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## System Control Pest Rice Plant based on Microcontroller Arduino Uno

To cite this article: Aswin Rosadi *et al* 2020 *IOP Conf. Ser.: Earth Environ. Sci.* **469** 012086

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# System Control Pest Rice Plant based on Microcontroller Arduino Uno

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**Abstract.** Pests rice plant attack almost every season. Pests rice plant include planthoppers, rats and birds. The farmers used to control pests of rice plants in traditional ways. These traditional methods are felt to be effective brackets to repel rice pests. In the case of the updated automation system by farmers to overcome rice pest. Arduino Uno microcontroller as a controller of Ultrasonic sensor (sound) and LDR sensor (receiver of light). The Ultrasonic Sensor detects arrival and then drives the Servo Motor to drive it away, while the LDR sensor receives light to activate Buzzer (sound output).

## 1. Introduction

Technology makes everything done to make it easier. Humans are always trying to create something that can facilitate its activities, it is what encourages the development of technology that has many tools as a tool to facilitate human activities and even replace the role of humans in a particular function. Technology plays an important role in the era of modernization as it is today, where technology has become an inseparable part of everyday life. Current technological developments have spread to all aspects of life so that at this time as if we are spoiled by the tools that can provide convenience.

The field of agriculture, especially farmers who grow rice in rice field area is one of the areas that are cultivated by some Indonesian people in obtaining livelihood. Until now pests are still a constraint for farmers. Almost every season there is a pest explosion on rice crops. The main pests of rice plants include planthoppers, rats and birds.

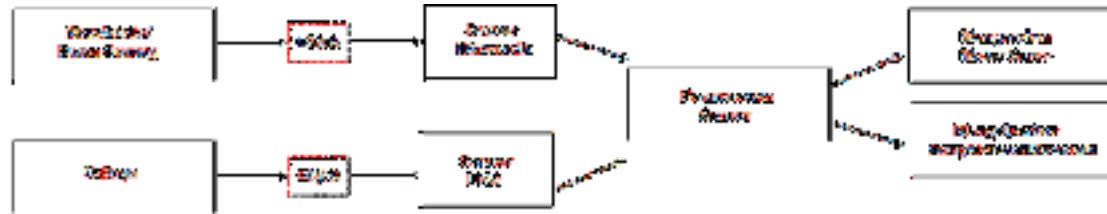
Usually, rice pests start attacking rice plants when the rice has begun to contain. This attack can be very detrimental to farmers because it is carried out in large numbers in groups or in groups. To reduce the impact of pest attacks on rice plants in the rice fields, farmers usually use traditional methods to repel the rice pests.

The development of science and technology, especially in the field of computerized engineering and digital circuits, has enabled the creation of electronic devices or systems that can work automatically (using a control system) that can replace a number of human routine work. Where, the sensor is a device that receives a stimulus and responds to it in the form of an electrical signal.



## 2. Methods

This automatic rice plant pest repellent consists of two main parts, namely hardware system (hardware) and software system (software). The hardware system consists of a series of sensor circuit system and Arduino Uno microcontroller circuit system. The software is using C language programming. A simple block diagram of Arduino Uno application as a grain repellent can be seen in Figure 1.



**Figure 1.** Geometry of slope model

### 2.1. Arduino Uno

Arduino Uno is an ATmega328 based microcontroller board (datasheet). It has 14 pin input from digital output where 6 pin input can be used as PWM output and 6 pin analog input, 16 MHz crystal oscillator, USB connection, power jack, ICSP header, and reset button. To support the microcontroller in order to use, simply connect only the Arduino Uno Board to the computer using a USB or power cord with AC-to-DC adapter or battery to run it.



**Figure 2.** Arduino Uno

### 2.2. Sensor Ultrasonic

The HC-SR04 sensor is an ultrasonic wave based distance measuring sensor. The working principle is as follows as ultrasonic radar. Ultrasonic waves are emitted and then received back by the ultrasonic receiver. The distance between transmit time and receiving time is a representation of the distance of the object. This sensor is suitable for electronic applications that require distance detection including sensors for robots.



### 2.3. Sensor LDR (Light Dependent Resistor)

Light Sensor LDR (Light Dependent Resistor) is one type of resistor that can experience a change in resistance when experiencing changes in light reception. The amount of resistance value on the LDR (Light Dependent Resistor) Light Sensor depends on the amount of light received by the LDR itself.



**Figure 4.** Sensor LDR

### 2.4. Motor Servo

A servo motor is a DC motor with a closed feedback system where the rotor position will be informed back to the control circuit that is in the servo motor. This motor consists of a DC motor, a series of gears, a potentiometer, and a control circuit.



**Figure 5.** Motor Servo

### 2.5. Buzzer

Buzzer is an electronic component that serves to convert electrical vibrations into vibrations of sound. Basically the working principle of the buzzer is almost the same as the loud speaker, so the buzzer also consists of a coil that is attached to the diaphragm and then the coil is flowed by a current so that it becomes an electromagnet, the coil will be pulled in or out, depending on the direction of the current and the polarity of the magnet, due to the coil mounted on the diaphragm then each movement of the coil will move the diaphragm back and forth so as to make the vibrating air that will produce sound. Buzzer commonly used as an indicator that the process has been completed or there is an error in an instrument (alarm).



Figure 6. Buzzer

### 3. Results and Discussion

This rice pest repellent program works, when there is a bird pest coming the ultrasonic sensor receives and processes detect and then outputs to drive the servo motor to drive the fan so that the pests of birds leave. Then for planthopper and rat pest repellent, works at night because the LDR sensor does not receive light, therefore the sensor works and outputs the sound by the buzzer..

```

penguisir_hama_padi | Arduino 1.6.7
File Edit Sketch Tools Help
penguisir_hama_padi
#include <Servo.h>
const int trigPin = 6;
const int echoPin = 7;
Servo myServo;

int pos = 0;
int stopPin = 5;
int buzzpin=8;
void setup() {
  Serial.begin(9600);
  myServo.attach(9);
  pinMode(stopPin, INPUT);
  pinMode(buzzpin, OUTPUT);
  buzz(200);
  buzz(200);
  buzz(200);
  delay(200);
}

void loop() {
  if (digitalRead(stopPin) == HIGH) {
    myServo.write(0);
    delay(1000);
  }
  myServo.write(pos);
  pos = pos + 1;
  if (pos == 180) {
    pos = 0;
  }
  delay(10);
  buzz(200);
}

```

```

penguisir_hama_padi | Arduino 1.6.7
File Edit Sketch Tools Help
penguisir_hama_padi
void loop()
{
  long duration, inches, cm;

  pinMode(trigPin, OUTPUT);
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  pinMode(echoPin, INPUT);
  duration = pulseIn(echoPin, HIGH);

  inches = microsecondsToInches(duration);
  cm = microsecondsToCentimeters(duration);

  Serial.println(inches);
}

long microsecondsToInches(long microseconds)
{
  return microseconds / 25.4 / 10000;
}

long microsecondsToCentimeters(long microseconds)
{
  return microseconds / 29.15 / 10000;
}

```

4.

There are still many types of pests of rice plants that have not been discussed, so it still needs a lot of development and detection of pests. This rice plant pest repellent system still needs the development of alternative energy sources so that it can work well and consistently.

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