Arduino Based Distancing Wristband Design

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ABSTRACT

Covid disease is a very dangerous disease because this disease is very easily transmitted to everyone, from the young to the elderly. With the conditions that are maintained and in this pandemic situation, many people underestimate how material the Covid 19 virus is. In designing this system simulation model, the devices used are in the form of a mini Arduino, pear sensor, battery, and buzzer. The method used to maintain a safe distance from people affected by Covid 19. In the form of research that can test how important it is for us to keep our distance from other people. With Arduino technology and pear sensors used to remind us that the distance between humans. So we have to be a bit oblivious when there is an output from the buzzer which has been warned by the pir sensor. With this tool, we can at least keep a distance from people around us.

 Keywords: Arduino Mini; Pear Senso; Batter; Buzzer; Maintain a Distance.

INTRODUCTION

In a situation like this, the corona virus is an epidemic that cannot be taken lightly. Most people who do not know this virus will think it is just ordinary influenza, but for medical analysis this virus is very deadly. The transmission of this virus is quite significant because it has spread throughout the world and all countries feel it (Mala et al, 2018). Until now there is no appropriate therapy to treat this virus. spread very quickly in the world and especially in Indonesia. Judging from the map of the spread of Covid-19 in Indonesia, positive cases spread to 34.

The rapid spread of covid-19 has resulted in the government implementing a social distancing system called PSBB (Large-Scale Social Restrictions). According to Nismawati, in 2020, the government also recommends maintaining physical distance and reducing the transmission of covid 19, which is a disease that is dangerous for a person's life. Because most people underestimate the disease. In designing this system simulation model, the device used is an Arduino mini microcontroller module as a data processor, a pear sensor to detect the distance to humans who are around, a buzzer to give Arduino sound effects.

METHOD
Research Methods

This method uses a research method that includes a literature study, a system based on references that have been further developed. Then an analysis of the needs of the components used in the manufacture of the Arduino-based wrist watch system is carried out. The next stage is system design, then the integration and testing stages are carried out (Nur, 2019).

The method that has been used is the Waterfall method, this method can be called the method first introduced by Winston Royce around 1970. This method consists of 5 iterative stages, namely the literature study analysis stage, the system design stage, the hardware assembly stage, the coding stage. , and the testing phase where this method is carried out from the top to the bottom sequentially (Hariono & Widya, 2019)
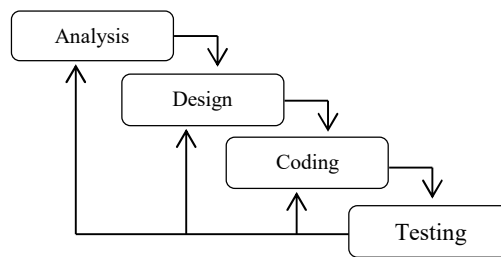
Figure 1. Waterfall Method

- Analysis of hardware requirements
  The process of collecting requirements is intensive to determine hardware requirements.
- Design
  This stage translates hardware requirements from the requirements analysis stage to the design representation so that it can be implemented into the program at a later stage.
- Programming the code
  The design should be translated into a hardened device program. The result of this stage is a computer program according to the design that has been created at the design stage.
- Testing
  Testing focuses on the hardware logically and functionally and ensures that all parts have been tested to minimize errors and output must be appropriate.

System Planning

Reducing the concept of system modeling and the reasons the system needs to be done. In order for this prototype to function as what is desired by the researcher. As for the design of the system in the formation of a prototype distance detection system.

Theoretical Basis

- **Peer Sensor**

Figure 2. PIR sensor model

The PIR sensor or also known as Passive Infla Red is a sensor that is used to detect the presence of infrared rays from an object. In this case, the PIR sensor is widely used to find out if there are visitors in the area that the PIR sensor can reach (Desmira & Nugroho, 2020).

- **Arduino**

Figure 3. Arduino Pro Mini

Arduino is a developer board that can be used to give commands to command tools based on the ATmega328P chip in a very minimalistic form so that users can organize them neatly. Basically, Arduino Pro Mini can be created and designed specifically to make commands by a project that does require a small circuit board(Puspasari et al., 2019)

- **Lithium battery**

Figure 4. Lithium battery

Lithnum battery is a rechargeable battery that moves from the negative electrode to the positive electrode when released, the direction will return when in the charger. This type of battery has a good energy density, no negative effect on memory and will not lose charge when not in use(Arfianto et al., 2016).

- **Sensor Ultrasonic**


Figure 5. Lithium battery

The ultrasonic sensor type HCSR04 is a device used to measure the distance from an object. The range of the distance that can be measured is about 2-450 cm. This device uses two digital pins to communicate the read distance. The working principle of this ultrasonic sensor works by sending ultrasonic pulses around 40 KHz, then it can reflect the echo pulses back, and calculate (Sufaidah et al, 2018).

Tool Working Principles

Based on block diagrams it can be described that the working principle of designing a distance detection system using pear and ultrasonic sensors as inputs and after that instructions are given to the paezo buzzer to be able to function by isting the sound output, so that the user can know how much distance 1 meter maximum adjacent to people around us. If the buzzer gives an out put in the form of a sound then we are warned to stay away from those around us.

System Planning

This arduino-based distance bracelet system consists of several components, namely pear sensor module, ultrasonic sensor, arduino mini, buzzer and batrai. The relationship to these five modules is depicted in a block diagram as seen in figure 6.
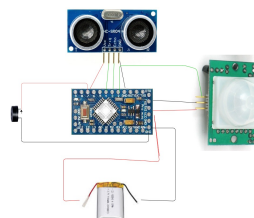

Figure 6. system Planning

After the components are connected, microcontrollers are inserted that have been coded according to the function of their respective tools. The buzzer will light up when it gets a signal from the pear sensor that has been processed by the microcontroller.

System Analysis and Design

A flowchart is a chart with certain symbols that describe the sequence of processes in detail and the relationship between a process (instructions) and other processes in a program.
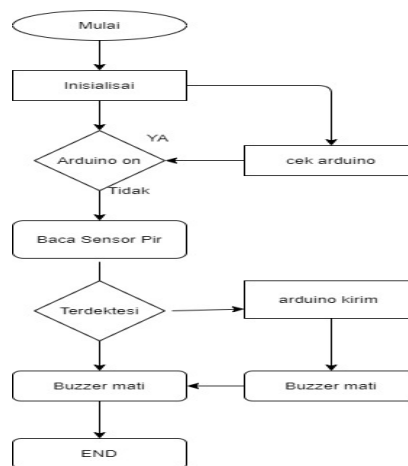
Figure 7. Flowchart

In general, the function of each unit is as follows:
- The PIR sensor functions to receive the distance that has been set so that it is sent to Arduino
- When received arduino mini then sent to the buzzer.
- Buzzer will function to provide a sound that is given to us as a marker for us. The buzzer will work when the Arduino alarm sends data based on the PIR sensor function.

RESULT AND DISCUSSION
Result
Reducing the concept of system modeling and the reasons the system needs to be done. In order for this prototype to function as desired by the researcher. The system design in the formation of a distance detection system prototype.

Figure 8. Planning Results

Tool testing is the last stage in tool development, at this stage both logic and functions will be tested so that they are feasible to be implemented in testing the use of PIR sensors, Arduino mini, buzzers to detect keeping distance with a distance that has been determined by the government at least 1 (one) meters of people around. The study tested two sensors, namely a mini PIR sensor and an ultrasonic sensor, the second tool is a buzzer. This test is carried out to find out whether the sensor can work properly when used later.

Discussion
Based on the block diagram, it can be described that the working principle of the design of the distance detection system uses PIR and ultrasonic sensors as inputs and after that instructions are given to the Paezo buzzer to function by outputting sound output, so that users can find out how far the maximum distance of 1 meter is close to people.

Table 1. Ultrasonic Sensor Experiment

NO	Test	Distance	Buzzer
1	First	2 meters	no sound
2	Second	1,5 meters	no sound
3	Third	1 meters	Sound
4	Fourth	0,5 meters	Sound

If seen in the image below, it can be seen that the ultrasonic sensor can detect from a distance of 0.5 meters to a distance of 1 meter. If the sensor has exceeded a distance of 1 meter, then the sensor cannot detect humans in front of the bracelet.

Figure 9. Ultrasonic Sensor Test

In the second experiment on top of the ultrasonic sensor can deciate at an angle of 0-60 if it exceeds that angle the sensor cannot deciate the distance. The sensor cannot read objects when they are at an angle that is more than 70 degrees. The sensor also requires power from the battery that can power to carry out the sensor function as desired by the researchers because the researchers are also considering because of the very small size of the battery.

Table 2. Ultrasonic Sensor Experiment

No	Test	Corner	Buzzer
1	1	30	Sound
2	2	60	Sound
3	3	180	no sound
4	4	230	no sound

From the table above, it can be explained that the ultrasonic sensor can have a passive motion reading at an angle of up to 30-60 degrees. If it exceeds this angle, the sensor cannot detect humans who are beside us.

Figure 10. Tilt Test

Test results on sensors from above can detect from the front, the left and right side can't. If the battery in the cas for 30 minutes the tool can function for 9 hours can function for that long because the han tool requires a very minimum power arduino mini hannya requires 5v 3v pir sensor with the power voltage then the battery will function quite long.

Table 3. Battery life test

No	Battery	Time
1	380 Mah	9 O'clock
2	1800 Mah	34 O'clock

CONCLUSION

Based on the results of the research that has been done, the following conclusions can be drawn.

- From several experiments the ultrasonic sensor can detect from a distance of 05-1 meters the sensor can detect and can read objects in front. While the distance of 1.5-2 meters cannot detect the distance.
- From several experiments, the PIR sensor can detect from an angle of 30-60 the sensor can read objects in front of you.
- While the experiment from an angle of 70-180 the sensor cannot read the object in front of it.
- This bracelet can function for 9 hours on a single battery charge.

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