



ABDIMAS TALENTA
Jurnal Pengabdian Kepada Masyarakat
 Journal homepage: <https://talenta.usu.ac.id/abdimas>



ABA DOA (Android-Based Attendance for D-III Accounting Lecturers) Using the USU Vocational Faculty Location Authorization Feature

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ARTICLE INFO

Article history:

Received : 19 December 2023

Revised : 22 December 2023

Accepted : 13 January 2024

Available online: 18 February 2024

E-ISSN: 2549-418X

P-ISSN: 2549-4341

How to cite:

Machfudz, E. S., Sinaga, A. F., Zufria, I., and Syarif, F. (2024). ABA DOA (Android-Based Attendance for D-III Accounting Lecturers) Using the USU Vocational Faculty Location Authorization Feature. ABDIMAS TALENTA: Jurnal Pengabdian Kepada Masyarakat, 9(1), 29-37.

ABSTRACT

This research details the development of Android-based Attendance Application for D-III Accounting Lecturers (ABA DOA) using Appsheet platform and utilizing LATLONG() and DISTANCE() functions for location validation. The development method applied is Rapid Application Development (RAD). ABA DOA provides convenience for lecturers with a self-photo feature as proof of validation, while integrating GPS and Google Maps to validate the location of attendance. The application results show efficiency in academic management with an optimal level of security. The LATLONG() function is used to determine the location coordinate point, while DISTANCE() is used to measure the distance between the authorized coordinate point and the attendance location. This research highlights the importance of technological innovation in supporting academic activities and campus management. The conclusion of this research is that ABA DOA successfully optimizes the attendance process with a high level of validation and security, making a positive contribution to the efficiency and effectiveness of study program management.

Keyword: Android Application, Attendance, GPS, Appsheet



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<https://doi.org/10.32734/abdimastralenta.v9i1.15457>

1 Introduction

Since the pandemic, many new systems have emerged that require people to start to be sensitive to technology and become more adept at using various existing technology features in order to carry out work or other activities safely.

Data entry such as attendance, educational guidance, lecture activities and so on is carried out using currently developing technology [2]. Now starting in 2022 the pandemic has subsided until now. But that does not mean we are careless about this situation, we must remain vigilant in living this new era.

As a result of the pandemic, many educational systems on campus have changed. For example, final project guidance activities, attendance, and campus activities are carried out online. This can be a new era for every academic to be literate and inevitably have to use technology well.

The online attendance used is very helpful for the campus environment to carry out educational activities. But for now, where the pandemic has almost disappeared, academics can already carry out campus activities online.

Online attendance, which was carried out during the pandemic, is now a permanent system for a university in filling attendance.

In the case study that the author found, namely the D-III Accounting Study Program, Faculty of Vocational Studies, USU, has conducted an online lecturer attendance. Although it was found that the attendance in and out of class was still manual with a signature. The attendance data that has been signed by each lecturer who attends is recorded back into Excel data by education personnel. Therefore, the author wants to create an android-based online attendance from an application development platform called Appsheet. This attendance application uses location authorization and utilization of spreadsheets such as excel tables as an attendance database which of course can be seen directly by the education staff of the USU Vocational Accounting D-III Study Program.

In its understanding Appsheet is an easy-to-use online platform for creating applications on mobile phones without having to use code with database sources such as spreadsheets, excel, and others making Appsheet easier to use [4]

In this research, there is a location authorization feature using Latitude and Longitude coordinate points adjusted to the integration of the validity formula. The use of Google Maps in the Location-Based Service (LBS) feature is used in this application. LBS is a service for mobile device applications that require knowledge of the geographic location of the mobile device, in this case Google Maps plays a role in the application of location-based services [3]. But in this application GPS is added to find out the location where attendance is taken as well as a form of validation. In short, GPS, which stands for Global Positioning System, is an automated technology to track a person's whereabouts when they allow it to be known [7].

2 Research Methods

This research uses data collection methods and system development methods. For data collection, there are 3 stages carried out, namely observation, interviews and literature studies. In the observation stage, observations were made directly when the team did practical work at the USU Vocational Accounting D-III Study Program. By observing how the system and the attendance process in and out of the lecturer class. The interview stage is carried out by asking questions about the attendance process to the Head of the USU Vocational Accounting D-III Study Program. Literature study is carried out by looking for references as support for making applications and writing in this journal.

Furthermore, the research was carried out using a system development method, namely Rapid Application Development (RAD). RAD is a software development process model that adapts from the Waterfall method which is incremental, especially for short manufacturing times [6].

Rapid Application Development or abbreviated as RAD is a linear sequential software development process model that uses a very short cycle in its development [10].

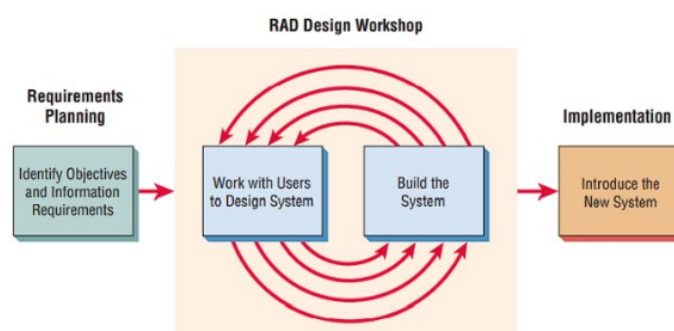


Figure 1. RAD design
Source: Amrullah et al.

3 Results and Discussion

The result of this research is a lecturer class attendance application developed through a platform called Appsheet. This application is integrated with mobile devices of the Android operating system type. ABA DOA is the name of the application made from the abbreviation (Android-based Attendance of D-III Accounting

Lecturers). The database used in the application is a spreadsheet provided by Google. In addition, the features in this application use location authorization which is loaded in a simple formula.

Latitude and longitude are determined based on the coordinates of the USU Vocational Faculty location loaded for location authorization needs. Because Appsheet is integrated with tools in Google, this online attendance has a photo feature as proof that the lecturer is really absent. This attendance photo is checked directly by the education staff through the shared Google Spreadsheet url link. Then for lecturers who take attendance must install an application that has been integrated with Android through a link that is sent. The head of the study program here has an order for all study program lecturers to take attendance.

3.1 App Home Page



Figure 2. Display before the main page



Figure 3. Main Page Display



Figure 4. Left Bar of the Application

3.2 App Home Page

When the application is started, a main page in the form of a calendar is displayed as a date reminder. There is a "+" symbol which if pressed will go to the attendance form page as well as pressing the words "Absent Lecturer D-III Accounting".

 A screenshot of the 'Absen Dosen DIII Akuntansi' form. The form has a back arrow and the app logo at the top. The fields are: 'nama*' (text input), 'mata kuliah*' (text input), 'tanggal*' (date picker showing 01/17/2024), 'jam*' (time picker showing 7:14:02 PM), 'status*' (text input), 'foto*' (image upload area with a camera icon), and 'lokasi*' (text input showing 3.579103, 98.616978). At the bottom, there are 'Cancel' and 'Save' buttons.

Figure 5. Display of Attendance Form

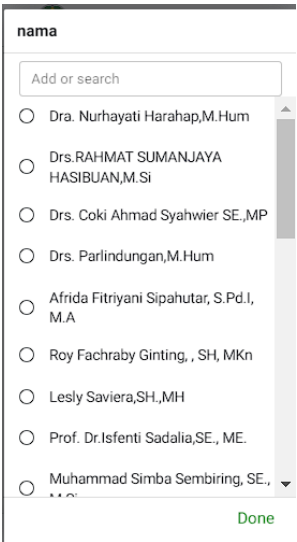


Figure 6. List of Lecturer Names

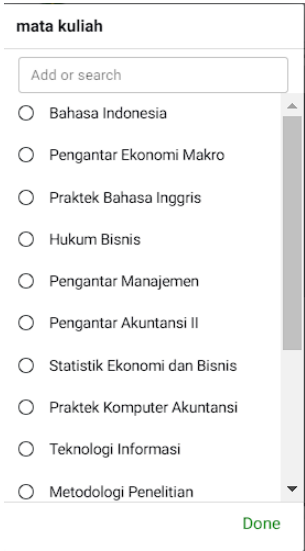


Figure 7. List of courses



Figure 8. Attendance application

The attendance form contains name, subject, date, time, status, photo, and location. Everything must be filled in by the absent lecturer in order to send the attendance into the database. The date, time, and location cannot be changed by the absentee to avoid fraudulent filling. Name contains a list of names of USU Vocational Accounting D-III lecturers and subjects filled in according to what is taught by the lecturer. Self photo when pressed will go to the camera feature that already exists in the cellular and has been integrated so that it cannot take pictures from the photo gallery.

The name that has been taken from the study program roster data is entered into the *value* in the appsheet so that it can be displayed in the form of a *dropdown* as well as a list of course names taught by the lecturer.

Figure 9. Absence Status

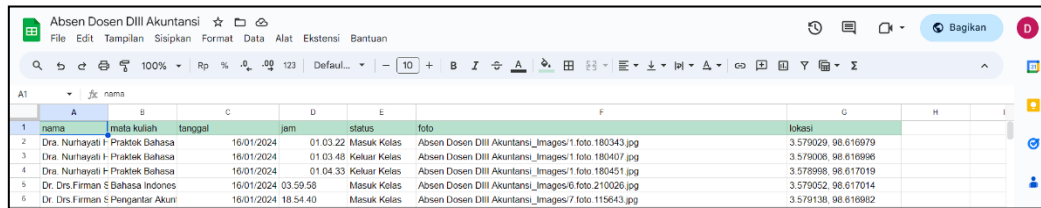
For attendance status, there are two options, namely entering class and leaving class, so lecturers are required to take attendance when entering and leaving class on the same day.

Figure 10. Location View

The location displays where lecturers are asked to allow GPS and when they are not in accordance with the specified location they cannot perform attendance activities. Global Positioning System (GPS) is a system to

inform its users known on the earth's surface based on satellites with position and location data sent from satellites in the form of radio signals with digital data [8].

3.3 Application Database



	A	B	C	D	E	F	G	H	I
1	nama	mata kuliah	tanggal	jam	status	foto	lokasi		
2	Dra. Nurhayati I-Praktek Bahasa		16/01/2024	01.03.22	Masuk Kelas	Absen Dosen DIII Akuntansi_Images/1 foto 180343.jpg	3.579029, 98.616979		
3	Dra. Nurhayati I-Praktek Bahasa		16/01/2024	01.03.48	Keluar Kelas	Absen Dosen DIII Akuntansi_Images/1 foto 180407.jpg	3.579006, 98.616996		
4	Dra. Nurhayati I-Praktek Bahasa		16/01/2024	01.04.33	Keluar Kelas	Absen Dosen DIII Akuntansi_Images/1 foto 180451.jpg	3.578998, 98.617019		
5	Dr. Drs Firman S Bahasa Indones		16/01/2024	03.59.58	Masuk Kelas	Absen Dosen DIII Akuntansi_Images/6 foto 210026.jpg	3.579052, 98.617014		
6	Dr. Drs Firman S Pengantar Akuri		16/01/2024	18.54.40	Masuk Kelas	Absen Dosen DIII Akuntansi_Images/7 foto 115643.jpg	3.579138, 98.616982		

Figure 11. Spreadsheet Database

The use of *Spreadsheet* is intended for education personnel to see attendance easily without having to input attendance from paper to *excel*. Spreadsheet is a platform for filling in table data that can be done online without having to install software.

Manual attendance is still defined as the process of collecting attendance data manually using stationery and paper [9]. For this reason, attendance input can be directly viewed on Google Sheets.

The location has been determined based on the coordinates obtained from Google Maps (3.5582309575994127, 98.65335289703343).

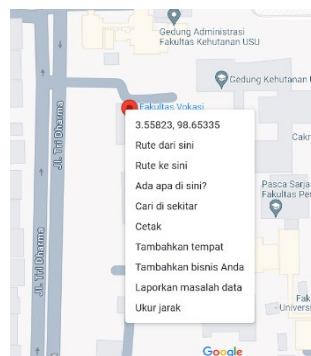


Figure 12. Latlong Point Coordinates

The location has been integrated based on the latitude and longitude coordinates of the USU Vocational Faculty with a radius of 1 km. So when lecturers are outside the location range, they will not be able to send attendance.

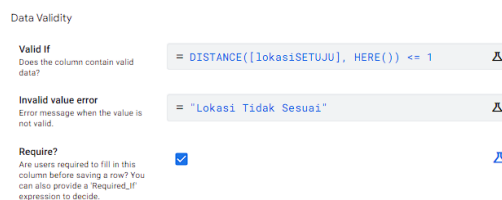


Figure 13. Location Validity Formula

By using a formula that is entered in the form of an if condition, the location can be authorized so that the lecturer cannot change the specified location. When the specified location does not match, it will issue an *error* value in the form of "Location Does Not Match". The location is determined based on the Longitudinal and Latitudinal coordinate points with Longitudinal value 98.65335289703343 and Latitudinal 3.5582309575994127 which is the coordinate point of USU Faculty of Vocational Studies. The formula `DISTANCE([locationSETUJU], HERE()) <= 1`, indicates that creating a `DISTANCE()` function or `locationSETUJU` distance in which Latitude and Longitude have been set in it. While the value 1 is the radius set to authorize the location.

In the sense that distance is the sum of the differences between two coordinate points located in different locations. The distance position can be near or far from the variant position. Distance measurements are often used in everyday life. This calculation is useful for determining the difference in value between two locations [5].

The screenshot shows a Google Sheets interface for configuring a formula. At the top, it says "Absen Dosen DIII Akuntansi : lokasiSETUJU (virtual)" with "type: LatLong" and "formula: =LATLONG(3.558182278...". Below this, the "Column name" is set to "lokasiSETUJU". The "App formula" is set to "= LATLONG(3.5581822785252393, 98.65337963414288)". There is a "Show?" checkbox which is currently unchecked.

Figure 14. Coordinate Point Determination Formula

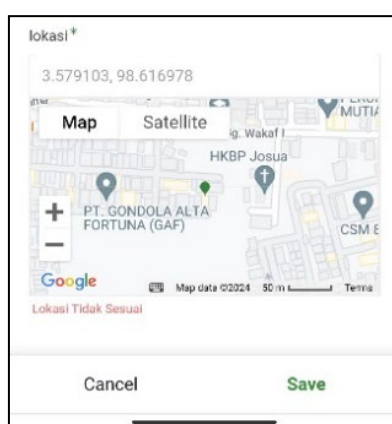


Figure 15. Notification of Unsuitable Location

Use the `LATLONG()` function to determine the Latitude and Longitude of an authorization location.

4 Conclusion

In the development of Android-based Absence Application for D-III Accounting Lecturers (ABA DOA), the use of `LATLONG()` function to determine coordinate points and `DISTANCE()` function for location validation plays an important role. The `LATLONG()` function makes it easy to determine the location with precision, while the `DISTANCE()` function provides control over the distance between the authorized coordinate point and the attendance location. The result of the application not only provides convenience in the digital attendance process, but also avoids fraudulent attendance filling outside the validated location through the use of the `LATLONG()` and `DISTANCE()` functions. Thus, ABA DOA provides an effective solution for filling attendance automatically stored in one file.

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