Design And Build An Automatic Plant Sprinkler For A Farmer Group In Klino Village

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Abstract.
This volunteer work is being done in Klino Bojonegoro, more specifically in the Bojonegoro and Madiun border region. By supplying IOT-based automatic plant sprinklers for watering the local chrysanthemum horticulture, this PKM activity serves to support farmer organizations in the community. Chrysanthemum and rose picking excursions are one of the tourist attractions in Klino Village, one of the tourist destinations in Bojonegoro. The female farmer organization Blooming Sari is in charge of managing the chrysanthemum cultivation (KTW). Using hoses and padlocks, traditional watering procedures are still used, and they are done in the morning and evening. The approach used in this program is to have casual, one-on-one conversations with farmer groups, followed by observations of field requirements and the creation of tools. The stages of activities completed include site surveys, tool and material analysis, tool creation, tool testing, socialization, monitoring, and PKM program evaluation. This PKM activity resulted to the creation of an IOT-based, smartphone-controllable automatic plant watering solution. There are a number of challenges, including those in tool manufacturing that necessitate numerous trials, pipe installation that requires pipes to match the position point, network limitations, and others. This leads to the conclusion that this PKM activity is effective, capable of resolving issues, and perhaps a solution to the issues facing farmer groups in Klino Bojonegoro village..

Keywords: *Automatic Plant Sprinklers, Women's Farmer Groups and Flowers Chrysanthemum*

I. INTRODUCTION

The Sekar Women's Farmer Group cultivates chrysanthemums as a pilot village through village plantings. The Klino Village Cash Land is used for the cultivation of chrysanthemum flowers, with an area of around 8x14 m, 5 beds, and seedlings of roughly 5000/1000 per bedeng (Ponce, 2014). The attractive plant chrysanthemum, also known as Chrysanthenum, is well-known, well-liked by the general public, and has a high economic value 2. In addition to being beautiful due to the variety of colors and shapes. Additionally, chrysanthemums are simple to assemble and retain a pretty long freshness.It also has the benefit of allowing for the organization of flowering and harvesting in accordance with market demands. Chrysanthemums are used as cut flowers to adorn spaces, flower baskets (vases), and floral arrangements. The same way that a potted chrysanthemum plant can be utilized to spruce up homes, hotels, restaurants, and business desks. in addition to being a plant for decoration. Chrysanthemums may also be employed as traditional medicines and as sources of insecticides (Pambudi, 2016).Because chrysanthemum flowers are so vulnerable to pests, caring for them can be difficult. It's crucial to provide water and maintain the right temperature conditions for the growth of healthy chrysanthemums (Andiani, 2013). The flowering process will also be hampered by improper water feeding. Plant watering tasks are still completed by employees using Gembor. In the village of Klino, chrysanthemum agriculture still makes use of traditional equipment for watering the flowers, specifically the Gembor.

Fig 1. Conventional watering (Drilling/Water Faucet) The implementation of watering chrysanthemums is carried out by 5 workers per day.

Because it employs a traditional tool in the shape of a drill, where the discharge of water has not been controlled, the water content provided has also not used a clear section. Even if it has been irrigated in the morning and evening, the conditions there tend to be deficient. When growing chrysanthemums in mountainous areas, sufficient lighting is typically required (Osman, 2017). It differs from farming in Klino Village, which has a warmer temperature, though. Therefore, automatic temperature monitoring and water administration are essential so that it can water every few hours in accordance with measurable temperature circumstances.There are a number of solutions that can be implemented based on the issues that the women's farmer organization in ds.klino is experiencing, including creating automatic plant sprinklers using IOT. IOT, or the Internet of Things, is a concept that attempts to increase the advantages of constantly linked internet access that makes it possible to connect machinery, equipment, and other physical objects (Ningrum, 2015). Machines can cooperate and even act on newly acquired knowledge thanks to the usage of network sensors and actuators to collect data and regulate their own performance (Jansson, 2020). Additionally, in order for farmer groups in Klino village to maximize the use of the supplied tools, training on the implementation of IOT-based tools will be provided.

II. METHODS

Making extensive observations to the Women's Farmer Group is one of the informal approaches used to carry out this community service activity program (KTW). The phases of a program's implementation are as follows:

1. *Parties concerned*

A team from the Electrical Engineering and Informatics Engineering Study Program at Billfath University completed this task. The Women's Farmers Group, which originated in the village of Klino Bojonegoro, is the activity's partner

2. *Official survey*

Through informal interviews with KTW, this effort aims to learn more about chrysanthemum growing in Klino village. Some of them inquire about the following: (1) the best planting pattern for chrysanthemum cultivation; and (2) what advancements are required to enhance the productivity of chrysanthemum cultivation.

3. *PKM Activities*

In order to address issues with traditional watering, this activity is implemented by giving the village IOT-based automatic plant sprinklers. At the scheduled time for automatic watering, the instruments available can make things easier for farmer groups. Additionally, it may be accessed using a smartphone to view air quality, room temperature, soil moisture, and a timer that has been set.

4. *Role of partners*

Participants in PKM activities play the role of partners in this activity by providing a venue for activities to take place.

5. *Monitoring and assessment.*

In order for this PKM activity to be beneficial and perform as expected, this monitoring activity is carried out to monitor activities and also suggest future solutions.

III. RESULT AND DISCUSSION

3.1 Result

On June 6, 2022, this community service project will be completed. Some of the tasks that will be completed during this phase are as follows:

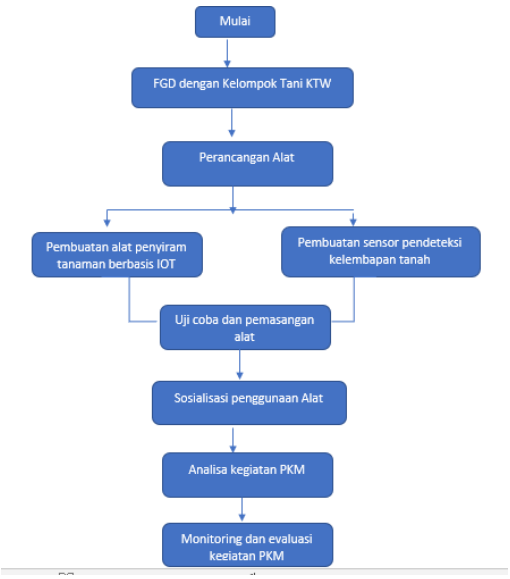

Fig 2. Stages Of Activity PKM

To equalize perspectives on the necessity of creating tools, the community and Billfath university held a group discussion forum as the first stage of the activity. The design of the tools was then completed by a group of instructors and students. The two components of the tool that will be created are automatic plant sprinklers and soil temperature and air humidity monitoring. The tool's trial against plants is the next step. Some of the challenges encountered throughout the experiment include some damaged components, the installation of improper pipes, and the necessity to alter the number of pipe holes. Additionally, because the used reservoir is small and can only hold 750 L of water, there are barriers in the process of water discharge that are still modest, necessitating the purchase of a reservoir with a higher size of 1500 L. The water output is improved after the reservoir was installed, and the pipe hole also correctly discharges water.Another challenge is when an unstable internet connection arises; in this case, a stronger network card is used in place of the modem to speed up smartphone monitoring and reduce the ensuing delay. Following the trial's improvement, socializing and the delivery of tools to the hamlet were the next items on the schedule. At the Klino village hall, socialization took place by showcasing community leaders and agricultural organizations (KTW). The purpose of this activity is to give instructions on how to utilize the tool properly and effectively. There were issues with the tool's operation during the activity, thus a reset was done to repeat the necessary processes. The following lists PKM socialization activities' documentation.

Fig 3. Socialization activities PKM

The next stage involves monitoring and evaluating operations, and in this case, the billfath university team monitors automatic plant sprinklers by keeping track of any setbacks encountered when using the instrument. Following the installation of the tool, there were 3 challenges in this PKM exercise. As a result, an evaluation is conducted as part of the action plan, namely by having a meeting to explore hiring villager

relief workers to operate and manage the equipment should there be a problem.Given that the Women's Farmer Group is entirely composed of women, technical personnel is required to help maintain the instruments that have been used so that they will function as effectively and meaningfully as possible in the future. The design of an IOT-based application for chrysanthemum plants in Klino Bojonegoro, East Java, has been accomplished in accordance with the proposal that has been made for the manufacturing of tools in this activity.The chrysanthemum growing greenhouse in Klino village has the following type of IOT-based automatic plant sprinkler installed:

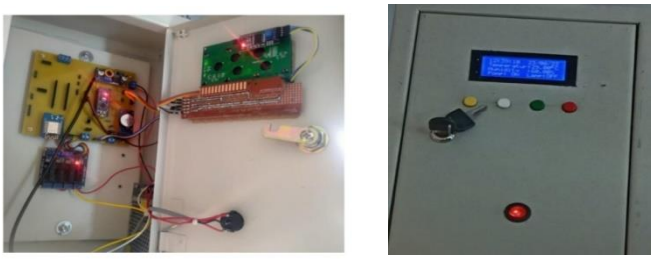

Fig 4. Photo of automatic plant sprinklers

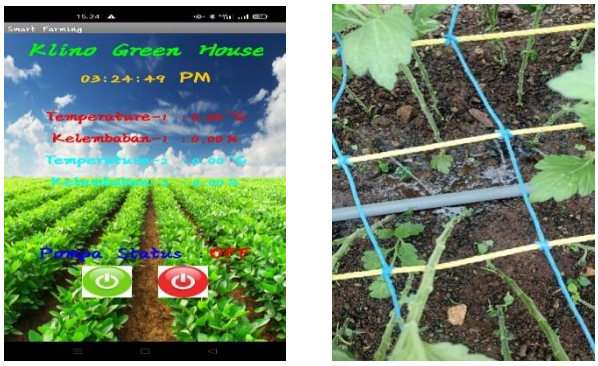

Fig 5. Application of automatic plant sprinkler system

Fig 6. Tool Installation

3.2 Discussion

The system used in chrysanthemum greenhouses is put into practice using a design that adheres to the idea that was created for the design. The Soil Moisturize Sensor and RTC, as well as other parts for the Arduino nano and Wemos D1 small, are used in the hardware installation.

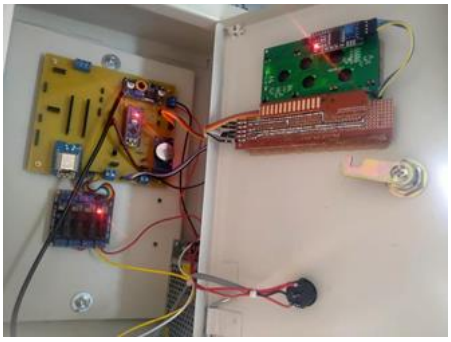

Fig 7. Box Control circuit system

Following are some details on the components used, including A moisture sensor that can find moisture in the soil is the FC-28 soil moisture sensor (Stephen, 2013). One of the development boards for Arduino compatible IoT (Internet of Things) projects is called Wemos. Wemos uses the ESP8266, a Wifi SoC chip that is currently relatively well-known (Kusuma, 2018). One of the compact, feature-rich microcontroller boards that permits the usage of breadboards is the Arduino Nano. The Real-Time Clock (RTC) is an integrated circuit on the motherboard of a computer that saves time values and is powered by a CMOS battery (one of them). The time values are expressed as hours, minutes, and seconds and as year, month, and date (Mulyawan, 2018).When the system is running, the tool's testing findings are used to identify any flaws. Pumps and running lights are tested in accordance with the timer's instructions, however there are occasional delays of 3 to 4 seconds. This is due to the requirement for a steady connection speed when sending signals to Firebase.

IV. CONCLUSION

Based on the community service projects that have been completed, it can be said that this activity offers the Women's Farmer Group in Klino Village the most recent information regarding the internet of things, as well as the opportunity to learn how to operate automatic plant sprinklers for chrysanthemum cultivation. Additionally, this activity assists the tool-making crew so that they can innovate once again to supply new agricultural implements, advancing the potentials in a village.

V. ACKNOWLEDGMENTS

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