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# Implementation of Iot-based Smart Security Network With Telegram Notification

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**ABSTRACT** The Internet of Things (IoT), is a concept that refers to a network of physical devices connected to each other and the internet. The way IoT works involves several components, including hardware, software, and network connectivity. Despite much talk, a standard definition for the Internet of Things (IoT) still does not exist today. The design of this research uses the action research method. smart security is a tool used to monitor the security of a room, smart security is composed of infrared as input, ESP8266 as process, and telegram as output. The sensor will detect movement, ESP8266 processes, if it meets the criteria then esp will send a notification to the telegram via the internet network. The smart security network system is declared successful if ESP is able to send notifications to the telegram application. Smart security systems require a stable network, if the network is less stable then the notification sent will be late. The telegram application is a medium that will be used as a recipient of information from the ESP.

**INDEX TERMS** Smart Security, Internet of Things, ESP8266, Telegram..

## I. INTRODUCTION

Currently, there is still no room security system that really focuses on securing the room and providing notifications to social media[1]. Even though security is very important because there are many important items in a room[2]. So it does not rule out the possibility of losing an item in the room[3]. Internet of Things (IoT), is a concept that refers to a network of physical devices connected to each other and to the internet[4]. The way IoT works involves several components, including hardware, software, and network connectivity[5]. Despite much talk, a standard definition for the Internet of Things (IoT) still does not exist today. However, in simple terms, IoT can be explained as a concept where things or objects around us can communicate with each other through the internet network[6]. In this context, IoT refers to the process of identifying objects connected to cyberspace (internet) through wired or wireless networks, and then the information obtained from these objects is processed using specialized application software[7].

The implementation of Iot can vary depending on the developer's wishes. This includes the creation of specialized software and integration with connected objects to obtain the desired information[8]. For example, developers can create a system that allows users to control household devices such as

lights, fans, or air conditioners through an app on their smartphone[9]. These objects will then be connected to the internet and can communicate with the app that controls them[10]. The main goal of Iot implementation is to create a more connected and intelligent environment where objects around us can interact with each other and share information to improve efficiency, convenience, and our daily lives as a whole[11].

In this research the author designs a device that can detect ID cards and human movements and send information via social media. This tool is designed using ESP8266 as the brain of the system and using Arduino IDE software[12][13].

This system is designed to be able, to provide information (notifications) to telegrams when the sensor detects movement[14]. In this era of technological advancement, it is not impossible to create a new innovation, making a "smart" system that can secure the room remotely by implementing the internet of things concept where this concept can connect objects with an internet connection so that monitoring, control via the internet network can be done[15].

The Internet of Things works by entering internet data into the system, but the quality and quantity of existing data are also often found errors to find alternatives, it will be more efficient if this system can be connected directly to sensors connected

to the internet network to obtain data, therefore this IoT is a technology that uses internet network connectivity that is connected continuously by connecting to the internet network through sensors and is always active[16].

**II. METHOD**

This research design uses the action research method. This applied research method aims to improve the effectiveness, efficiency, and quality of work products. Action research is used as a means to test, develop, discover, and create new actions that can be applied in the context of work.

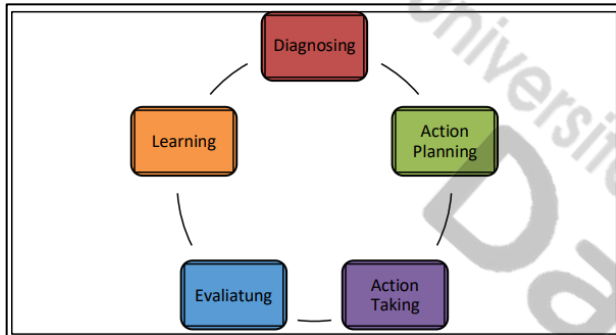


FIGURE 1. Action Research

By implementing this action, it is expected that the work execution process will become more directed, run faster, and produce more and better quality[17]. This research method is carried out through information gathering and searching for additional references from various sources such as books and other literature[18].

In implementation, tools or means are used as a way to implement or carry out a concept, policy, or project[19]. This requires a good understanding of how to optimize the use of these tools to achieve the desired results[20]. Successful implementation involves good planning, efficient coordination and proper management of resources to achieve the desired results[21].

**A. DIAGNOSING**

Diagnosing, this stage contains the identification of the main problems that the research subjects have that they want to solve or change[22]. Identify and diagnose the main problems that exist in order to find out more about the object to be studied[23].

**B. ACTION PLANNING**

After understanding the main problem, then proceed with drafting the right action plan[24] At this stage the researcher carries out an action plan to overcome the previously identified problems, here the author uses the ESP8266 microcontroller as the main process media[25]. the infrared sensor functions to detect movement and the telegram application as an information medium that conveys notifications, this system is called the Internet of Things or IOT.

Divide the system design into hardware and software design to determine the overall architecture of the Smart Security system. In the planning stage, some software or hardware is needed[26]. Various Software and Hardware that will be needed in a series of smart security are as follows:

TABLE 1. Software and Hardware

NO	SOFTWARE & HADWARE
1	ESP 8266
2	KABEL JUMPER
3	SENSOR INFRARED
4	MINI BOARD
5	KABEL USB
6	LEPTOP
7	PONSEL
8	APLIKASI TELEGRAM
9	APLIKASI ARDUINO IDE

The entire hardware and software becomes a single unit called automation and is applied to the process of motion detection, and notification as output[27][28]. Next is the step of compiling the system of the tool, here is the system flow of smart

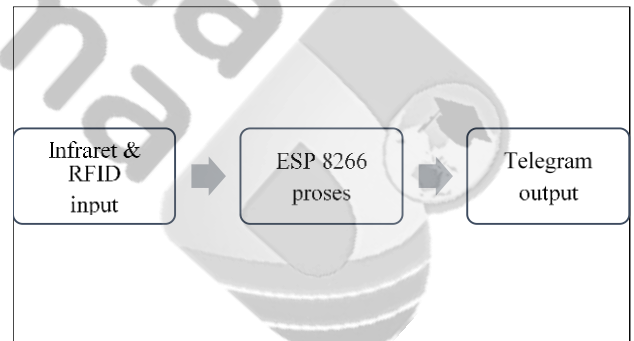


FIGURE 2. Block Diagram

**III. ACTION TAKING**

The following are the steps in the process of making a smart security system prototype which consists of hardware and software implementation. Implementation involves steps to effectively apply hardware and software, so that the system can operate according to its purpose and function.

This process includes assembling and setting up the hardware so that it can connect with the appropriate software. The hardware is carefully configured to be compatible with the software to be used. Implementation ensures that all components work synergistically to achieve the desired performance. It is important to carefully plan and execute the implementation so that the system can function smoothly and meet user needs. Here is the network topology of smart security.

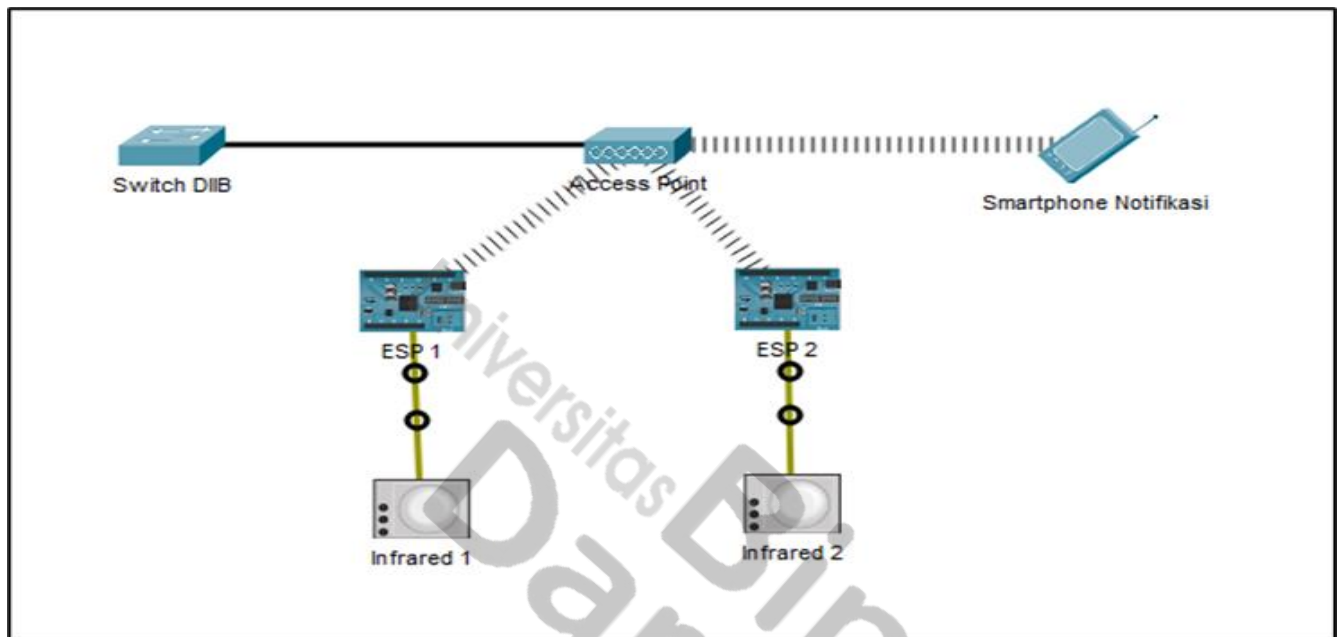


FIGURE 3. Network Topology

The hardware is divided into several modules and basic electronic components, while the software uses Arduino IDE software as a program writing editor and telegram as an application that receives data and delivers Android-based notifications.

At the hardware assembly stage, it consists of ESP8266, infrared sensors, parts of the hardware with each other must relate and work together harmoniously or interact according to the needs of the tool and the purpose of making Smart Security based on the internet of things. From the various hardware components above, it will then be assembled into one that forms an integrated tool, thus making a tool to monitor the room.

#### A. NETWORK TOPOLOGY

The smart security network is structured with several circuits involving several devices at once. The devices used in this network are routers, access points, esp, and smart phones.

The router that acts as an internet network source will be connected to the existing access point. The access point will be the center of the smart security network because the access point will play a role in connecting esp to the internet network so that it can send data to the telegram.

#### B. BOT TELEGRAM

In the design of a smart security network, a medium is needed that can be used as an output in the form of notifications from smart security. In the research the author needs a medium to display information which can be accessed in real time. In this study, the authors chose social media, namely telegram. The author chose telegram because telegram is an open source social media application, so users can create a bot that we can set ourselves.

By using the open source telegram application (API), all users can create bots according to their needs. The telegram application also does not charge at all for the use of bots in their program. After creating your own bot, telegram will provide an ID and token that can be used to connect ESP8266 with telegram.

#### C. PROTOTYPE

After making the telegram bot is complete and getting the ID and Token from the bot that has been made, the next step is to make a prototype of the wifi device in smart security. The smart security wifi device circuit is made using a 400-point mini board and is assembled as follows:

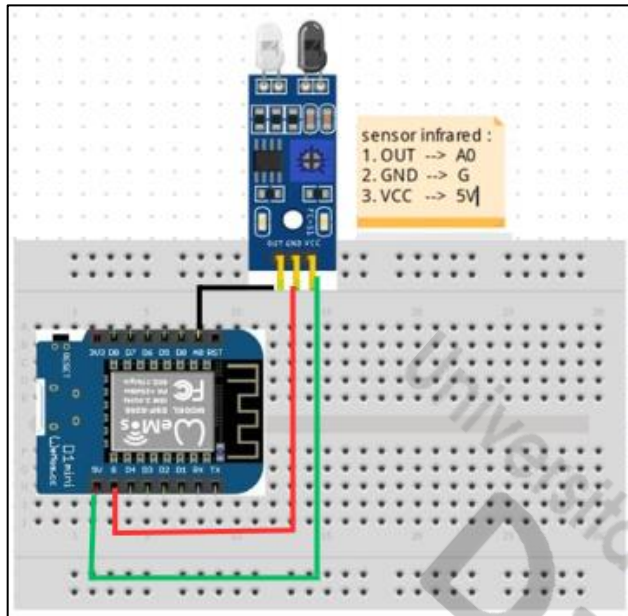


FIGURE 4. Smart Security Wifi Device

The smart security prototype circuit is arranged using a mini board. Mini board functions as a connection between component components used in a series of smart security tools. when the infrared sensor detects a vibration, the infrared sensor will send data to the ESP and the data will be processed if it meets the criteria, the data will be sent to the internet network and finally will reach the telegram application.

V. RESULTS

Testing is carried out on smart security network devices. Testing is done using a miniature room as a simulation. The device is tested to find out whether the system is working properly or not, whether the network from smart security can be connected or not. The following are the results of testing the smart security network system:

TABLE 2. Network Testing Results

Pengujian	MAC Address ESP	Jaringan	Delay Notifikasi (telegram)
Pintu 1	C8:c9:a3:5b:d8:a8	Terhubung	0,6
Pintu 1	C8:c9:a3:5b:d8:a8	Terhubung	0,7
Pintu 1	C8:c9:a3:5b:d8:a8	Terhubung	0,7
Pintu 2	44:c9:a3:5b:d8:58	Terhubung	0,6
Pintu 2	44:c9:a3:5b:d8:58	Terhubung	0,7
Pintu 2	44:c9:a3:5b:d8:58	Terhubung	0,7

The smart security network system is declared successful if the ESP is able to send notifications to the telegram application, here is evidence of the notifications that have been generated:

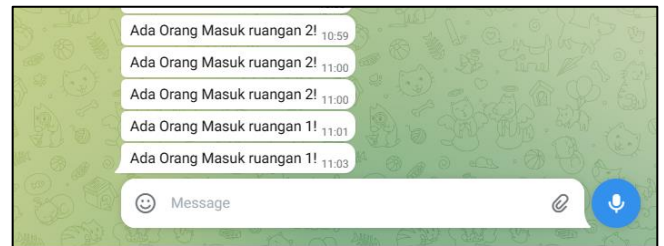


FIGURE 5. Telegram Notifications

VI. EVALUATING

After the implementation period is considered sufficient, then the researchers carry out an evaluation of the test results. After evaluating the test results from smart security, it works well. Judging from the trials carried out starting from network trials, infrared sensor trials, telegram applications as notification media, wifi network trials on the ESP8266 device. From the results of these tests, it shows that it is connected and accessed on the network.

Thus this smart security prototype is able to display results that are almost the same as the input given. And also done with repeated testing shows that this smart security prototype network is able to display almost the same results for each of the same inputs. Everything is running as expected.

VII. CONCLUSIONS

The Internet of Things (IoT) system is any form of activity carried out using access media. With the existence of IoT securing the room becomes easier and more efficient. The smart security network topology is composed of 2 infrared sensors, 2 microcontrollers, which are connected to the internet network and will provide information in the form of notifications in the telegram application. After designing the network topology and testing the smart security prototype tool by utilizing WiFi technology can work well as well as the notification process through the telegram application. The application of a network contained in the design of an internet of things system using wireless in a wifi that is supported by a microcontroller to expand from internet connectivity that is connected uninterruptedly so that it can be managed as needed. The research that has been carried out and in accordance with the problems formulated and analyzing the results of the tests that have been carried out, there are several conclusions that can be drawn, namely:

1. Smart security requires a stable network, if the network is less stable then the notification sent will be late.
2. Implementation only up to the prototype stage and room simulation, the smart security design will be connected to the telegram application. The design uses hardware such as ESP8266, infrared sensor, jumper cable and breadboard and in



software using Arduino IDE and telegram application (telegram bot).

3. The telegram application is a medium that will be used as a recipient of information from ESP. So that it can make it easier to provide information (notification) if someone enters the room.

With the implementation of this smart security network, securing the room becomes easier and more efficient.

### VIII. ADVICE

The smart security network system is certainly not perfect and still has shortcomings, for that it is necessary to make improvements and optimizations to the system to make it better. The suggestions that the author wants to convey so that this system runs more optimally are as follows:

a. ESP8266 does not yet support image input because this module still cannot be connected to the camera module, so the output still does not support images and is limited to text messages that will become telegram notifications. The author suggests for development to use a more sophisticated module such as ESP cam32 which has a camera support so that it can provide image output.

b. The smart security network requires a stable network to run the system. If the network is less stable, the delay will take longer, the author suggests that when implementing this smart security it must be supported by a stable internet network.

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