

iConnect: A Web-Based Digital Platform for Integrated Management of Large-Scale Events

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Abstract

Efficient event management is essential for organizing academic and research exhibitions, ensuring smooth participation and communication. However, the traditional process often involves manual work and delays in communication. The iConnect Event Registration System is developed to provide an easy-to-use platform for students, lecturers and event organizers to register for events, receive real-time updates, and automatically generate participation certificates. This project follows a prototyping methodology with phases including planning, analysis, design, and implementation after prototype validation. The method were chosen due to the approach where a simplified, functional version of a system is built, tested, and refined based on user feedback and widely used in both specialized engineering projects and general software development. Key features of the system include simple and fast registration processes, automatic generation of certificates upon event completion, and instant notifications to keep participants informed of event updates and statuses. The system benefits students and event organizers by reducing manual work, improving communication, and enhancing user experience throughout the event cycle, the success of the project will be evaluated based on user satisfaction, reliability of certificate generation, and effectiveness of notification delivery. In conclusion, the iConnect system aims to offer a practical and scalable solution to support academic event management.

1. Introduction

With the rapid development of society and the general improvement in cultural and educational levels, contemporary university students no longer limit themselves to learning solely through classroom instruction [1]. iConnect: A Web-Based Digital Platform for Integrated Management of Large-Scale Events is a proposed initiative to enhance the management of large-scale events, particularly those involving innovation, research and academic participation.

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Participants from different backgrounds can showcase their research and innovations in front of a panel of experts to gain constructive feedback and genuine industrial insights to improve their products. These efforts serve to better prepare them for their transition into the professional world [1]. Due to the spirit of innovation, the decision was made to address the management aspect of this event, especially the registration aspect of this event.

Currently, event registration is conducted via Google Forms. This platform isn't suitable for events with many participants and lacks a unified method to handle certifications and important documents. There is no streamlined operation for handling participant activities, causing a high time and energy burden on the organizer. The key solution is to find a unified way to solve these problems [2]. The only unified way is through computerization [2]. A streamlined system where registration and document distribution can be done on a single platform is considered much easier.

The lack of automation has cost the organizers a lot of time and energy. Although parts like registration, certification, and event guidelines have been computerized, they are not connected. Good management is crucial for a successful event from start to finish [3], and the current process is still lacking. Thus, we propose iConnect, a complete event management system. It will combine important components into one system to achieve the event's goals [4]. iConnect will automate tasks like registration and sending certificates or documents to participants. The system will be available online and serve the main functions of an event manager [3].

One major issue is the lack of a single system to handle registration, project submissions, and the dispersing of participation and award certification. Without a centralized digital platform, organizers face difficulties in checking participant details, tracking payments, and distributing certificates, leading to delays, miscommunication, and security risks, especially with many participants, exhibitors, and speakers involved.

Another problem is the heavy workload on event staff due to manual processes. Staff must handle registrations, send emails, and manage records manually, making last-minute changes a challenge and disrupting event coordination. To solve these problems, iConnect is proposed. This digital system will allow users to register online, make secure payments, receive updates, and get certificates. With automated processes, iConnect will reduce waiting time, improve tracking, enhance communication, and ensure smoother certificate distribution, making UTHM's innovation exhibition more efficient and successful. So, the main objectives of this project are:

- To identify and analyse the requirements and challenges in the existing competition registration process to ensure the system meets the needs of participants, organizers, and administrators.
- To design and develop a user-friendly, efficient, and secure platform that automates competition registration, manages participant data, and manages organizer tasks effectively.
- To evaluate the system's efficiency and accuracy through unit system testing and user feedback.

As such, the project will be developed for the purpose of creating a centralized, web-based event management platform to streamline and automate the registration, communication, and documentation processes involved in organizing large-scale academic and innovation events. By addressing the limitations of current manual and fragmented systems, iConnect aims to reduce the administrative burden on organizers, minimize human error, and enhance the overall experience for participants. This study contributes to the growing body of research on integrated technology innovation by examining how web-based platforms can streamline complex administrative processes in academic setting [3]. The research addresses the gap between fragmented event management tools and the need for cohesive, scalable solutions in institutional contexts [1,3]. The platform will serve as a comprehensive solution that supports secure online registration, efficient participant data management, timely updates, and automated certificate distribution. Ultimately, iConnect will contribute to a more organized, professional, and impactful event environment, particularly for academic institutions such as UTHM.

2. Literature Review

Several event registration systems have been developed by various institutions to streamline and improve event management processes. Among these are e-Ganapp [1], Intelligent Event Finder [2], vCRM Registration System [3], Competition Registration Platform [4], and the Online Registration System [5]. Each of these systems introduces features such as digital registration, attendance tracking via QR codes, automated certificate generation, data analytics, and user communication tools. For example, e-Ganapp simplifies registration and attendance tracking for university events [1], while the Intelligent Event Finder system uses AI to recommend events based on user interests and handles registration, payment, and feedback collection [2].

Meanwhile, vCRM focuses on simplifying new student registration through online forms and video calls [3], and the Competition Registration Platform supports team management and structured competition announcements using web-based frameworks [4]. The Online Registration System modernizes exam sign-ups through a three-layer web structure that improves accuracy and reduces delays [5].

While these systems demonstrate the advantages of digital event management, they also highlight certain limitations. Many are built for specific use cases, such as student registration or public events, and lack the flexibility to support a full academic event cycle. Most systems are not integrated end-to-end, meaning that

important processes like document distribution, participant communication, and submission tracking still require manual intervention or separate tools.

As a result, they may not be suitable for more complex, large-scale academic events that involve multiple stages, such as abstract submission, video uploads, and certificate issuance. This gap emphasizes the need for a more versatile and centralized platform like iConnect. Designed specifically for academic events like iConnect at UTHM [6], iConnect aims to combine key features—registration, submission, document generation, and administrative monitoring—into a single, user-friendly system that reduces manual workload and improves the overall experience for both organizers and participants.

2.1 Strengths and Weaknesses of The Past Studies

Table 1 gives a simple look at some past event registration systems, showing what they're good at and where they fall short. The e-Ganapp system makes things easy with QR check-ins and automatic certificates. It's fast and great for academic events, but it doesn't work well outside of that setting. Meanwhile, Intelligent Event Finder & Management system comes with smart tools like event suggestions, payments, and app support. It uses AI to help manage events from start to finish, but it's built more for business use and can be complicated to develop.

Next, vCRM Registration lets users have video calls and upload documents. It helps improve the overall experience, but it's mostly useful just for student registration. The Competition Registration and Announcement system handles things like user sign-ups, team creation, and event updates. It's good for communication and teamwork, but it mainly focuses on academic events. Finally, the Online Registration System is used for signing up for exams and assigning seats. It's accurate and quick but only works for exam-related tasks. Overall, each system has its strengths, but they also have limits that make them less flexible for wider use.

Table 1 *Strengths and weaknesses of the past studies*

Research Title	Features	Strengths	Weaknesses
e-Ganaap [1]	QR check-in, auto-certificates	Fast and user-friendly; ideal for academic events	Limited scalability to other institutions
Intelligent Event Finder & Management [2]	Smart recommendations, cross-platform app, payment & analytics	AI-enhanced event discovery and full-cycle management	More commercial than academic, high development complexity
vCRM Registration [3]	Video call consultations, document submission	Enhances user engagement and service quality	Limited to student registration scenarios
Competition Registration and Announcemen [4]	Competition announcements, user registration and approval, team formation, news updates and notifications	Improves communication and teamwork	Focuses on academic events only
Online Registration System [5]	Online exam registration, automated exam seating assignments	Accurate data management and fast registration	Only for exam registration

3. Methodology

This chapter explains how the Event Registration System was developed using the Prototype model. This method was chosen because it allows the system to be improved step by step with user feedback. The chapter covers each part of the project, including planning, analysis, design, building the system, testing, and final use. It also shows how the project was done to meet its goals and focus on user needs [3].

Fig 1 illustrates the Prototype model, which starts by creating a simple version of the system. This early version helps users and developers test the design and features. The system is then improved based on feedback until it works well. This method is useful when the system is complex or the requirements are not clear. It helps make sure the final system matches what users really need.

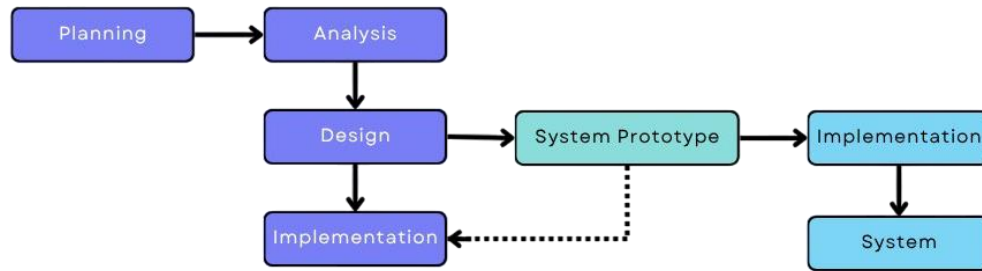


Fig. 1 *Prototype model*

3.1 Planning Phase

The planning phase was the first and most important step in building the iConnect Event Registration System. In this phase, we set clear goals and created a simple plan to guide the project. To understand the problems with University Tun Hussein Onn Malaysia (UTHM)'s current event registration process, we prepared some interview questions, focusing on how to make the user experience better than using Google Forms. We interviewed two UTHM lecturers who have experience handling university events, since they understand both the admin and user sides. Their feedback helped us understand what users really need. We also made a Gantt chart to plan the timeline and keep the project on track. This phase gave us a strong base to continue the development smoothly.

3.2 Analysis Phase

This phase focused on finding out what the Event Registration System needs. Fig 2 shows the interview process conducted with two UTHM instructors to learn about their expectations for a new system and the present event registration procedure. The interview style allowed for a more flexible and open-ended questions.

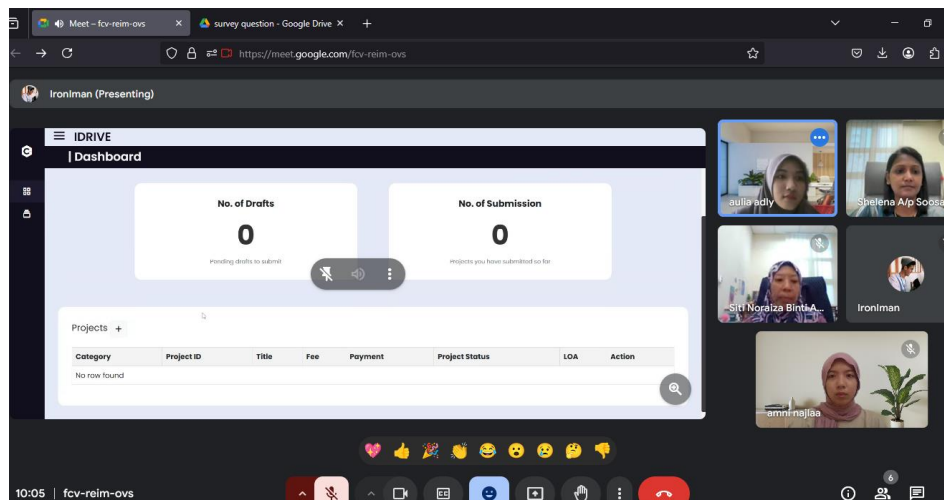


Fig. 2 *Interview session with UTHM lecturers through Google meet*

Based on the feedback gathered, several important needs were identified. The system should generate a Letter of Acceptance (LOA) after payment is made. Participation certificates should be given after the video submission, and Award certificates should be provided once the event has ended. To organize projects efficiently, the system must auto-generate a unique project ID for each submission. Other than that, project abstracts should be limited to under 500 words. Participants should also have the option to edit and resubmit their project details before the deadline.

For better management, the system should allow administrators to track whether each group has submitted their information or is still pending. A notification reminder should appear each time a participant opens the system, unless they have already submitted their project. Additionally, the admin should be able to view group details and generate reports by printing or exporting the participant list in PDF or Excel format.

These functional and non-functional needs played a crucial role in guiding the system's design and development, guaranteeing that it not only addresses present issues but also incorporates useful capabilities beyond those of already-available tools like Google Forms.

3.3 Design Phase

To further clarify and visualize the system logic and workflow, diagrams were developed. These diagrams are crucial for making sure a system's architecture is well understood by both developers and stakeholders.

The use case diagram in Fig 3 represents how users and administrators interact with the IDrive registration system. There are two main types of users: the User and the Admin. Regular users can sign up, log in, add and edit projects, make payments, and generate a Letter of Approval (LOA) — which is dependent on completing the payment. The admin, on the other hand, can view participants' projects and authenticate their payments. This diagram helps illustrate the core functionalities available to different users, showing clearly what each role can do within the system.

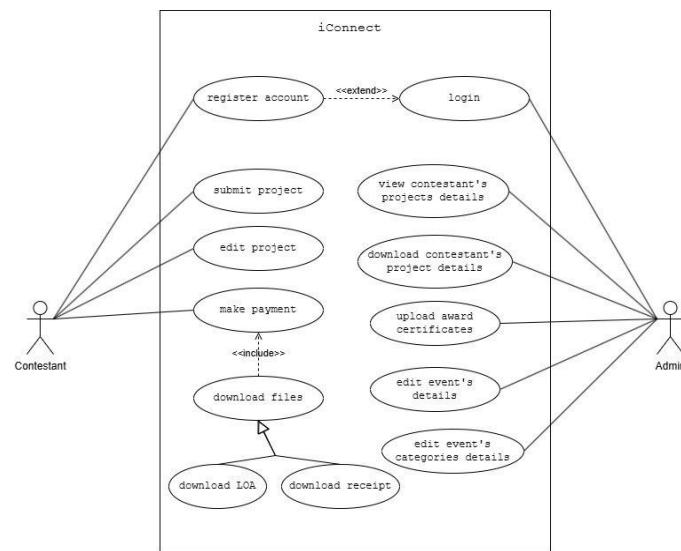


Fig. 3 Use case diagram

The Entity Relationship Diagram (ERD) shows how users, admins, and different parts of the system interact. Users start by registering with their name, email, and password. Once registered, they can choose from different categories, each with its own name, description, and fee. After selecting a category, users can join related projects that include details like the project's title, ID, contact info, and organization name.

Each project may involve a payment, and once the payment is made, the system generates a certificate for the user. On the other side, admins are responsible for managing the projects. They have their own login credentials and oversee how the projects are organized and run. Fig 4 illustrates the diagram that show the connection between all these parts and how they work together in the system.

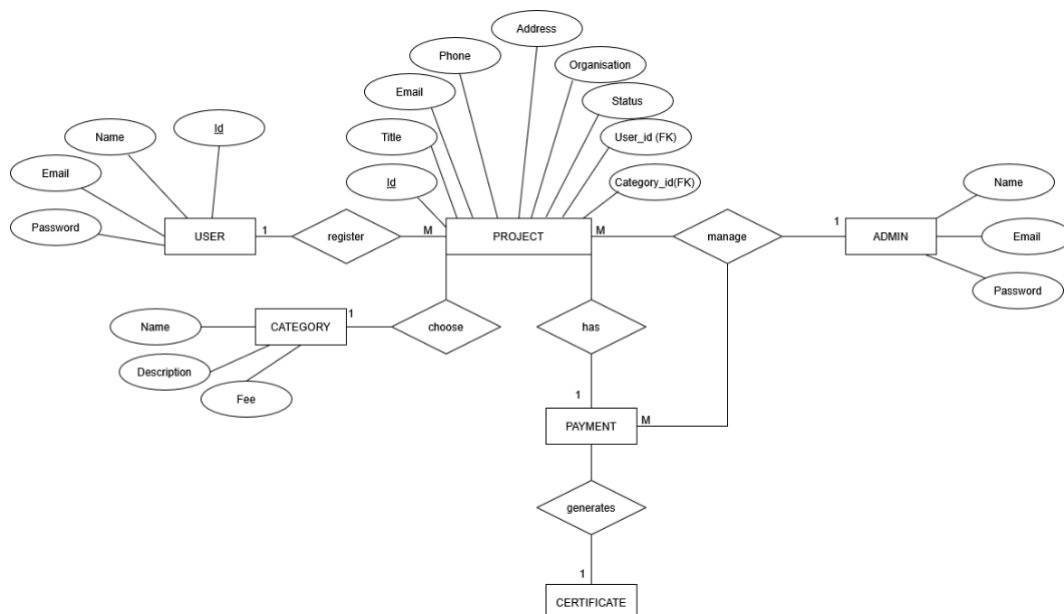


Fig. 4 Entity relationship diagram

3.4 System Development

Initial development began after completing the design documentation, focusing on basic features such as user registration, login, and project abstract submission. Even if the design was not fully finalized, the system was already usable for early testing and feedback. The user interface (UI) was designed to ensure easy navigation for both participants and admins. Wireframe were created for main screens like the homepage, event details, registration, login, admin dashboard, and submission tracker.

The design kept a consistent colour theme, especially the reddish-orange gradient, to create a clean and unified look. A responsive layout was planned to support access on PC, tablets, and smartphones. Navigation flow was arranged to help users move smoothly between sections. The frontend and backend interaction are also outlined to show how user data would be processed and stored.

3.5 User Evaluation

After creating the first prototype, a chosen group of users, including UTHM lecturers interviewed earlier, will test the system. They will be required to use the system and do routine tasks like creating an account, logging in, and submitting a project entry. The feedback will help identify flaws, confusing navigation, and usability problems. This input will guide improvements in the next development stage and highlight the prototype's weaknesses.

3.6 Improved System Development

The system will be improved and changed in response to the input gathered during the first user assessment. Better form validation, enhanced user interface components, and new features recommended by user testing and interviews will all be included in this updated edition. The opportunity for participants to revise and resubmit entries before the deadline, automated creation of participation or award certificates, downloadable admin reports in PDF or Excel for administrative use, and reminder alerts for project submissions. The system will give administrators a clearer view of project group data and submission statuses. Fig 5 illustrates the improved system, which closely resemble the final version and ensure reliable performance across all features.

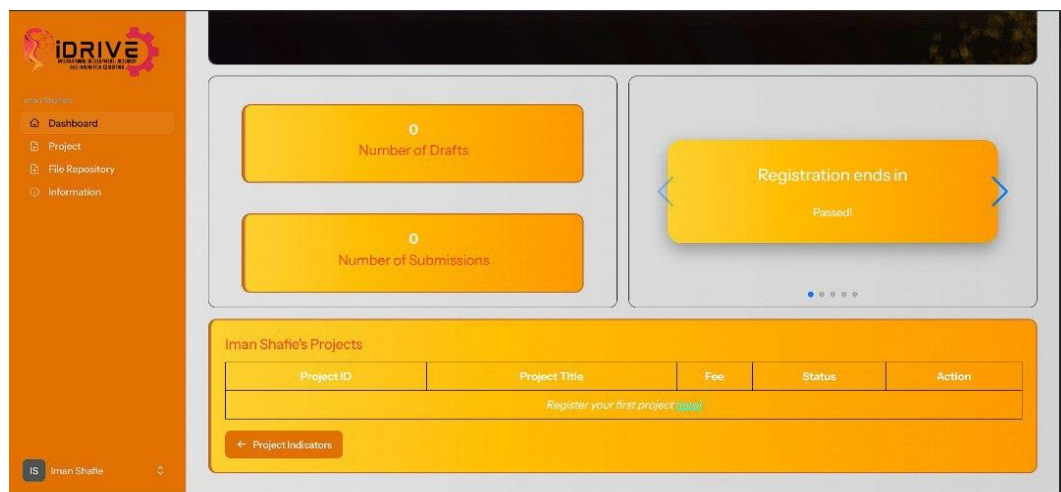


Fig. 5 Improved system

3.7 Final Evaluation and Testing

The improved system will be thoroughly tested during the final evaluation and validation phase. To begin with, system testing will be carried out to ensure that each module functions correctly and integrates well with others. Next, usability testing will be conducted to gather feedback from a wider group of users to assess the ease of use, interface clarity, and overall user satisfaction. In addition, performance testing will be done to verify that the system responds well under expected user loads without any major delay or errors. Finally, security testing will be performed to ensure that user data is protected and that the system prevents any unauthorized access.

3.8 Deployment

The system must be hosted on a server or ready for local demonstration at this deployment phase, and all features must function as intended. The system will go through final testing to ensure complete functionality, security, and performance prior to official release. Lastly, the system will be shown to stakeholders and supervisors for project assessment and review.

4. Results and Findings

After conducting user evaluation and testing phases, those results and feedback need to be restructured and analysed to ensure the system developed meets the requirements. Aspects to consider after analysing the results are the system's functional requirements like login, registering project and editing project draft. Apart from that, the system's non-functional aspects like colour theme, navbar and objects consistency still need to be analysed and improved if errors occurred. All the results obtained from user feedback and internal testing will be beneficial in identifying iConnect Event Registration System's flaws and tackling it. For testing, two types of testing will be conducted: Unit Testing and System Testing. Both tests will be carried out internally by the development team to verify whether each system functionality is operating correctly and interconnected with others. The security level of the system will also be evaluated.

4.1 Analysing user's feedback

To ensure the system addressed real user needs, significant effort was made to collect feedback from various individuals, especially the project supervisor and several UTHM lecturer. In the first part of the evaluation, they were asked what features the system should include and how they perceived its implementation in their operations. These questions helped to build a basic understanding of the system's essential functions while ensuring the design was both practical and achievable. In the second part, the focus shifted to whether the system met the previously identified requirements. Feedback from this phase played a key role in confirming that the system aligns with the needs of its intended users. Finally, after deployment, actual users were asked about the system's usability to assess whether it effectively support a user-centered design.

4.2 Unit Testing

Unit testing is a method used to check individual parts of the system to make sure each one works correctly [4]. Several units were tested throughout development. To begin with, the sign-in unit was tested to ensure that only registered users could access the system, while admins had a special access right. Next, the login unit confirmed that users could log in and out using their registered email and password. Email verification was also tested to make sure users received a link to confirm their email address, helping maintain system security.

The project registration form was tested to ensure it correctly collected project and personal details, and that all inputs were validated before being saved to the database. The edit and delete functions were tested to allow users to update their project and personal information, while admins could manage event categories and details. The system's ability to generate and allow users to download Letters of Acceptance and certificates was also tested and confirmed. Lastly, admin features for saving participant data as PDF or Excel were tested to support internal reporting. Each function was tested individually to ensure it worked properly on its own. The result of these unit tests is shown in Fig 6, which displays all the successfully passed test cases for each feature.

```

Microsoft Windows [Version 10.0.26100.4351]
(c) Microsoft Corporation. All rights reserved.

C:\Users\IMAN SHAFIE\Documents\iConnect>php artisan test

PASS Tests\Unit\ExampleTest
  ✓ that true is true 0.73s

PASS Tests\Feature\auth\AuthenticationTest
  ✓ login screen can be rendered 11.60s
  ✓ users can authenticate using the login screen 6.32s
  ✓ users can not authenticate with invalid password 0.57s
  ✓ users can logout 0.26s

PASS Tests\Feature\auth\EmailVerificationTest
  ✓ email verification screen can be rendered 0.87s
  ✓ email can be verified 0.46s
  ✓ email is not verified with invalid hash 0.29s

PASS Tests\Feature\auth\PasswordConfirmationTest
  ✓ confirm password screen can be rendered 0.67s
  ✓ password can be confirmed 0.10s
  ✓ password is not confirmed with invalid password 0.34s

PASS Tests\Feature\auth\PasswordResetTest
  ✓ reset password link screen can be rendered 0.76s
  ✓ reset password link can be requested 2.29s
  ✓ reset password screen can be rendered 1.29s
  ✓ password can be reset with valid token 0.78s

PASS Tests\Feature\auth\RegistrationTest
  ✓ registration screen can be rendered 0.11s
  ✓ new users can register 9.86s

PASS Tests\Feature\DashboardTest
  ✓ guests are redirected to the login page 0.88s
  ✓ authenticated users can visit the dashboard 0.15s

PASS Tests\Feature\ExampleTest
  ✓ returns a successful response 0.86s
  
```

Fig. 6 Unit testing results

4.3 System Testing

Once all individual components were confirmed to work through unit testing, system testing was carried out to evaluate how these components function together as a complete system. The system will be tested with sample

data with pre-determined results to compare with the actual results produced by the system. This will prove the system's overall functionality and logical integrity.

Based on the Fig. 7, the success rate of the iConnect system is divided into three key areas: Usability (34.1%), System Performance (33.3%), and Interface Design (32.6%). These values indicate that users found the system relatively well-balanced across all three aspects, with usability slightly leading. This suggests that iConnect is generally user-friendly, performs reliably, and has a design that meets user expectations, contributing to its overall effectiveness and success.

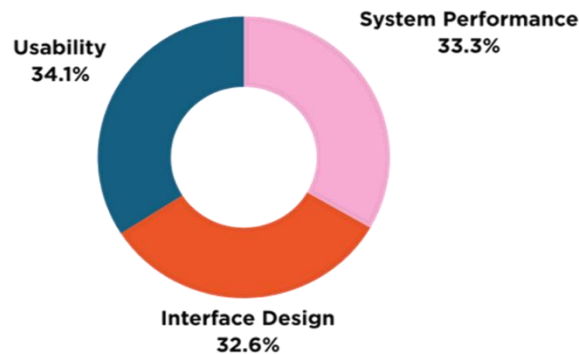


Fig. 7 iConnect success rate

System Usability Scale (SUS) were conducted with 35 participants consists of academic (n=20), students (n=10) and administrators (n=5). Reliability analysis of Cronbach Alpha shows 0.87 indicate excellent consistency [11]. Table 2 shows the results obtained.

Table 2 SUS results

Participant Category	N	Mean SUS Score	SD	Adjective Rating
Academic Staff	20	76.3	5.2	Good
Students	10	71.8	6.1	Good
Administrators	5	81.2	4.3	Excellent
Overall	35	74.5	5.7	Good

The overall SUS score of 74.5 places the system in the "Good" category, exceeding the industry average benchmark of 68 [11,12]. To ensure the statistical validity of this score, the following analyses were performed:

- **Reliability Analysis:** The survey instrument achieved a Cronbach's Alpha of 0.87, confirming that the 10-item questionnaire provided a consistent measure of the platform's usability [11, 14].
- **Participant Variance:** The higher score among Administrators (81.2) compared to Students (71.8) suggests that the platform's "Perceived Usefulness" is most pronounced for power users who handle complex administrative tasks, a finding consistent with TAM research in institutional settings [15,16].
- **Acceptability Range:** According to Bangor's adjective rating scale, a score of 74.5 is categorized as "Acceptable" and "Good," indicating that the system is ready for production deployment with only minor cosmetic refinements needed [12,17].

4.4 Future Recommendation

Based on the development and testing process, several improvements are recommended for future versions of the iConnect system. One key improvement is to add real-time error messages during form filling, which would help users correct mistakes immediately and improve the overall user experience. In terms of security, the system can be enhanced by implementing two-factor authentication, stronger password rules, and activity tracking to better protect user data. For the admin side, it is suggested to develop a dashboard that provides real-time statistics such as user registration numbers and event participation reports. Lastly, setting up a continuous update and maintenance plan will help keep the system efficient, secure, and user-friendly in the long term.

5. Conclusion

The iConnect system was developed to address the challenges of managing academic events, particularly at Universiti Tun Hussein Onn Malaysia (UTHM). Traditional methods, such as using Google Forms, made registration and communication difficult, especially during large-scale events. By combining registration, project submissions, payment verification, and automated certificate generation into a single platform, iConnect simplifies the entire process and reduces the workload for organizers. Feedback from users, especially UTHM lecturers, played a key role in shaping the system's design and functionality. The system went through several stages of testing, and results showed that it met its main goals providing a smoother experience, reducing manual errors, and improving efficiency. Users found the platform more convenient and effective compared to the old manual process. While iConnect has proven to be a useful tool, there's still room for improvement. Issues like server stability, database capacity, and internet connectivity could affect performance as the user base grows. In future updates, adding features like better error handling, enhanced security, and admin dashboards could help make the system even more powerful. Overall, iConnect is a strong step forward in modernizing academic event management and has great potential for wider use.

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Conflict of Interest

There is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: **Study conception and design:** Amni Najlaa Binti Ahmad Bukhari, Aulia Binti Adly; **System development (including database and functionality):** Iman Shafie Bin Haidzir; **Technical paper documentation:** Amni Najlaa Binti Ahmad Bukhari; **Final report preparation:** Aulia binti Adly, Iman Shafie bin Haidzir, Amni Najlaa binti Ahmad Bukhari; **Project supervision and manuscript review:** Shelena Soosay Nathan; All authors reviewed and approved the final version of the manuscript.

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