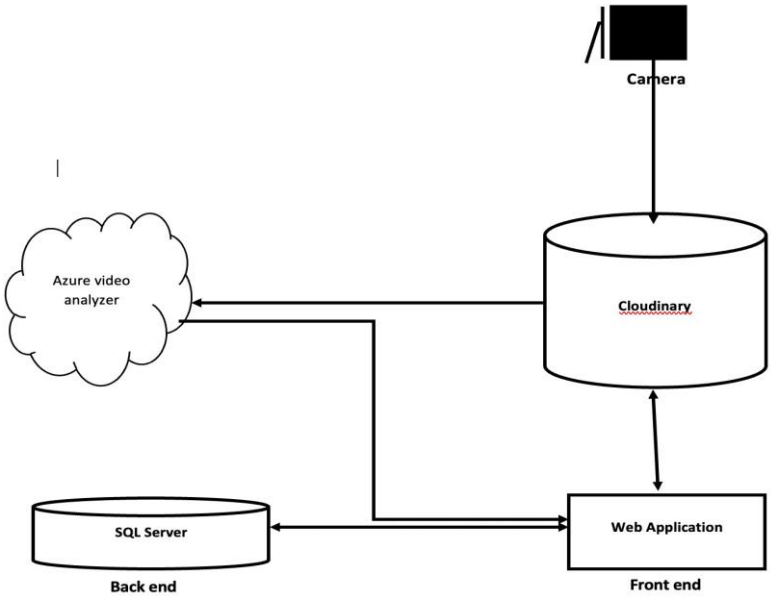

Figure 3.1 Hostel Management System

1. HARDWARE: A camera records the activities in the hall which is uploaded to Cloudinary.
2. CLOUDINARY: Cloudinary stores and backup the video clips that need to be analyzed.
3. THE BACKEND: The web application has an API to call Cloudinary services and receive the JSON string output from Cloudinary and use JSON converter to add each field to a list. This list would be evaluated with a condition statement to find only the fields requested by the user i.e., Things that are specific to the object.
4. THE FRONTEND: The user sees the analysis given by the item analyzer.

3.1.1 Hostel management system use case

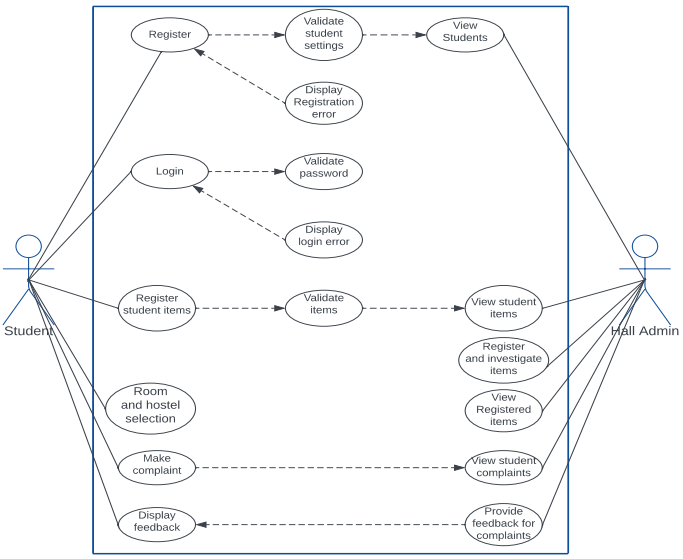

Figure 3.2 Hostel Management System Use Case Diagram

Figure 3.2 shows the use case diagram and it consist of a student which is a primary actor, a hall admin which is a secondary actor. These actors are able to perform the following actions:

Student:

1. Register details on the portal: This requires students to fill in his details after registration is complete the student is greeted with a registration success or failure error.
2. Logins to the portal: This requires students provide their valid credentials so as to gain access to the website.
3. Register item: Students are required to register only allowed items.
4. Hostel and room selection: Student is required to select the hostel of his/her choice. Immediately the student has selected a room the student is required to pick a room of his or her choice.
5. Make complaints: Students can make complaint to the hall admin whenever they notice anything wrong with their room.
6. Receives feedback: Students receive feedback regarding the complaint they made.

Hall Admin:

1. Manage established information system: This allows the hall admin to be able to query and produce reports on its students.
2. Investigate missing items: This enables the hall admin to generate insights concerning missing items.
3. Check and response to complaints: The hall admin being an admin of the system responds the complaints made by students.

3.2 How the hostel management system works.

This part will describe briefly how to install and configure this web application on a solitary computer system, followed by how to run it. This section discusses the installation process for the average user who wants to develop or utilize the web application on a solitary PC.

The proposed system must meet certain hardware and software requirements in order to operate on a local server, which makes it available to anybody who clones the project straight from our GitHub account and opens it using Visual Studio.

Home page: This is the first page that a user view. It is an index page that is accessed by every user that views the hostel management system. This article summarizes the system's capabilities. The system area allows registered users to log in and unregistered people to create an account. It also has a quick log-in mechanism at the bottom of the page.

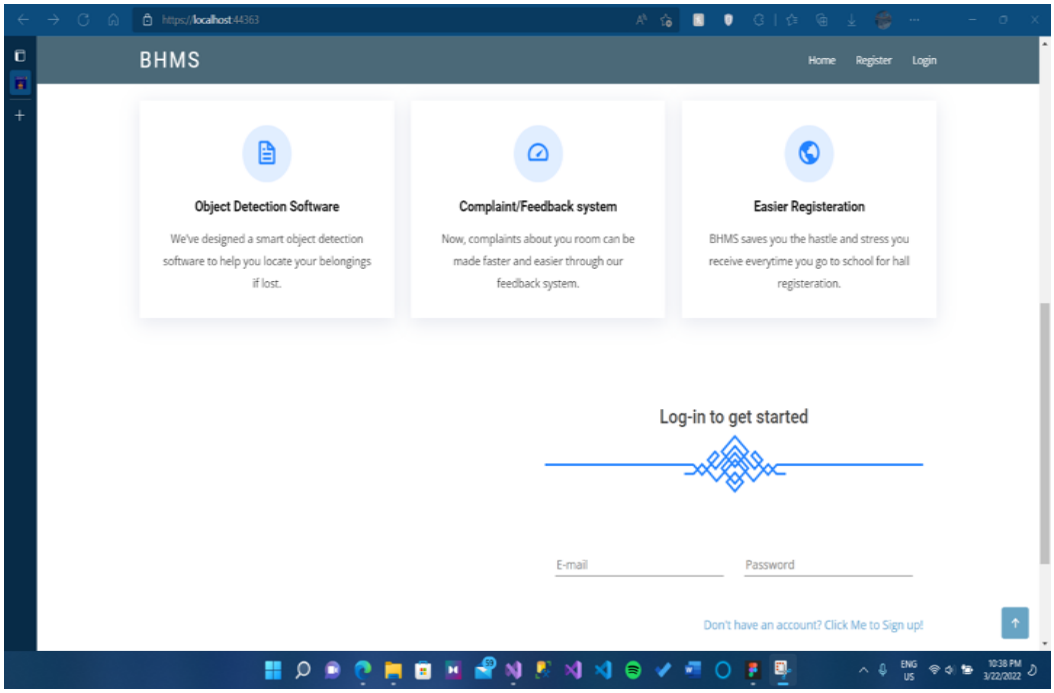

Figure 3.3 Home page

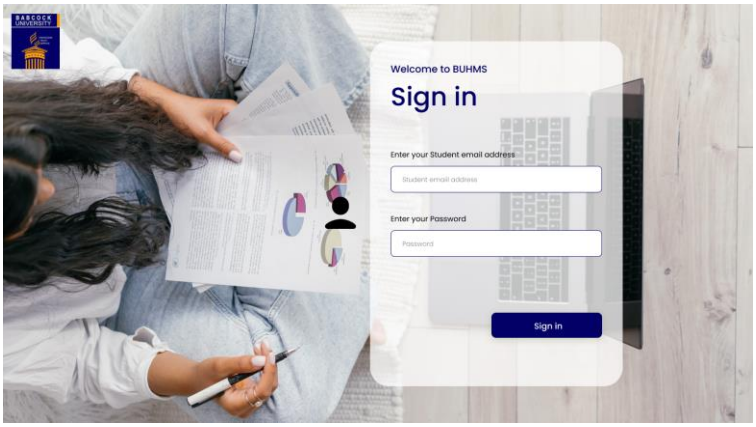

Figure 3.4 Sign in Page

Sign-in page: Users can sign into the system with their emails and password, stored on a local database. Adequate authentication is provided for the fields.

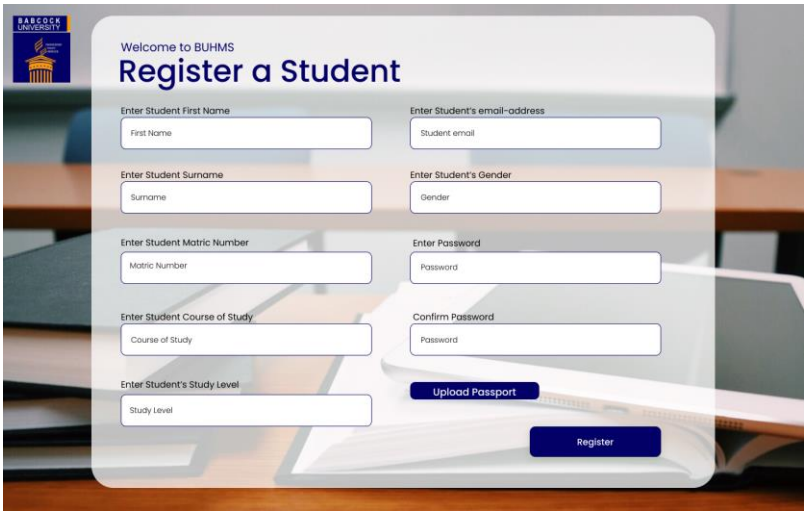

Figure 3.5 Registration page

Registration page: Students can register their details into the system with this page. Each field has a form of validation, e.g., student matric number must not be less or greater than seven character

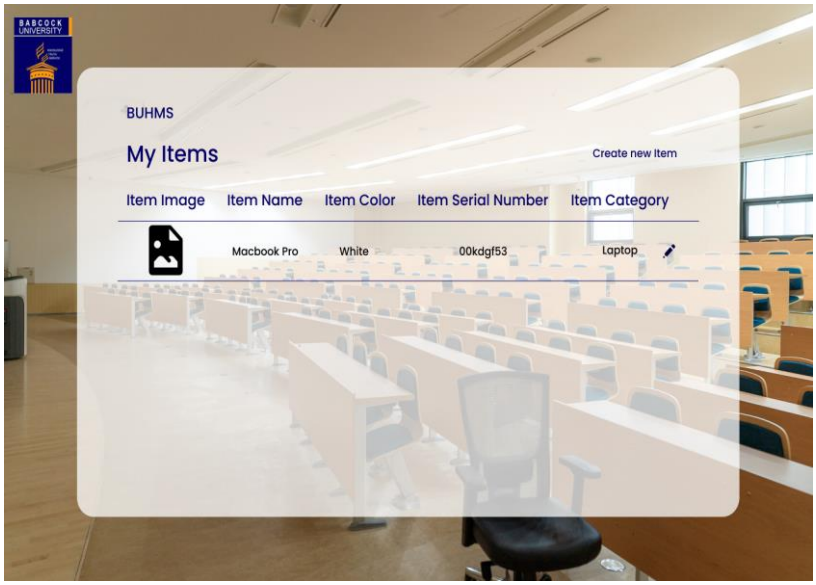

Figure 3.6 Registered Items Page

Item manager feature: This is done via the usage of an item index page, which enables logged-in users to see just the items they've registered. If a user does not already have an item registered, he or she will be requested to do so on the create item page. This page will need the following information: the item's name, its color, its serial number, a photograph of the item, and its category. The item category is a drop-down list of all eligible item categories. These categories will be created by the chief hall administrator and the hall administrator. When a learner recognizes that he or she has entered an incorrect thing, the item might be changed or even deleted.

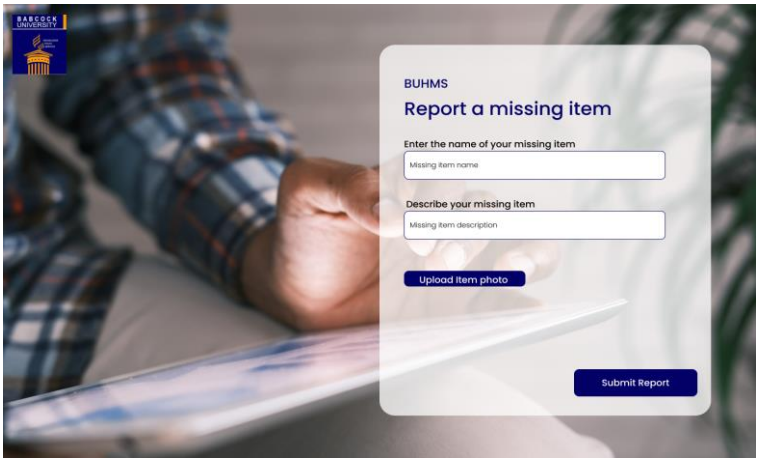

Figure 3.7 Report Missing item

Reporting Missing Items: A student can fill the report form to report a missing item. The result of this form is viewed only by the hall admin.

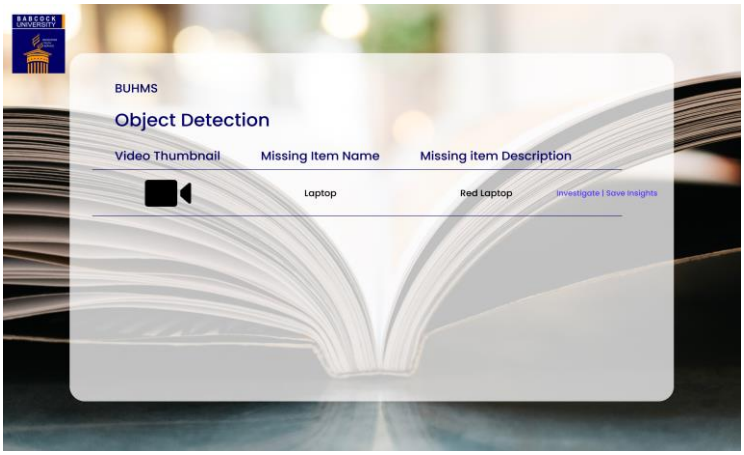

Figure 3.8 Missing items page

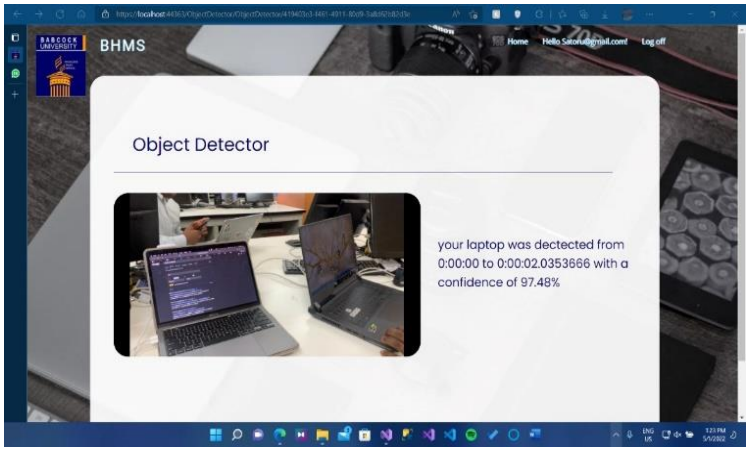

Figure 3.9 missing item insight.

Object detection feature: shows the description of the item, and CCTV footage from the day the item was stolen. The outcome of the video upload creation page will appear in the object detection page's index. The option of creating new insights from CCTV video or viewing already generated insights will be displayed. The outcome of view insight will provide the time period during which the item was spotted, as well as the degree of confidence in the finding. The degree of confidence is calculated using:

$$b_1 \pm t_{1-\frac{\alpha}{2},n-2} s_{b_1}$$

Where b_1 is the calculated slope and S_{b_1} is the estimated standard deviation of b_1, or

$$S_{b_1} = \frac{s}{\sqrt{\sum_{i=1}^{n}(X_1 - X)^2}}$$

When an object is not located in the CCTV video, the result is "item could not be located."

Figure 3.10 Hostel Registration page

Hostel registration feature: This role entails the chief hall administrator creating hostels from the hall index, as well as creating, amending, and deleting pages. The hall index page lists all available halls and includes a picture of the hall, its name, category, capacity, available spaces inside the hall, the number of blocks, and the number of rooms per block. The "create" page prompts the chief hall administrator to input the hall's name, the hall administrator's name, assign the hall a gender, upload a photo of the hall, specify the hall's category, specify the hall's total capacity, and specify the hall's block count. Students can select a room from the hostel registration index, create, delete, and edit pages. The hostel registration index page displays hostels to students based on their gender, so as to prevent a student from registering for the wrong hostel. A student must choose a room from the hostel registration create page. This page asks the student to choose a room and choose a roommate, which can be done if they want.

4 CONCLUSION

In conclusion, we now have the ability to do virtually everything from our computers. The Hostel Management system (HMS) is an emerging technology and a computer system that has revolutionized the world thereby making tasks that seem difficult easy by the use of the Internet. Students no longer need to overcrowd supervisors' offices because of project topics or research suggestions as this has been solved by this web application. Students can now at their comfort proceed with their project work online. This is a welcoming development.

This project work has emphasized the capabilities and reliabilities of a computer system i.e. Its accuracy, speed, and timeliness of the information that it encompasses.

The most important lesson from this project work is that information is essential and its availability cannot be washed away and the ability to move such information through established networks such as the Internet is the key benefit of the online student's project supervision.

Throughout the main text, please follow these prescribed settings: 1) the font is mostly Times New Roman; 2) almost all the words are typed in 10 points; 3) each line throughout the paper is single-spaced; 4) in most cases, 10 pts spacing shall be left above and below any heading, title, caption, formula equation, figure and table.

As mentioned in the abstract section, it will be rather easy to follow these rules as long as you just replace the "content" here without modifying the "form".

REFERENCES

1. Beech, M. (2010). Accommodations Assisting Students with Disabilities.
2. Baffoe, E. A. (2015). *Hostel Management System*.
3. O.Shoewu, S.A.Braimah, & O.Duduyemi. (2016, November). *Design and Implementation of Hostel Management System (HOMASY): LASU as Case*

Study. Retrieved from Research Gate: https://www.researchgate.net/publication/326493698_Design_and_Implementation_of_Hostel_Management_System_HOMASY_LASU_as_Case_Study.

4. Sneha, S., & Rajendra , P. (2016). Hostel In Out Management and Monitoring System Using RFID, Face and Thumb Recognition. *International Journal of Innovative Research in Science, Engineering and Technology*, 4978-4984.
5. Ritesh, K. B., Aman, J. K., Beesu, V. M., Utkarsh, A., Dr. Rajiasimha, A. M., & Shilpa, D. (2018). Hostel Management System. International Journal of Trend in Scientific Research and Development, 856-862.
6. A.Aswar, A.Ganesan, V.Kavitha, D., & V.Karthicksabri. (2019). Hostel Automation System. *International Journal of Computer Science and Mobile Computing*, 161-166.
7. Kiran, R., K.Md.Mois, & P.Ganesh, R. (2020). Hostel Management System using Ensemble Learning. *International Research Journal of Engineering and Technology*, 1146-1148.
8. Ashesh, K., & AppaRao, D. .. (2020). Hostel Management System Using Service Now. *European Journal of Molecular & Clinical Medicine*, 1078-1084.
9. Verma, M. (2021). Implementation of Blockchain-based technique to a Hostel Room Booking System: Practical Aspects. *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, 1-4.
10. Software testing help. (2021, September 27). *SDLC(Software Development Life Cycle) Phases, Process, Models*. Retrieved from Software testing help: https://www.softwaretestinghelp.com/software-development-life-cycle-sdlc/

Oxford Dictionary. (2021). *Hostel*