
Design Of Investment Detection In Fish Cultivation Uno Arduino Based

Arnawan Hasibuan¹, Asran¹, Rizky Ramadhana Sembiring¹ Muzamir Isa², Mohd Irwan Yusoff², Siti Rafidah Abdul Rahim²

¹Department of Electrical Engineering, Universitas Malikussaleh, Lhokseumawe, Indonesia

²School of Electrical System Engineering, Universiti Malaysia Perlis, Malaysia

*Corresponding author, e-mail: arnawan@unimal.ac.id

Abstract— Fish farming is a job that many Indonesian people do, especially in villages. The nature of fish that is able to adapt quickly to transfer from pond to pond makes many residents choose to breed fish over other livestock. Many types of fish can be cultivated well, but most people choose to cultivate goldfish. Goldfish have an economic value that is quite tempting for the community. There are some fish that have a higher economic value, but people are more extra in maintaining them, for example in terms of feed. Goldfish can be fed only when the sun is hot. If the sun does not come out, then the goldfish should not be fed because it can cause the fish to die. Besides that, goldfish only need water flowing into the pond for fish oxygen. The number of people who breed fish, there are also many irresponsible people. The reason is, when the fish begin to grow up, many fish begin to disappear, making people nervous and hot. Based on the above problems, it provides a very potential opportunity to create a tool that can overcome community unrest. Fish farming theft detection tool which is an innovative tool to overcome or find out the perpetrators of theft. Thus, hopefully the tools used can reduce the risk of stealing fish and reduce the losses of fish cultivators.

Keywords : Fish, handphone, pond, sensor and Arduino UNO.

This is an open access article under the [CC-BY-SA](#) license.

1. Introduction

Goldfish (*Cyprinus carpio*) is one of the freshwater fishery commodities which is currently the prima donna in the fisheries sub-sector. This fish on the market has high economic value and a large amount of demand, especially for several local markets in Indonesia. Goldfish or what is also known as the common carp is a fish that is worldwide. However, the cultivation of goldfish or other types of fish has many problems with fish managers or cultivators. The large number of thefts has caused anxiety for residents who have fish farming, especially in rural villages. Many fish cultivators spend time guarding their fish to prevent theft. In fact, they are willing to spend the night or sleep in the hut they have prepared for the night.

Based on the above problems, it provides an opportunity to design a very potential tool capable of overcoming a problem. Intruder detection tools in arduino uno-based fish farming, which is an innovative tool that, God willing, can solve the above problems.

2. Goldfish Farming

The body of a goldfish (*Cyprinus carpio*) is equipped with fins. The dorsal (dorsal) is relatively long with the back of a hard radius and the last, namely the third and fourth fins, is serrated. The location between the dorsal and ventral fins is opposite. The pectoral fin is located behind the gill cover (overculum). Goldfish scales are relatively larger in size and are classified into the type of cycloid scale linea lateral (lateral line), located in the middle of the body, across from the gill cover to the rear end of the base of the tail. Pharyngeal teeth consist of three rows of molars [1].

2.1 Microcontroller

A microcontroller is a microprocessor that is devoted to instrumentation and control. The microcontroller is also a digital electronic device that has input and output as well as control with programs that can be written and deleted in a special way.

Each microcontroller has a different architecture depending on the design. However, each architecture basically has uniformity in its main points and ways of working. Based on the architecture, the microcontroller is divided into two, namely:

a. CISC (Complex Instruction Set Computing)

Complex Instruction Set Computing (CISC) or a collection of complex computational instructions is a computer architecture where each instruction will perform several low-level operations, such as loading from memory (load), arithmetic operations, and storage into memory (store) that work together.

b. RISC (Reduced Instruction Set Computer)

Reduced Instruction Set Computer (RISC) is part of the microprocessor architecture, is small and functions for instructions in communication between other architectures. RISC applications are on Apple CPUs.

2.2 PIR sensor

PIR sensor or also known as Passive Infra Red is a sensor that is used to detect infrared rays from an object. As the name implies, the PIR sensor is passive, which means this sensor does not emit infrared rays but can only receive infrared radiation from outside [2]. PIR sensors can detect radiation from various objects and because all objects emit radiation energy, for example when a motion is detected from an infrared source with a certain temperature, namely humans [3] [4]. Trying to pass through another infrared source, for example a wall, the sensor will compare the infrared radiation received per unit of time, so that if there is movement there will be a change in the reading of the sensor [5].

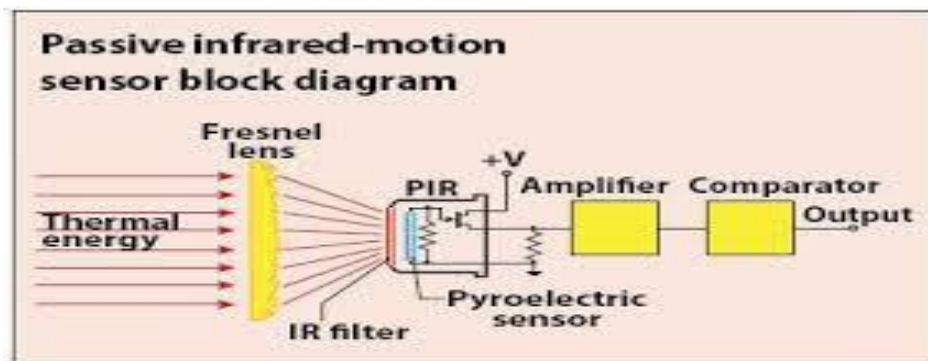


Figure 1. Principle of PIR Sensor

2.3 Arduino UNO

The Arduino is an open-source, single-board micro controller that is used to create electronic projects. Arduino consists of two main parts, namely a physical circuit board (microcontroller) and a software or Integrated Development Environment (IDE) that runs on the computer. The Arduino UNO is a microcontroller board based on the ATmega328. Arduino UNO has 14 digital input and output pins, 6 of which can be used as PWM outputs, namely on pins 11, 10, 9, 6, 5 and 3 with 8 bit resolution [6].



Figure 2. Arduino UNO ATmega 328

2.3 SIM800L GSM Module

The SIM800L module is the most popular GSM / GPRS Serial module used by electronics hobbyists and electronics professionals alike. Which can be applied in various projects. remote control via message from a cellphone with a micro sim type card. At present, there are several types of Breakout Board, but the most widely sold in Indonesia is the mini version with a Micro SIM type GSM card [7].



Figure 3. GSM SIM800L

2.4 Resistors

Resistors are the basic components of electronics that are used to limit the amount of current flowing in a circuit. As the name implies, resistors are resistive and are generally made of carbon. From Ohms law it is known that resistance is inversely proportional to the amount of current flowing through it. The unit of resistance of a resistor is called Ohm or denoted by the symbol Ω (Omega).

2.5 Liquid Crystal Display (LCD)

Liquid Crystal Display (LCD) is a tool that functions to display a measure of magnitude or number, so that it can be seen and known through its crystal screen display [8]. Where the use of LCD in this temperature logger uses an LCD with 16x2 characters (2 lines 16 characters). 16x2 LCD has 16 pin numbers, where each pin has a symbol and its functions. This 16x2 LCD operates on a + 5V power supply, but can also operate on a + 3V power supply.

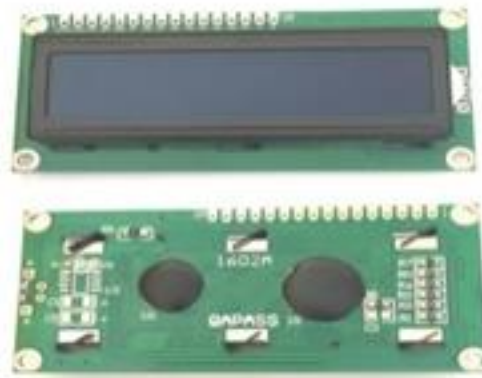


Figure 4. Liquid Crystal Display

2.6 Buzzer

Buzzer is an electronic component that is included in the transducer family, which can convert electrical signals into sound vibrations. Another name for this component is called a beeper. In everyday life, it is generally used for alarm circuits on clocks, house bells, hazard warning devices, and so on. The types that are often found in the market are the piezoelectric types. Because this type has advantages such as relatively cheap price, easy to apply to electronic circuits [8].

2.7. Device Communication with Cell Phone

The definition of communication is an activity to convey information, be it messages, ideas, and ideas, from one party to another. Usually this communication activity is carried out verbally or verbally so that it makes it easier for both parties to understand each other. Literally, the definition of communication is the interaction between two or more people to convey a message or information. Communication in general aims to provide knowledge to others.

2.8 Power Supply

The power supply serves to provide voltage for electronic circuits in the design of this tool. The power supply gets a voltage source from PLN of 220 Volt AC which is then reduced to 5 Volt DC using an adapter according to the voltage required by the design system. The adapter is a tool or bridge for connecting a DC voltage source. This DC voltage is needed by various electronic circuits to operate. The core circuit of the adapter / power supply is a rectifier circuit, a circuit that converts alternating current signals into direct current signals.

2.9 Software Support

Arduino IDE (Integrated Development Environment) is software for writing and uploading code from an Arduino physical board computer using the simplified c ++ language which is often called sketch making the Arduino platform easy to use. Arduino IDE consists of:

1. Program editor: A window that allows users to write and edit programs.
2. Compiler: A module that converts program code (Sketch) into codebiner.
3. Uploader: A module that contains binary cod

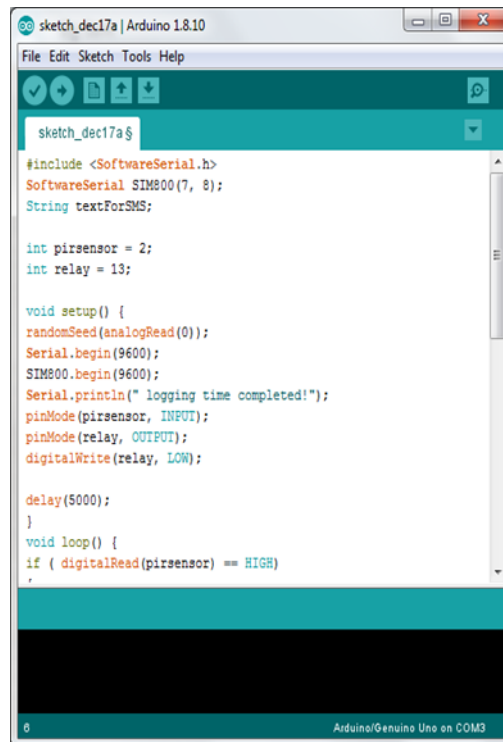


Figure 5 Display Arduino IDE.

3. Design Method

Design methods are steps, procedures, certain techniques that demonstrate a number of specific activities used by the designer in the design process. The research conducted can be described:

1. Designing with literature study, namely by conducting a literature review related to the issues discussed. Which is expected to provide confidence that this research can be carried out and provide direction to reduce errors in research.
2. Next, designing the circuit, namely the selection of components that are in accordance with the design, making the PCB layout or system path and finally assembling the components on the PCB, after the design is ready to design then design software for automatic feeding scheduling systems and sensors to detect the required pH levels with the Arduino Uno.
3. Compiling the Arduino program, then designing the tool. After the circuit and software have been made, then the tool is tested by operating the pear sensor to detect movement around the pond. hardware and software are operating properly, but if the system cannot operate properly it needs to be evaluated and analyzed what is the cause of the failure of the tool, then after finding the cause, repairs are made to the hardware or software.
4. After the tool can operate properly, then we analyze the work of the tool, then take data in the form of measuring the voltage on several components, namely, the PIR Sensor, Arduino, and the GSM SIM800L Module. Retrieval of this data is to determine the characteristics of the components in the automatic cage heating system, so that the voltage on the components is in accordance with the datasheet and does not damage the components in the circuit which will affect the work of the tool.

4. Result and Discussion

Results and discussion are one of the core stages of all aspects in this final project. The results obtained can be used as a very important reference in the continuation of the design and further development if more perfect results are still needed. This chapter will discuss about system realization, system performance testing, differences between humans and animals and their obstacles, security system design, and device communication with Android.

4.1. System Realization

In the realization of the system, the design of the fish farming theft detection tool has been assembled. First, the tool is checked on each component or series to match what is desired. If an error occurs, an evaluation is immediately carried out. After the evaluation is carried out in accordance with the function of the tool, then the measurement will be carried out on the tool.

4.2. System Performance Testing

In measuring and analyzing system performance, there are several parts that will be measured and analyzed, namely the Adapter, Liquid Crystal Display (LCD), SIM800L GSM Module, PIR Sensor and Arduino Uno.

4.2.1 Adapter output voltage

In measuring the output voltage from the adapter using a digital multimeter measuring instrument. The output voltage of the full wave rectifier circuit is in the form of a DC voltage that comes from a transformer which functions to reduce the voltage from 220 AC to 5 Volts DC using an adapter as shown in Figure 6.



Figure 6. Adapter output Voltage MeasurementResults

In measuring the output voltage of the Adapter, the results obtained are 4.31 Volt, this indicates that the Adapter is in good condition so that the expected output voltage is in accordance with input voltage on measurement.

4.2.2 LCD input voltage

LCD input voltage In measuring the input voltage on the LCD using a digital multimeter measuring instrument, the input voltage on the LCD is DC voltage, then the multimeter is in mode to measure DC voltage. The voltage to supply the LCD comes from the power supply of 5 volts. The measurement results obtained are 4.82 volts as shown in Figure 7.



Figure 7. LCD Voltage Measurement Results

In the measurement of the LCD input voltage the results obtained are 4.82 volts, this indicates that the LCD is in good condition so that the expected output voltage matches the input voltage in the measurement.

4.2.3 GSM SIM800L Module input voltage

In measuring the input voltage on the GSM SIM800L module using a digital multimeter measuring instrument, the input voltage on the GSM is DC voltage, then the multimeter is in mode to measure DC voltage. The voltage for GSM supply comes from the power supply of 5 volts. The measurement results obtained are 5.28 volts as shown in Figure 8.



Figure 8. Module Measurement Results

In measuring the input voltage of the GSM SIM800L Module the results obtained are 5.28 volts, this indicates that the SIM800L GSM Module is in good condition so that the expected output voltage matches the input voltage in the measurement.

4.2.4 PIR Sensor input voltage

In measuring the input voltage on the pear sensor using a digital multimeter measuring instrument, the input voltage on the pear sensor is DC voltage, then the multimeter is set into the mode to measure the DC voltage. The voltage to supply the pear sensor comes from the power supply of 5 volts. This voltage is required for the pear sensor to operate. The measurement results obtained are for volts as shown in Figure 9.



Figure 9. PIR Sensor Voltage Measurement Results

In measuring the input voltage on the PIR Sensor the results obtained are 5.48 Volt, this indicates that the PIR Sensor is in good condition so that the expected output voltage matches the input voltage in the measurement.

4.2.5 Arduino Uno input voltage

In measuring the input voltage on the Arduino Uno using a digital multimeter measuring instrument, the input voltage on the Arduino Uno is DC voltage, then the multimeter setting goes into mode to measure DC voltage. The voltage to supply the Arduino Uno comes from the power supply of 5 volts. This voltage is needed by the pir sensor to operate. The measurement results obtained are 5.64 volts as shown in Figure 10



Figure 10. Results of Arduino Uno Voltage Measurement

In measuring the Arduino Uno input voltage, the results obtained are 5.64 Volts, this indicates that the Arduino Uno is in good condition so that the output voltage which is expected to match the input voltage at the measurement.

4.3. Use of Software

In designing an intruder detection tool in Arduino Uno-based fish farming, the designer uses 2 pieces of software that are useful in completing the design.

4.3.1 Proteus Software

Proteus is used to make it easier for designers to combine all predetermined materials according to the design needs that have been carried out. The following is a picture of the entire tool design carried out in the proteus software.

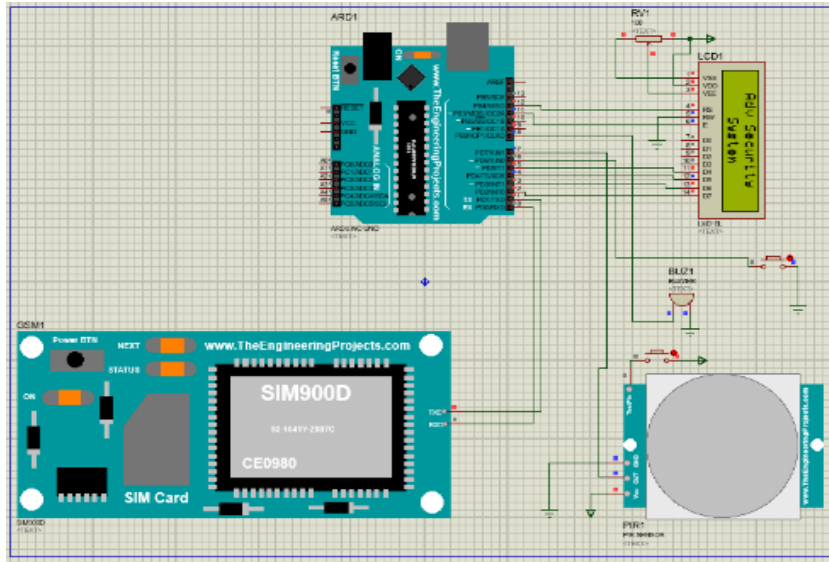


Figure 11. Design on proteus

4.3.2 Arduino IDE Software

The use of the Arduino IDE is as data processing and managing the program according to the wishes of the overall design. Can be seen in Figure 4.7.

```
coding_gsm_sem | Arduino 1.8.13
File Edit Sketch Tools Help
coding_gsm_sem
#include <SoftwareSerial.h>
#include<LiquidCrystal.h>
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
SoftwareSerial mySerial(9, 10);

int sensor=7; //The output of PIR sensor connected to pin 7
int push_switch=6; // push button switch connected to pin 6
int buzzer=8; // buzzer connected at pin 8
int sensor_value; //variable to hold read sensor value
int sms_count=0;
int ledPin=13;

void setup()
{ pinMode(sensor,INPUT); // configuring pin 7 as Input
  pinMode(push_switch,INPUT); // configuring pin 6 as Input
  pinMode(buzzer,OUTPUT); // configuring pin 8 as OUTPUT
  mySerial.begin(9600);
  lcd.begin(16,2);
  delay(500);
```

Figure 12. Coding on the Arduino IDE

4.4. Tool Design Constraints

When starting the design of a microcontroller-based fish culture theft detection device using a GSM SIM800L module with a PIR sensor, it is difficult to get a network or signal due to the location, especially at night.

4.5. Device Communication with Cell Phone

Communication is made to find out a condition or condition of a person or a tool. In designing a fish farming theft detection tool, communication is used between the design of a microcontroller-based

device with Android using SMS (Short Message Service). The working mechanism of the SMS system is to send short messages from one customer terminal to another. So, the design of tools with Android must be introduced first by using coding in the Arduino IDE.

4.6. Testing the distance and time of sending messages

For testing the design of the tool, the data for the testing of the tools is obtained, the data obtained by the designer is the time data and its function. Then to get the data, the designer has determined a certain distance according to the field. Time data is taken by the designer to see the time lapse of the tool to the cellphone, while the function data is to see whether the tool is working or not. For more details, see table 4.6 as follows.

Table 1 Detection Testing

Distance (m)	times (s)	Description
1	0,75	Active
2	0,76	Active
3	0,77	Active
5	0,8	Active
7	-	Off

When a moving object is within 1 meter the sensor can detect, the output signal is High. Furthermore, the distance is moved to 2-3 meters, the sensor can still detect and have High value.

When the object movement is moved with a distance of 5 meters the output signal is High. However, when the object is moved at a range of 7 meters, the output signal is Off or completely worthless because the object is not detected by the sensor or device.

5. Conclusion

The conclusions that can be drawn from the design of a fishing theft detection tool are as follows:

The results of the test show that there is a network problem with the GSM SIM800L Module which makes it a little difficult to get a signal for sending messages to cellphones. The design does not work immediately the first time it is turned on, it takes a while for the design to be ready to work. The PIR sensor works to detect and filter wavelengths (IR Filter) with infrared light on the human body which makes a difference from animals or the like.

References

- [1] B. C. G. S. Worang, H. J. Sinjal, and R. D. Monijung, "The strategy of developing freshwater aquaculture in Dimembe District, North Minahasa Regency, North Sulawesi Province," *e-Journal Budid. Perair.*, Vol. 6, no. 2, pp. 68–76, 2018, doi: 10.35800 / bdp.6.2.2018.20635.
- [2] I. Mahdi, "PIR (Passive Infrared Receiver) motion sensor is a sensor that is used to detect infrared rays. Design of Intruder Detection Systems Using Passive Infrared Sensors With Alarm Sounds And Sending Short Messages," 2018, [Online]. Available: http://eprints.uty.ac.id/1045/1/NASKAH_PUBLIKASI_3115211023_IMAM_MAHDI_TEKNIK_KOMPUTER.pdf.
- [3] B. Prima, "Designing a Home Security System Using Microcontroller-Based Pear Sensors (Passive Infra Red)," *J. Teknol. Electron.*, Vol. 1, pp. 1–11, 2010.
- [4] S. Desmira, Didik, Nugroho, "Application of Passive Infrared (PIR) Sensors on Doors," *J. PROSISKO*, vol. 7, no. 1, p. 2, 2020.
- [5] A. Gifson, P. Utara, and J. South, "With a Passive Infrared Sensor Based on At89S52 Microcontroller," *Telkomnika*, vol. 7, no. 3, pp. 201–206, 2009, [Online]. Available: <http://telkomnika.ee.uad.ac.id/n9/files>.

- [6] A. Syofian, "Control of Sliding Fence Using Android Smartphone Applications and Arduino Microcontroller Via Bluetooth," *J. Tek. Electrical ITP*, vol. 5, no. 2252, pp. 45–50, 2016.
- [7] A. Nugraha, "Motorcycle Security Systems Using Android-Based Arduino," *Fatmah Riski Dinniah*, vol. 2, no. 1, pp. 1–16, 2017.
- [8] R. D. Risanty and L. Arianto, "Design and Construction of Room Electrical Control Systems Using Atmega 328 and Sms Gateway as Information Media," *J. Sist. Inf.*, Vol. 7, no. 2, pp. 1–10, 2015.