

CHAPTER 3

RESEARCH METHODOLOGY

Making this project begins with reading references from various related journals, next preparing any hardware needed including the two input sensors, then calibrating the two input sensors where the two input sensors are used to obtain existing data. After that, the coding process is carried out by entering the implementation of Fuzzy Logic and uploaded to the microcontroller, then in the last stage is the testing of the tools that have been made.

3.1. Preparing The Device

The author prepares the tools needed in this project, the tools needed are Arduino, ultrasonic sensor, TDS sensor, breadboard, jumper cables, two relays, and two mini-pumps.

3.2. Calibration

This study uses data from distance values and ppm, data obtained from calibrated sensor inputs. The ultrasonic sensor is calibrated using a ruler so that it gets the appropriate distance value and for the TDS sensor it is calibrated using a TDS meter so that it gets the appropriate ppm value.

3.3. Collecting Data

Data is obtained from two sensors, namely ultrasonic sensors and TDS sensors, the data itself refers to water conditions, namely water with ppm conditions and low, sufficient, and high altitudes. The data is then processed to produce 12 fuzzy rules. Furthermore, it will produce an output in the form of a delay to activate the relay.

3.4. Program Implementation

The program is created and uploaded to Arduino Uno, ultrasonic sensors and TDS sensors are input to determine the amount of ppm and how far the water level is in the reservoir, then the input in the form of values is processed using a fuzzy algorithm with 12 rules to produce a defuzzification value. This defuzzification value will later be used as a delay to turn on or turn off the relay on the nutrition pump and water pump.

3.5. Testing

The testing stage is carried out by calculating how long the tool can take to reach optimal conditions according to PPM conditions and the initial water level. The values at the testing stage will be displayed in the testing table

