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DESIGN OF MONITORING TRAIN TRACKING USING ARDUINO AND GPS SENSOR MODULE

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Keywords:Train, Arduino, GPS Sensor Module

ABSTRACT

The problem of train users who are always left behind when leaving the train prompted us to design a train tracking monitoring system using the Arduino literature and GPS sensor module. analysis and design is made with UML design that is usecase and business processes use flowmaps. This design is expected to be a reference to system developers to be used as a reference in making the system. Train users can be helped by the train tracking monitoring system including user train can find out specific information about the existence of the train cars, train users do not need to inquire the whereabouts of the train through KAI officers because it is available in the train tracking monitoring system, provides the effectiveness and efficiency benefits to train users

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INTRODUCTION

PT. Kereta Api Indonesia (Persero) is a state-owned company (BUMN) that is oriented towards transportation services. In the course of its history, railroad transportation in our country proves its meaningful role in the transportation

sector in supporting economic growth and national development. The development of technology has now been felt in all areas of human life. Technology has been widely used to facilitate human work, both in offices, education, business and so on with the development of technology in the field of automation systems.

As a large company of course, PT. Kereta Api Indonesia (Persero) is demanded to be more transparent and satisfying service regarding information conveyed to the public, especially to passengers as consumers. We can see lately about the number of uses of long-distance transportation in Indonesia, that trains are included in the category 3 largest as the most widely used means of transportation.

Problems that arise between passengers and PT. KAI, there are some problems that cause passengers to feel dissatisfied with the services of PT. KAI, among other things, is about the delay of train arrivals for which passengers have no known information. In addition, other problems also arise, when passengers do not know specific information about the existence of the train car and PT. KAI service personnel do not provide detailed information about the position and information of the train car to be used.
Based on the background and problems, we are interested in raising the phenomenon that occurs regarding the availability of information on the position and position of train cars to minimize passenger concerns about the latest train information that will be used. We provide solutions by building a "Train Tracking Monitoring" system design that can overcome these problems by utilizing Arduino and GPS Modules.

LITERATURE REVIEW

The literature used in developing of journal is :

Arduino Microcontroller

Arduino Uno is a series developed from ATmega328-based microcontrollers. Arduino Uno has 14 feet of digital input / output, of which 6 digital feet can be used as a PWM (Pulse Width Modulation) signal. PWM signal serves to regulate the motor rotation speed. Arduino Uno has 6 analogue input legs, a crystal oscillator with a clock speed of 16 MHz, a USB connection, an electrical connector, a header foot from the ICSP, and a reset button that functions to repeat the program.
Arduino UNO can also be defined as a microcontroller board based on ATmega328. Arduino UNO contains everything needed to support a microcontroller, easily connect it to a computer with a USB cable or supply it with an AC to DC adapter or use a battery to start it.[1]

GPS Sensor Module

GPS Module is a sensor to find the location and distance of public services with Map and Augmented Reality Camera-View on Android-Based Mobile Devices. The application can facilitate the search for public service locations needed by

simply selecting on the general service location menu. GPS Module is a sensor to find the location and distance of public services with Map and Augmented Reality Camera-View on Android-Based Mobile Devices. The application can facilitate the search for public service locations needed by simply selecting on the general service location menu[2]

GPRS Module

GPRS modules are chips or circuits that will be used to establish communication between mobile devices or computing machines and GSM or GPRS systems. Modems (demodulator modulation) are an important part here. This module consists of a GSM or GPRS modem module supported by power supply circuits and communication interfaces (such as RS-232, USB 2.0, etc.) for computers. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or can be a cell phone that provides GSM modem capabilities.[3]

Simcard

The SIM card (the abbreviation customer identity module card) is a portable memory chip used in GSM mobile phones. It is an important component in cellular telecommunications as it identifies and stores telephone numbers and connects the cell phone to the cellular operator's network. Because the SIM card also has a memory element (limited), they can also be used as portable containers to hold telephone contacts. The SIM card is small and rectangular, around 25mm x 15mm, and it is located in one corner. This feature is very safe to insert the card properly into the appropriate slot on the cellphone.[3]

Printed Circuit Board (PCB)

PCB (Printed Circuit Board) is a copper-coated board used to make electronic circuit lines. PCBs that are used in general are made of single layer manifold material. The electronic component is designed using the ATMega328 microcontroller minimum system, servo motor continues, push button, buzzer, and 16 x LCD display. The program on the PCB solvent is created using Arduino IDE software.[4]

Analysis and Design

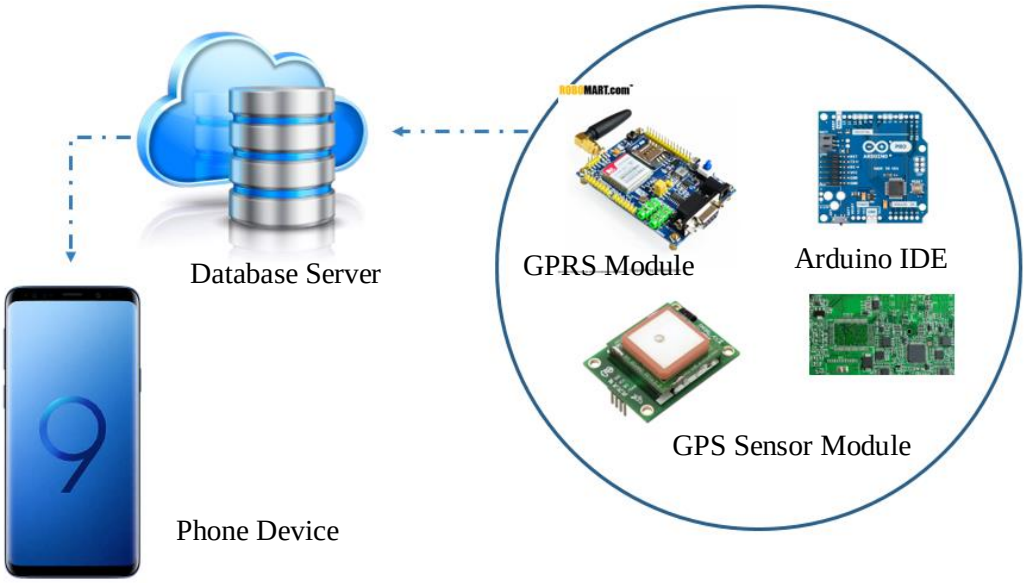


Figure 1. Overview of the Device

Figure 2. Usecase

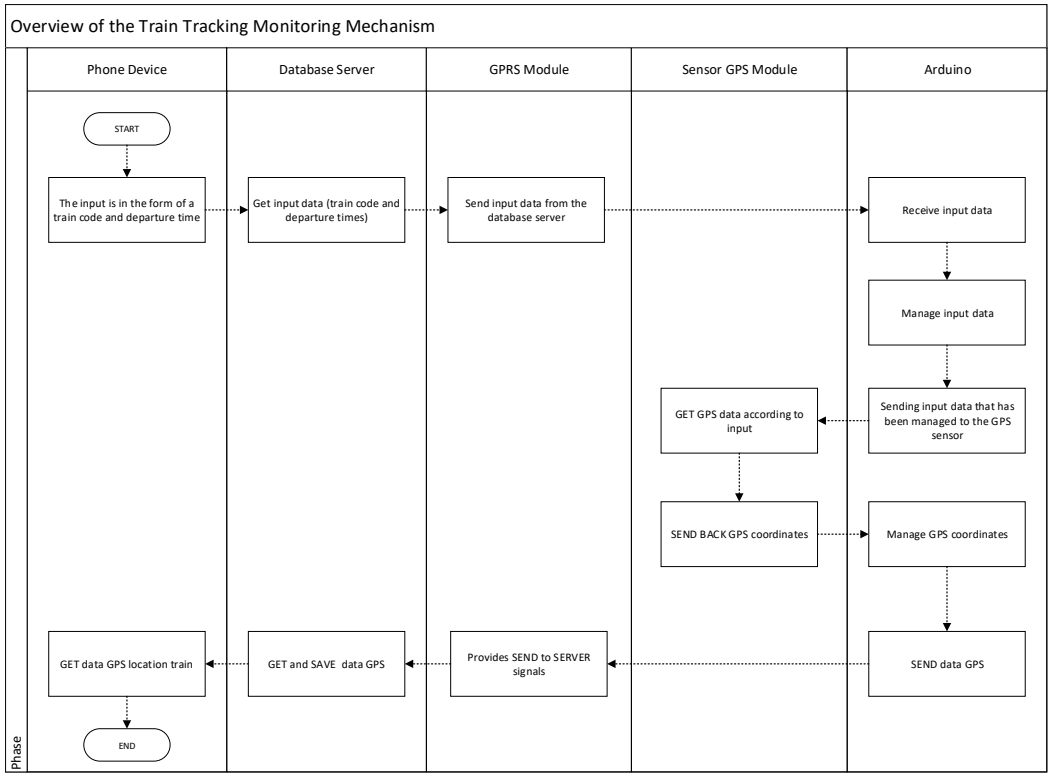


Figure 3. Train Tracking Monitoring Mechanism

In Figure 3 is a depiction of the Train Tracking Monitoring mechanism that utilizes several entities, along with an explanation of each entity used in this mechanism.

Phone Device

In this mechanism, a phone device is defined as an entity that sends input and an entity that receives output. The input which becomes the raw data that will be processed is the train code and departure time and the output data that will be displayed by this entity is the GPS location of the train data.

Database Server

Database server is an entity that receives input data from the phone device where the input data is. This entity will also be tasked with sending and storing processed data in the form of GPS data to phone devices.

GPRS Module

GPRS Module is an entity that will become a link or communication channel for sending data to and from the database server and sending data directly to Arduino devices.

Arduino IDE

This entity is an entity that will manage input data into a data library that will later be read by the GPS Module. The input data will be decomposed into the program

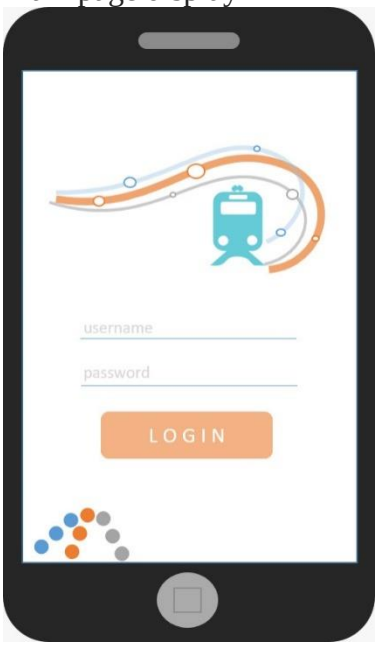
code for the microcontroller. In addition, Arduino will also receive GPS coordinates returned by the GPS module. The coordinate data is processed from the form of the microcontroller program code into round data in the form of longitude and latitude.

GPS Sensor Module

GPS Module is an entity that will provide train location data based on shipment data from the Arduino library.

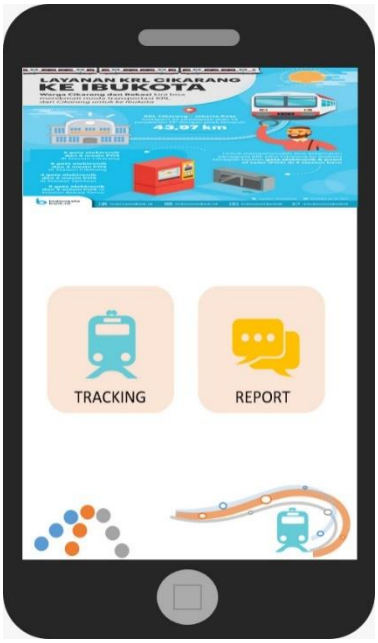
MOCKUP APPLICATION

Main page display



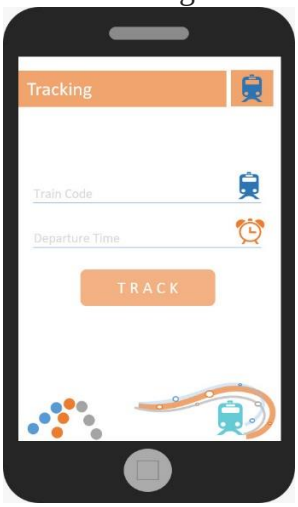
The following is the main page display of the train tracking monitoring system, users are required to login first before proceeding. The two fields in the login are the username and password created by the user and verified by email. If the user does not have an account, then they can register their account first. This main display can be used by everyone who will travel by train or for those who just want to know the whereabouts of the train cars

Menu page display



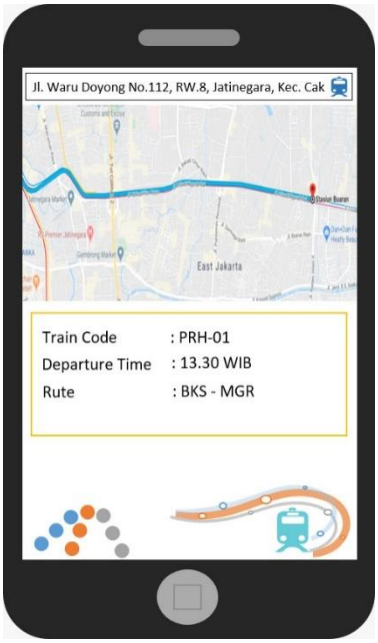
In the menu display there are two menus, namely tracking and report. The tracking menu is used for users who want to know the whereabouts of the carriage they mean while the report menu is used for daily, weekly or monthly reports of trips that he has done in a certain period of time. This view will only be displayed if you already have an account through the main login screen before

Train Tracking Menu



This is a display of the main business processes in the train tracking monitoring system. Users who have registered their accounts and can log in, select the tracking menu, then the display appears as follows. The user enters the train code and departure time, then the system will store the data in the database server and then display the detailed information needed by the user in train tracking monitoring.

View Train Tracking Monitoring



This is a display of the results of the train tracking monitoring consisting of the train code, departure time and route

CONCLUSION

The conclusion of this journal is that train users can be helped by the train tracking monitoring system including:

1. User train can find out specific information about the existence of the train cars
2. Train users do not need to inquire the whereabouts of the train through KAI officers because it is available in the train tracking monitoring system
3. Pprovides the effectiveness and efficiency benefits to train users

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