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Prototype Of Chili Plant Pest Trap Using Arduino UNO

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ABSTRACT
Chili farmers often experience losses due to pests which always damage chili plants. So that farmers can increase their production results, a solution is needed that can help farmers deal with this problem, namely by making a microcontroller-based pest trap Arduino Uno which is much more natural and safe than chemical pesticides, with a long usage period and the results are also much more promising. rather than using chemical pesticides. Arduino is used as a control center in the process of catching pests. As a control center, Arduino is installed with programming logic to be able to run other tools such as the HC-SR04 ultrasonic sensor as a pest detector, a relay as an extension of the ultrasonic sensor command to run a fan (fan cooler) to suck up pests, and a light sensor to turn on the attractant lights at night. days so that this pest trap protects chili plants for 24 hours.

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INTRODUCTION

The chili commodity has the biggest role in supporting government efforts to increase farmers' income and standard of living, expand employment opportunities, develop agribusiness, increase exports while reducing imports and preserve natural resources, besides that chilies are important for providing nutrition to the community (Rukman, 1996). Most of the obstacles faced by farmers are pest attacks. According to BPTP JAMBI (2014) there are several important pests that can attack chili plants, namely: Thrips (Thrips parvispinus Karny), Fruit Flies (Bactrocera sp.), Whitefly (Bemisia tabaci), Peach Aphids (Myzus persicae), Aphids (Aphididae) and mites (Polyphagotarsonemus latus and Tetranychus sp.).

One of the farmers in East Lombok Regency, precisely in Rempung Village, revealed that pest attacks reduced farmer productivity. Initially, in every 5 days, farmers were able to harvest 20-30 kilograms of chilies and after the pest attack occurred, farmers were only able to harvest 6 kilograms in every 5 days on a large area. land about 50 square meters. The emergence of pest attacks has forced farmers in Rempung Village and East Lombok Regency to mostly use chemical pesticides to reduce the pest population. According to them, using chemical pesticides is very easy to kill pests even though they are very expensive. The use of this pesticide is very unfortunate for environmental observers because pesticides, apart from killing chili plant pests, can also kill pest predators which should be maintained for the balance of the ecosystem. This was emphasized by Haryono (2012) in Yatim (2018), that the use of

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chemical insecticides is aimed at reducing pest populations, so that their use is increasingly widespread and farmers are very dependent on pesticides.

On this basis, researchers are trying to present a solution to the problems experienced by chili farmers, especially in Rempung Village and in East Lombok Regency in general, by making a microcontroller-based pest trap (Arduino Uno) which is much more natural and safe than chemical pesticides, with a long lifespan. use for quite a long time and the results are also much more promising than using chemical pesticides. Arduino itself is a tool used as a control center in the process of catching pests. As a control center, Arduino is installed with programming logic to be able to run other tools such as a fan (fan cooler) for vacuuming pests and turning on attractant lights at night.

METHODS

Design Method

In the process of designing a tool to trap pests for chili plants, the author used the Prototype Method. The Prototype Method is a system creation process that is created in a structured manner and has several stages that must be passed in its creation. The Prototyping approach is an iterative process that involves a close working relationship between designers and users. Processes in the prototype model in general. Can be seen in figure 1 below:

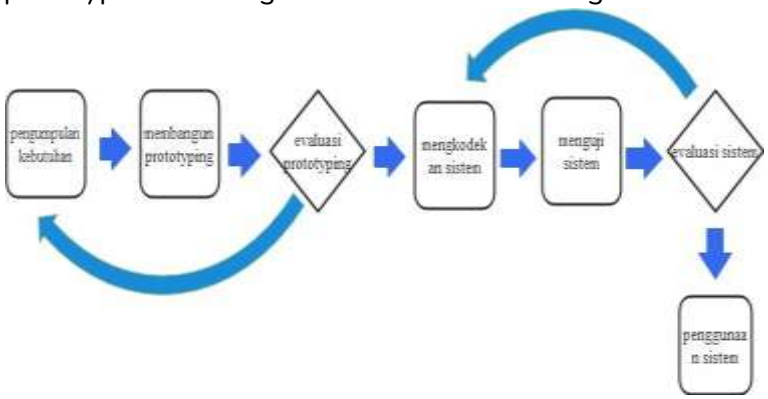

Figure 1. Prototype Method

Block Diagram

The system block diagram is a general description of the flow of the device that will be created. The workflow of the main interconnected device systems, the block diagram flow can be seen in Figure 2 below:

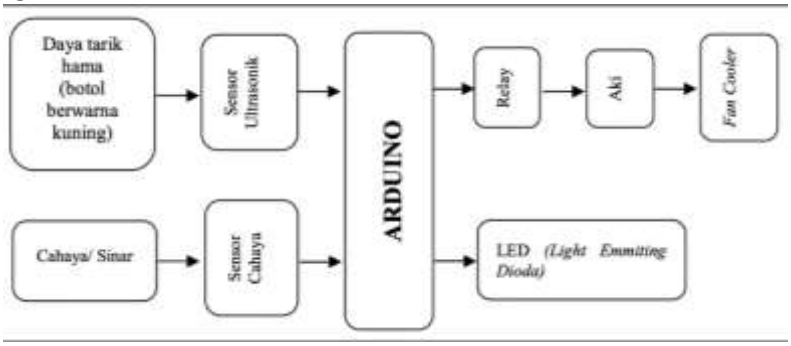

Figure 2. Block diagram flow

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Information :

1. Pest attraction (yellow bottle): to attract all chili pests
2. Ultrasonic sensor: to detect approaching pests
3. Light/light: which comes from sunlight
4. Light sensor: to attract pests at night
5. Arduino Uno: As a controller that will control the entire tool process.
6. Relay: To regulate the electricity flow at the output
7. LED (Light Emitting Diode): lights to attract pests at night
8. *Fan cooler*: To suck pests that come close to the attractant

Flow chart

To clarify the flow of the Chili Plant Pest Trap Prototype Using Arduino UNO, you can see it in Figure 3 below:

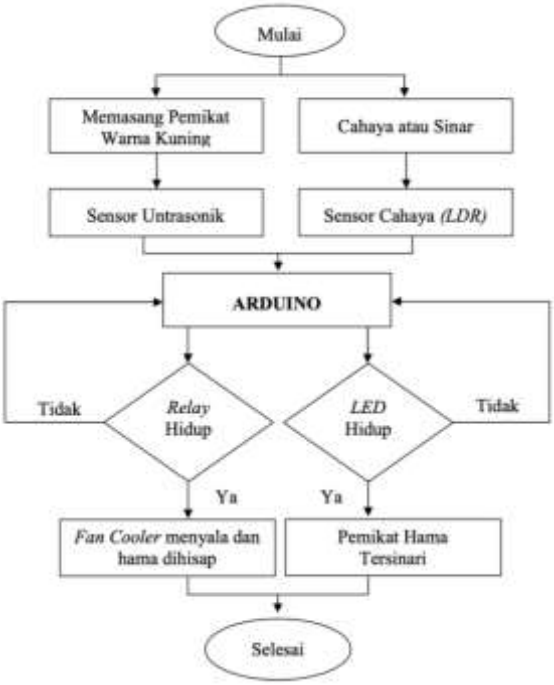

Figure 3. Flowchart

RESULTS AND DISCUSSION

Device Design Results

The display of the results of designing a device in the form of a chili plant pest trap that is capable of working automatically can be seen in figures 4, 5 and 6 below:

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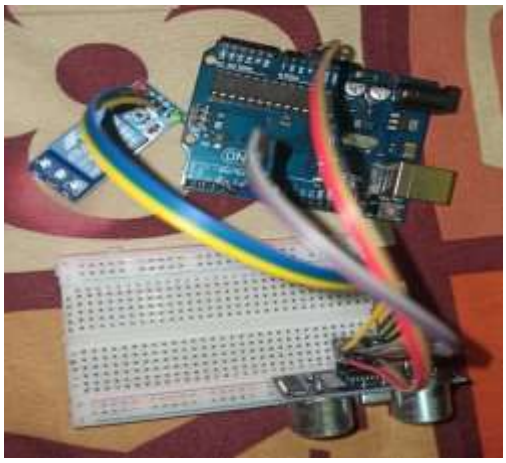

Figure 4. Implementation of the Ultarsonic Sensor

Figure 5. Light Sensor Implementation

Figure 6. Finished results

Tool Testing

Determining the location of the tool at the testing stage is very influential on the results that will be achieved, therefore in this test we placed the tool in the middle of a rice field with an area of approximately 50 square meters. For more details, see Figure 7, for testing the tool. during the day it can be seen in figure 8 and for testing the tool at night it can be seen in figure 9 below:

Figure 7. Tool Placement

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Figure 8. Tool Test Results During the Day

Figure 9. Equipment testing results at night

From the results of tests carried out by the author from morning to noon, this tool works well when the ultrasonic sensor distance is 5-8 cm. This distance is adjusted to the shape of the tool and its suction power which causes some chili plant pests to be sucked into the trap, wrong the other is fruit flies. Test results with ultrasonic sensor distance settings of 9-14 cm and 1520 did not show good/significant results and the tool even experienced problems because the distance settings did not match the shape of the tool, and the suction power decreased. Meanwhile, the test was carried out in the afternoon until evening during the first test, the light sensor turned on when there were still rays of sunlight in the afternoon so the author lowered the sensitivity level of the sensor then the next day the sensor turned on right when the environmental conditions of the chili farming land had started to dim and indicating that night is coming. The pest detection mode by ultrasonic sensors at night is not much different from the conditions that occur during the day, the pests caught in the trap are moths and leaf-destroying lice. This pest is affected by the light from the LED (Light Emitting Diode)

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which illuminates the trap until the sun starts to rise and the light sensor is active to turn off the LED (Light Emitting Diode) light. From the results of this test, there were two pest predators caught in the trap, namely beetles and weaver ants, so the author carried out a realease/release back into nature to balance the structure of the food chain in chili farming land.

CONCLUSION

Based on the test results of the tool that has been made, it shows the effectiveness of the tool in catching chili plant pests by setting the ultrasonic sensor distance to 5-8 cm. This distance is in accordance with the shape of the tool and its suction power which causes some chili plant pests to be sucked into the trap either in night or day mode. Tests carried out in the afternoon to evening, the light sensor turns on when the environmental conditions in the chili farming land start to get dim/night and turns off when the sun starts to rise. There are two pest predators that are caught in the trap, namely beetles and weaver ants, so the author carried out a realease/release back into nature to balance the structure of the food chain in chili farming land.

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