CHAPTER 3 RESEARCH METHODOLOGY

The steps to complete this project are:

1. Literary Studies

The author collects basic theories from internet media and journals related to the project, so that it can help the research process. The following basic theories are studied as follows:

- a. ESP 32-CAM
- b. PIR sensor
- c. Telegram Bot
- 2. System design

In designing the system, it is necessary to pay attention to the arrangement of the circuit, the details of the components so that they do not experience errors and damage. The design is also needed to make it easier for writers to make tools as expected. At this stage, a home security system maker is carried out using an esp32-cam that has been connected to the telegram platform. This security system is designed automatically, can notify homeowners of danger notifications via telegram when the PIR sensor successfully detects a movement.

a. Hardware Design Program

In hardware design includes the manufacture of components. For the tools and materials needed in the manufacture of a PIR sensor-based home security system, namely:

- a. One ESP32 CAM microcontroller
- b. One PIR sensor
- c. One buzzer
- d. One LED light
- e. One PCB
- f. Jumper Cable

- g. Other materials such as cardboard and plywood
- b. Software Design Program

Software design can be started by creating a system flow, using the installed Arduino IDE 1.8.13 application software, the ESP32-CAM board functions as a program controller. It also requires UniversalTelegramBot to connect to Telegram. This home security system will work automatically. When the PIR sensor (Passive Infrared Receiver) is ready to detect human-generated motion, the ESP32-CAM will automatically take a picture and send it to the telegram server and the homeowner will receive a notification in the form of text and photos.

c. Bot Telegram

All kinds of messages, requests and commands sent by the user will be forwarded to the telegram version of the server called the API Bot Interface. it is necessary to make a telegram bot first for use in this security system design.

d. Arduino Code Program

Coding on the system design using the ESP32-CAM board. The libraries used are UniversalTelegramBot 1.2.0 and ArduinoJson 6.9.0. These programs are useful for connecting to wifi, setting telegram commands, making settings on the PIR sensor and taking pictures and sending pictures to telegram.

3. Testing

After all the tools are installed, the next step is to perform functional and performance testing on hardware, software and all tools to determine the ability, resilience, and performance range of the system to work optimally. The system is tested and data collection is observed directly. The simulation is done by means of the owner of the house passing the distance and forming a certain angle. Observations were also made in dark and light conditions.