Design of Bag Monitoring Security System Based On Internet of Things

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***Abstract*—Most common belongings that lost, stolen, drop, or not monitored because of our activity are wallet, suitcase, and bag. If those item stolen, most unlikely can retrieve back. Bag monitoring security system base on Internet of Things is a solution for acknowledge of bag condition. Is our bag open or close, whether it far or near us, or where is the exact position of our bag on the world. This system is using Arduino as microcontroller, bluetooth module as distance indicator, sim 800L module to send data to cloud server and make a call to give notification of opened bag, GPS module to acknowledge bag location, and Telegram app to display notification of every request to the system. Output of this research is a system that capable to display notification for user with 8 second delay notification**

Keywords— ***Bluetooth; GPS; Monitoring; IoT***

I. INTRODUCTION

Security is a condition which is free, shield or hiden, peace; not fear or worry; no risk[1]. Secure is a state where all basic need oh human which need of feel safe is fullfiled[1].

Monitoring is a routine process of collecting data and measuring progress for the program or observing changes, which focus on process and output. Monitoring provide basic data to answer the problem, and evaluation is put those data in use and expected to give more. Evaluation is studying situation for a problem, giving solution and what to do or not, suggesting a repairment. Without monitoring, evaluation cannot be done because it has not basic data to analyze and worried to cause speculation [2].

This research focus on the design of bag monitoring security system that can be monitored through smartphone. In researches that have been done there are development about security system focus on several problem.

There are severa related research before, among others: "On the Design Fire Detection Based on Internet of Things and SMS Gateway Using Arduino" that focus on fire in forest and real-time information using short massage. On this paper also explained the result of the system [4]; "On the Design Magnetic Lock Using Keypad and Solenoid Based on Internet of Things" by Helmi Guntoro, Yoyo Somantri, and Erik Haritman focus on build a key using PIN to unlock it. There are deficiency from this research that the security still can be breach if anybody else know the PIN to unlock the door [5]; "On the Design of Friendly Baby Room Monitoring System in Smartroom Using Application Based on Internet of Things" by Dodi Ichwana Putra and Dian Eka Putra that focus on implementation of *pervasive computing concept* and *Internet of Things for monitoring friendly baby room through social media application to ease the user in supervising baby safety and room condition* [6]; "Design of Safety System of Bicycle on Public Place Based RFID" by Purhendi Bayu Basuki, Unang Sunarya, and Atik Novianti that focus on the system in the public space. Beside, this research is headed to substitution from paper ticketing system to RFID card [7]; and also research about "Intelligent Monitoring System of Special Vehicle Based on the Internet of Things "that focus on giving information real-time. This monitoring system is also capable to surviliance temprature, humidity, and vehicle location using several technology, such as sensors, wireless communication, and RFID [2].

Based on recent researches, there is still a few research that focus on building security system that combine security system with daily things such as backpack or bag and can be accessed through smartphone and get notification via social media. Most

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existing security system using short message as notification. This notification become less interesting because short message considered to be out of date due to development of technology.

II. System Design

In this section, there will be explain about system requirement, and whole system design which become purpose of the research. System specification developed until the end of the research as follows:

- Security system only activated when bag is in bluetooth range with internet connection.
- Using bluetooth module as distance indicator between bag and user.
- Using *reed switch* as an indicator if bag open or close.
- Using Wemos D1 microcontroller as controller to designing security system.
- Using GPS module to get location of bag in earth surface.
- Using Telegram application to displaying notification from the system that came from sensors.
- Accessible by any kind of smartphone with internet connection, using Telegram application
- Real-time data sent from censors to microcontroller

Final system design shown by Figure 1.

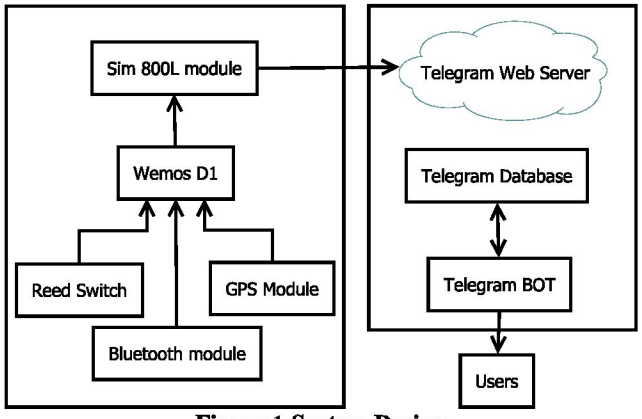

Figure 1 System Design

WEMOS D1 Mini work as controller that collect all data from GPS, bluetooth, and reed switch. These modules collecting various data, but only few that sent using sim 800l module to Telegram web server. Reed switch is used to detecting bag in open or close condition. GPS module is act as a marker of bag position on earth surface. Bluetooth module is used to detect the bag near user or not. And Telegram BOT is used to display every information that user ask trough application.

III. Preliminary Result

This system is design with 1 GPS Neo6M2 module which used to detect bag location on earth surface. 1 reed switch as indicator of bag condition is it open or close. 1 bluetooth module as distance indicator, and also 1 ESP 8266 type Wemos D1 as microcontroller.

Bluetooth module acted as indicator of safe zone for the bag. If the bag still in bluetooth range, then the bag is still in safe zone because user can watch or monitored by eye. If the bag is out of bluetooth range, notification will alert user using a simple phone cal which indicate the bag is out of bluetooth range

Reed switch acted to give information about the bag is it open or close. Reed switch is place on the zipper and on the other zipper is placed with magnet. when the bag is open, reed switch is out of magnetic field. It caused system to operated. After system operated and all sensors get power, the system make a simple phone call to user as notification that someone is try to open the bag.

If the bag is out of bluetooth range, user can send request to Telegram bot chat for bag location. GPS module that installed in the system will give information about bag's location and send it via Telegram. Bot chat only send latitude and longitude data to user chatroom, then user can use that data to Google Maps application.Figure 2 show how system implemented with all sensors

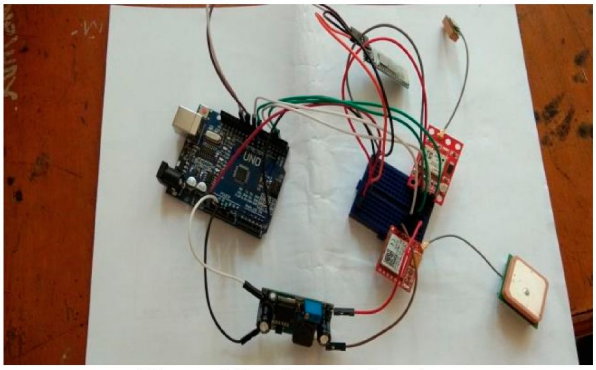

Figure 2 Implemented system

Testing and Analysis

This test is applied to all sensors under some circumstances. System is test in closed area (in laboratory). User test each sensors performance by varied input value for each sensor. The device used by user to monitored the bag must have internet connection in order to get notification from Telegram but there is no need for internet connection to get notification about bag in open or close condition. By using data tha sent by Telegram bot chat, user input the data in Google Maps application. Figure 4 shown screencapture of Google Maps data using smartphone and computer.

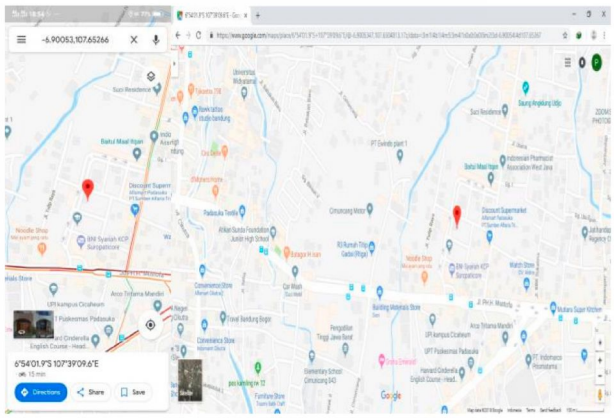

Figure 3 screencapture from smartphone and laptop

Table 1 Result of GPS module

No	Time Sent	Time Received	Delay (second)	GPS Data		Amount of Satelite
				Latitude	Longitude	
1	11:31:39	11.32.06	7	-6.90055	107.65267	11
2	11:37:52	11.37.58	6	-6.90057	107.65269	9
3	11:43:00	11:43:05	5	-6.90060	107.65271	10
4	11:48:12	11:48:19	7	-6.90053	107.65267	12
5	11:53:21	11:53:28	7	-6.90056	107.65268	10
6	11:58:30	11:58:38	8	-6.90054	107.65266	10
7	12:03:42	12:03:53	11	-6.90054	107.65267	12
8	12:08:55	12:09:06	11	-6.90053	107.65266	10
9	12:14:07	12:14:17	10	-6.90053	107.65263	12
10	12:16:16	12:16:25	9	-6.90058	107.65264	11
		Average	8			

IV. Conclusion and Future Works

This system can be used on every device with internet connection, Telegram application, and active sim card. Bluetooth range in this research is averaging 15 meter, reed switch tolerance is 5 cm, and delay from GPS module is 8 second in average.

Design of Bag Monitoring Security System Based on Internet of Things is simple and cheap. Feature on this system only monitored latitude and longitude of bag position also zipper condition base on reed switch. Furthermore, of this research as follows:

1. Using GPS shield for more efficient time of GPS.
2. Adding camera to get more information about bag condition
3. Less wired jumper to reduce device volume and reduce system delay. Tabel 1 Pengujian *delay* notifikasi

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