CHAPTER 1

1. Introduction

Chrysanthemum (Chrysanthemum sp.) is a cut flower ornamental plant that has both aesthetic and financial value. As a native of a nation with four unique seasons, chrysanthemums are challenging to grow in Indonesia, because chrysanthemum receives an average of 16 hours of light per day at its natural site, it needs more radiation to maximize photosynthesis. The vegetative phase of chrysanthemum plants requires a lot of water since at this time the plant's roots, stems, and leaves grow more quickly and use more water. [1]. Chrysanthemum plants go through a vegetative development phase after the final two weeks of seedling growth, which lasts until the eighth week. The period of irradiation must be extended while the chrysanthemum plant is in the vegetative stage until the flowers are of the appropriate quality and have a height of at least 70 cm [2].

A greenhouse is a structure with a bubble-like shape and a glass or translucent interior that shields plants from unfavorable weather conditions while allowing them to receive light that is suitable for growing chrysanthemums. Additionally, the greenhouse is built to activate the regulation of many environmental factors, such as air temperature, sunlight, humidity, wind speed, and nutrients, that have an impact on plant growth [3]. The environmental conditions of the greenhouses are less precise than those tracked by technology since many of them are manually run by people who water the plants and assemble them every day. The development of Internet of Things (IoT) technology allows for the remote integration and control of automation in greenhouses [4]. Since research that has been effective in creating and constructing an autonomous control system in greenhouses is the basis for this, it would have a favorable impact on the development of chrysanthemum plants. Real- time and additional variables should be put in the crop area using advanced control systems and equipment [5]. Based on research testing and implementing a control system design that uses temperature and humidity sensors and light intensity on the UNISLA building prototype, the control system runs well and is integrated to a web server and can be controlled via the internet. So it really needs a lot of development that can be done. As is the case for further research, the logic of using sensors turns out to be very possible to be developed, for example automation so

that it can used as a way to save electricity. or later the sensor value can be stored in the database [6].

With the aforementioned issues, the main contribution of the research is to design and construct a greenhouse prototype with a size of 100 cm x 50 cm x 100 cm that is able to regulate temperature and humidity based on the Internet of Things (IoT) with Firebase in order to increase growth and efficiency in monitoring the growth of chrysanthemums as a method of remote observation from the greenhouse. Based on the minimum setpoint of the DHT21 sensor value for the active actuator, the system can automatically stabilize the temperature and humidity in the greenhouse prototype. Based on the minimal setpoint of the LDR sensor value used as the light intensity variable, the system can automatically turn on the LED lights. In order to warn horticulturists who were outside of the greenhouse, the monitoring system was designed with notifications on Telegram in the form of warnings of abnormal temperature and humidity levels. The construction of this greenhouse is expected to accelerate chrysanthemum plant development.