

## CHAPTER 4

### ANALYSIS AND DESIGN

#### Hardware



**Figure 4.1:ESP 8266**

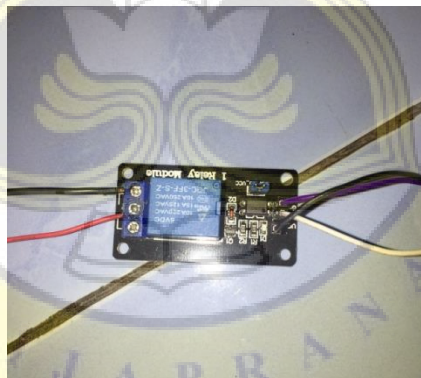
The ESP8266 is a Wi-Fi module that functions as a microcontroller enhancement. here the author uses esp8266 because this device can connect directly to Wi-Fi and establish a TCP/IP connection. This module is also equipped with a processor, memory and GPIO where the number of pins depends on the type of ESP8266 that we use. So that this module can stand alone without using any microcontroller because it already has equipment such as a microcontroller.

And the author also connects it to tasmota because Tasmota is an open source firmware alternative for products based on the esp8266 chip that can be customized according to our wishes. By using this firmware, we can change the address/pointing server of the destination so that it can be connected with our own application.



**Figure 4.2: RFID Access Control Panel X1 Keypad Card Password Door Lock**

RFID Access Control Panel X1 Keypad Card Password Door Lock (Radio Frequency Identification) is a technology that utilizes radio frequency as the identification of an object, and in this tool there is also a pin password which is the same as a tool for unlocking the key. This tool works in 12 Volt voltage and can support 1000 standard users.



**Figure 4.3: RELAY**

Relay is a switch (Switch) which is operated electrically and is an Electromechanical component (Electromechanical) which consists of 2 main parts, namely Electromagnets (Coil) and Mechanical (a set of Switch Contacts/Switches). Relays use the Electromagnetic Principle to drive the Switch Contacts so that with a small electric current (low power) they can conduct higher voltage electricity. For example, a Relay that uses 5V and 50mA Electromagnets is able to move the Armature Relay (which functions as a switch) to conduct 220V 2A electricity.

This Relay serves to deliver Voltage to the Solenoid.



**Figure 4.4:SOLENOID**

This Door Lock Solenoid is one of the Automatic locking Solenoids that functions specifically as a Solenoid for Door Locking. This Door Lock Solenoid requires a Voltage of 12Volt, the working system of this Solenoid is Normally Close. The Solenoid valve will be pulled if there is Voltage and conversely the Solenoid valve will be stretched if there is no Voltage.



**Figure 4.5:ESP 32 CAM**

Esp32cam is a Camera Module which is one of the Microcontrollers that has additional facilities in the form of Bluetooth, Wifi, Camera, even up to the MicroSD slot. after that the Ip address in Esp32 will be copied in the Telegram Message so that it can be seen Live.



**Figure 4.6: PUSH BUTTON**

This Push Button functions to open the solenoid from the inside, the way it works is just by pressing the button, the solenoid will open. This Push Button works in a voltage of 12 Volts.



**Figure 4.7: STEP DOWN DC 5 A**

A step down transformer is a transformer that reduces the output voltage. A step-down transformer has fewer secondary turns than the primary, so it acts as a voltage reducer.

## Algorithm Decision Tree

Decision tree learning is a method commonly used in data mining. The goal is to create a model that predicts the value of a target variable based on several input variables.

A decision tree is a simple representation for classifying examples. For this section, assume that all of the input features have finite discrete domains, and there is a single target feature called the "classification". Each element of the domain of the classification is called a class. A decision tree or a classification tree is a tree in which each internal (non-leaf) node is labeled with an input feature. The arcs coming from a node labeled with an input feature are labeled with each of the possible values of the target feature or the arc leads to a subordinate decision node on a different input feature. Each leaf of the tree is labeled with a class or a probability distribution over the classes, signifying that the data set has been classified by the tree into either a specific class, or into a particular probability distribution (which, if the decision tree is well-constructed, is skewed towards certain subsets of classes).

A tree is built by splitting the source set, constituting the root node of the tree, into subsets—which constitute the successor children. The splitting is based on a set of splitting rules based on classification features. This process is repeated on each derived subset in a recursive manner called recursive partitioning. The recursion is completed when the subset at a node has all the same values of the target variable, or when splitting no longer adds value to the predictions. This process of top-down induction of decision trees (TDIDT) is an example of a greedy algorithm, and it is by far the most common strategy for learning decision trees from data.

In data mining, decision trees can be described also as the combination of mathematical and computational techniques to aid the description, categorization and generalization of a given set of data.