DESIGNING UI FOR STUDENT PRESENCE MOBILE APPLICATIONS USING THE HCD METHOD

Josua Hutasoit[1], Vanda Rohmatulloh[1], Nazlah Sari Putantri[1], Lusiana Efrizoni[2]
[1]Program Studi Sistem Informasi, STMIK Amik Riau
[2]Teknik Informatika, STMIK Amik Riau
email: [*]josuahutasoit05@gmail.com

Abstract: Student attendance is one of the activities carried out in the lecture process. Attendance is also an element of a student's final grade for each course offered in accordance with a university's academic guidelines. Attendance at STMIK Amik Riau is done manually, where students are called one by one and then the lecturer changes the attendance data in SIMDOS. This method is of course very inefficient, and takes a long time. Apart from that, this manual process is prone to fraud where students can make absences. Therefore, this research proposes a QR-Code based student attendance mobile application prototype at STMIK Amik Riau using the User Centered Design (UCD) method. The results of the research are in the form of a prototype or user interface design for the student attendance mobile application. It is hoped that this prototype can help programmers to build QR-Code based student attendance mobile applications.

Keywords: Presence, QR-Code, User Interface, User Centered Design

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Abstrak: Kehadiran atau presensi mahasiswa merupakan salah satu kegiatan yang dilakukan dalam proses perkuliahan. Presensi juga merupakan salah satu elemen nilai akhir mahasiswa setiap mata kuliah yang ditawarkan sesuai dengan panduan akademik suatu perguruan tinggi. Presensi di STMIK Amik Riau dilakukan secara manual, dimana mahasiswa dipanggil satu per satu lalu dosen merubah data presensi yang ada pada SIMDOS. Cara ini tentunya sangat tidak efisien, dan membutuhkan waktu yang lama. Selain itu proses manual ini rentan terjadi kecurangan dimana mahasiswa dapat melakukan titip absen. Oleh karena itu penelitian ini mengusulkan prototype aplikasi mobile presensi mahasiswa berbasis QR-Code di STMIK Amik Riau menggunakan metode User Centered Design (UCD). Hasil dari penelitian berupa prototype atau rancangan user interface aplikasi mobile presensi mahasiswa. Diharapkan prototype ini dapat membantu programmer untuk membangun aplikasi mobile presensi mahasiswa berbasis QR-Code.

Kata kunci: Presensi, QR-Code, User Interface, User Centered Design

INTRODUCTION

In the rapidly advancing field of information technology, as it stands today, mobile applications have become an integral part of many people's daily lives [1]. Mobile applications are being used in various domains, including the realm of education. One educational area that can benefit from the use of mobile application technology is student attendance monitoring.[2]. Recording student attendance in each lecture session plays a crucial role in ensuring student participation and engagement in the learning process. Attendance can also be one of the assessment criteria for students in a university[3].

Attendance is an event that determines the presence of a person or group of people at a certain place and must be at a certain time. Attendance is one of the student samples determined by the school[4].

Several previous studies have conducted research on attendance applications. Research by Yanti Wulandari (2020) on attendance applications has been carried out and resulted in a good attendance application developed web-based with the codeigniter framework [5]. Research conducted by Kukuh Prasetiyo Aji (2022) made an IOT-based Presence Application using NodeMCU ESP8266, the data obtained from reading RFID in the form of Tag codes was successfully stored in the database [6].

The next research was conducted by Ananda Pramono (2020) designing this attendance application system using the Android Face Recognition with Deep Learning library to make it easier to implement the Viola-Jones algorithm for face detection and Support Vector Machine for face recognition in the applica-

tion [7]. Research conducted by Fiori Anugerah Nasution (2022) who designed an employee attendance system using retina scanning-based attendance for ASN at the Bukittinggi State Attorney's Office [8]. Research conducted by Komang Sri Utami (2021) using intranet networks and IMEI readings as well as local network restrictions to conduct attendance shows that the attendance system to be implemented provides accurate and efficient results [9].

Then research by Salhazan Nasution (2018) designed an online attendance tool using RFID on a student card integrated with a website [10]. the next research by Haryansyah (2022) made an internet of things-based communication presence system for effectiveness of recapitalization of student attendance [11].

In previous research that has been conducted by several researchers, the author finally has an idea entitled "Designing User Interface for Student Attendance Mobile Application Using Human Centered Design Method". With the design of this mobile attendance application, students will find it easier to monitor the percentage of attendance, so that students can evaluate their attendance independently. The student attendance process is carried out by scanning the QR-Code displayed by the lecturer. Thus the lecturer does not take attendance manually by calling students one by one during lectures, thus shortening the lecturer's time and making the recapitulation process more efficient and effective.

METHOD

In this chapter, we will discuss the research stages, which consist of problem identification, literature review,

user context specification, and user requirements specification. The stages to be conducted in this research will employ the Human-Centered Design (HCD) approach, which is adopted from a study conducted by Putu G and others titled "Application of Human-Centered Design Method in User Interface Design (Case Study: PT.X)." The use of the Human-Centered Design method is chosen for designing the user interface because its stages are based on the general characteristics of humans, as well as human perception and psychology[12]. The stages of Human-Centered Design can be seen in the following diagram.
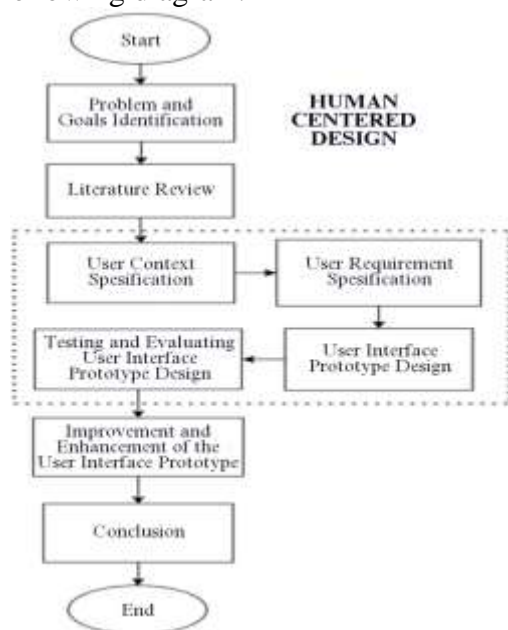

Image 1. Research Methodology

In image 1, it represents the stages of research using the Human-Centered Design approach, which focuses on users and user needs. The first stage is problem identification and goal setting, followed by collecting relevant literature reviews. After that, determining the user context involved and specifying user requirements. The next stage involves designing

the prototype user interface for the mobile attendance application, conducting testing, and evaluating the prototype design results. Is the designed prototype in line with user needs or not? Subsequently, improvements and enhancements are made to the prototype based on the evaluation results, and finally, conclusions and recommendations are provided.

Problem and Goals Identification

The issue addressed in this research is the manual attendance process, where students are called one by one, and instructors manually change attendance data. Subsequently, these records are compiled by the teaching faculty for inclusion in the final grade calculation. This results in a lengthy process of attendance compilation, especially if instructors are responsible for more than three classes. Another weakness of the attendance system is that proof of student attendance can only be accessed by instructors through the Faculty System (SIMDOS).

The objective of this research is to design a prototype for a mobile student attendance application based on QR-Code, using the Human-Centered Design approach and Figma as the editing software. QR-Code is utilized as an attendance method directly integrated with the existing academic information system at STMIK Amik Riau. Human-Centered Design is an approach focused on the development of systems that are useful in the creation of interactive systems, especially in user interface design. The role of Human-Centered Design is to enhance usability factors, including efficiency, effectiveness, and user satisfaction.

By using Figma as the editing software, researchers can effectively apply Human-

Centered Design principles in the design of the mobile attendance application. Figma allows for the creation of interactive prototypes that can be used to test concepts, workflows, and interface interactions with users. This aligns with the Human-Centered Design principle, which encourages design testing with users throughout the design process.

Research stages

In this of the research stage, the design process of the student attendance mobile application consists of user context and user needs. The following is an explanation of the research stages:

User Context

The user context for the mobile student attendance application includes both instructors and students. Before the start of a class, instructors will open the attendance portal through the campus academic system, SIMDOS. The subsequent process involves the system generating a QR-Code, which displays student data along with the QR-Code. Instructors can also view and edit student attendance in the system. To record student attendance, there are two methods: scanning and uploading the QR-Code. The QR-Code is then processed by the system to update attendance data by searching for a match with the QR-Code generated for the class. The system provides a notification if a student is marked as present in that class. Students can also view their attendance history and percentage in the system.
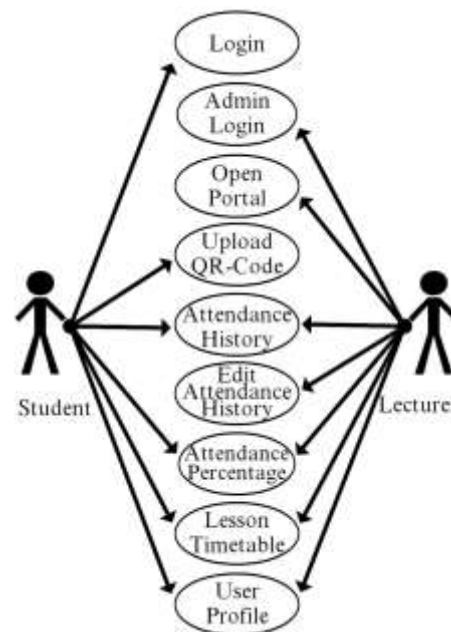

Image 2. Use Case of Student Attendance Mobile Application

Image 2 depicts the use case of the mobile student attendance application using Unified Modeling Language (UML) diagrams. Use cases are used to describe the types of interactions between users and the system. Based on image 2, users of the mobile student attendance application include students and instructors. For students, their access rights include login, QR-Code upload, attendance history, attendance percentage, class schedules, and user profile. On the other hand, instructors have access rights such as admin login, opening the learning portal, viewing attendance history, editing student attendance, viewing student attendance percentages, accessing student class schedules, and managing user profiles.

User Requirements

Based on the questionnaire results, the researcher identified the needs of both instructors and students. The researcher will develop a prototype design with features required by both instructors and students for mobile-based attendance using real-time QR-Code scanning integration with the system. User requirements include:

Class Schedule

The class schedule includes the course name, course code, instructor's name, class time, classroom location, and credit hours. Class schedules are essential for reminding users of upcoming classes.

Upload QR-Code

The Upload QR-Code feature allows users to send scanned or gallery-selected QR-Codes to the system. When successful, the system marks the student as "present."

Attendance History

The attendance history contains course names, course codes, instructor names, attendance percentages, the total number of sessions, and session details. Attendance history is useful for monitoring attendance percentages and considering future attendance, as student attendance significantly affects grades.

Profile

The user profile includes a profile picture, student ID (NIM), email, student data, and academic summary. Profiles serve as electronic student ID cards (E-KTM), and the academic summary page also displays the GPA and the student's active status for that semester.

RESULTS AND DISCUSSION

In the results and discussion section, we will explain the prototype of the mobile attendance application at STMIK Amik Riau using the Human-Centered Design method. This will include the stages of designing and creating user interfaces for mobile attendance applications using figma. The following is the design of the mobile attendance application prototype:

User Interface Prototype Design

This stage explains the prototype of the mobile student attendance application tailored to user needs. The User Interface of the mobile attendance application consists of the following screens: login screen, home screen, attendance percentage menu, attendance detail menu, and student account menu.
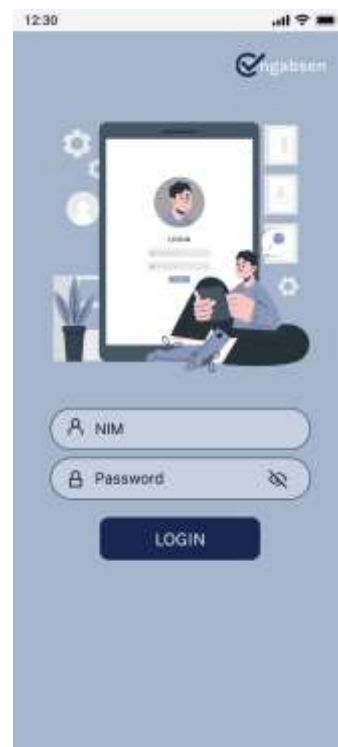

Image 3. Login Menu

Image 3 is the login screen of the QR-Code-based mobile student attendance application using the Human-Centered Design method. This menu will be used for logging in using STMIK Amik Riau campus accounts. Students are required to enter their Student ID (NIM) and password. Upon successful login, students will be directed to the home menu.

Image 4. Home Menu

Image 4 is the home screen of the mobile student attendance application. To access this menu, you can click on the home icon. This menu displays the schedule of ongoing classes at the time of student login and the next classes. In the bottom right corner of this menu, there is a (+) icon that allows you to scan and upload the QR-Code displayed by the in-

structor. Students can view attendance summaries by clicking on the diagram icon.

Image 5. Attendance Percentage Menu

Image 5 is the attendance percentage menu in the mobile student attendance application. To access this menu, students can choose the attendance history menu. This menu displays all the courses taken by the student in that particular semester. The menu features percentage circles, where green indicates present, and red indicates absent. Students can also view attendance percentages and check attendance details by selecting the (>) icon. Then, students are directed to the attendance summary menu.

Image 6. Attendance Detail Menu

Image 6. Student Account Menu

Image 6 is the attendance detail menu in the mobile student attendance application. This menu provides details for the selected course, allowing students to view the total number of sessions, the number of attendances, the number of absences, the attendance percentage, meeting dates, meeting topics, and attendance status for each session. Afterward, students can view their personal information by clicking on the profile icon.

Image 7 represents the student account menu in the mobile student attendance application. To access this menu, you can click on the student account icon. This menu displays two buttons: student data and academic summary. The student data menu contains information about gender, religion, and address. Meanwhile, the academic summary menu shows academic status, cumulative grade point average (GPA), total credit hours, academic advisor, and enrollment year.

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Testing and Evaluating User Interface Prototype Design

Table 1. Respondent Results

No	Description	Number of Respondents	Login Menu	Home Menu	Attendance Percentage Menu	Attendance Detail Menu	Student Account Menu
1	Strongly Agree	25	71%	71%	71%	71%	71%
2	Agree	10	29%	29%	29%	29%	29%
3	Disagree	0	0%	0%	0%	0%	0%
4	Strongly Disagree	0	0%	0%	0%	0%	0%

After the user interface prototype design is completed, the next step is to test and evaluate the prototype to gather user experience feedback from the testers. Testing is conducted using usability testing. A total of 35 respondents participated in the testing, and the results showed that 10 of them found the designed prototype easy to use. This is evident from the average time users spent using the features in the prototype. Additionally, 35 respondents indicated that the visual design was appealing and not monotonous. Therefore, it can be concluded that the designed prototype meets user needs.

Improvement and Enhancement of the User Interface Prototype

Based on the testing and evaluation results of the prototype design, no significant issues were found, so there is no need for improvement or enhancement of the user interface prototype at this time. In other words, the designed prototype is already sufficiently aligned with user needs and can be further developed into an application.

CONCLUSION

A include retina scanning, facial recognition, fingerprint scanning, voice recognition, and others. Consfter designing the user interface for the mobile student attendance application using the Human Centered Design method, the following conclusions can be drawn: The attendance process has become more efficient as instructors no longer need to call out the names of each student individually. The attendance application helps students track their attendance percentage easily, and instructors can easily access attendance summaries for their courses. The technology used in this research is the QR-Code scanning method, which requires students to scan the QR-Code displayed by the instructor. In future development, attendance processes could be upgraded to use more advanced technologies like biometric authentication. These technologies mayequently, students would only need to scan their biometrics to verify their attendance.

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