THE DESIGN OF DETECTOR TOOL AND MASK-WEARING WARNING ARDUINO UNO-BASED

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ABSTRACT

Where this development also triggers the development of Internet of Think (IoT) technology .This study discusses the Design of the Arduino Uno-Based Mask Detector System, which is connected to a face scanner system for access to warnings on the use of masks at the office entrance. The purpose of this study was to raise awareness of the importance of wearing masks and complying with health protocols. Where the research uses data collection methods by means of interviews and observations .The design of the tool uses several devices such as arduino uno as a database load, servo motor as an automatic door mover, ultrasonic sensor as a detector of someone who has passed the door and will give orders to close the door automatically after that, infrared sensor as a command to activate the pump motor water as a tool for washing hands automatically, buzzer as a warning for the use of masks, and Relays as dividers and current distributors to the devices used. good. The system can raise awareness to comply with health protocols.

Keywords: Arduino uno, Buzzer, Infrared Sensor,Servo Motor, Ultrasonic Sensor

INTRODUCTION

The Covid-19 developments could be seen in around worldwide and Indonesia itself. This virus could be developed and spread quickly where it has really big impact in various field such as the economy, education, and quality of life. It demands people to follow the required health protocol such as wearing mask, keep the distance, and avoid the crowds in order to avoid getting exposed by this virus. (Dewi, 2020) stated that this virus is a new kind of disease outbreak yet unidentified. It has various symptoms such as high fever, coughing, hard breathing, respiratory disorders, and the loss ability of smell and taste. People who get exposed by this virus usually feel the symptoms on the 5th and 6th day after getting exposed.

The Indonesia especially Batam Covid-19 cases have been developed rapidly due to many people do not run the health protocol properly. Many people do the activity outside the home without wearing a mask. This could be seen at public place like department store,

openmarket, and the office. Hence, the researcher would like to invent a microcontroller tool that could provide the warning for those who disobey the health protocol.

This tool is particularly designed by Arduino uno based that connected to several module sensor and the selected entry or exit door. It works by giving the command to close the door automatically if there is any indication of someone who does not wearing a mask, and it will give the warning alert to wear the mask.

Based on the background explanation above, the researcher identifies some problems as below:

1. There is no system that provide the warning alert of the mask wearing.
2. There are still many people who disobey the health protocol like wearing a mask.
3. There is lack awareness of the dangerous of Covid-19 disease transmission.

THEORITICAL REVIEW

2.1   ARDUINO UNO DEFINITION

(Rahmawati Mega, 2021) Arduino is a board or can be called a microcontroller which can be used in several fields of technology. Arduino itself has an Atmel AVR processor, which is equipped with an Arduino software system that can be accessed with the C programming language.

2.2   ULTRASONIC SENSOR

(Fallis, 2017)It is a sensor that can input data on any object or item in front of it by sending a wave signal which if there is something in front of it will reflect the wave signal back. This sensor itself has a sensor frequency of 40 KHz point until it reaches a point of 400 KHz.

2.3   INFRARED SENSOR

(Qosim, Mar. Marpaung, 2020) The infrared sensor itself has a transistor system component and an infrared LED that is optically integrated. Where this sensor will be able to send data if there is something or objects that move or are in front of this sensor. Where this sensor has a scan range from 2 CM to a distance of 400 CM.

2.4   BUZZER

(Sukarjadi, 2017) The buzzer itself is a module that can emit sound. The buzzer itself is commonly used as a warning device, as it is often applied to fire warning alarms, gas leaks and others. This buzzer consists of a set of diaphragms consisting of coils which when the coil is given an electric current will create a sound where this occurs due to the electric current being attracted in depending on the polarity of the existing magnet.

2.5   RELAY

(Widodo, Prasetya, 2019) Relay is a module device that can work as a divider or distributor of an electric current and also as a switch in a device. The working system itself is the use of a magnetic field that can be created by a conductor which can create a larger electric current that can activate a switch that has a higher electric current.

2.6   MOTOR SERVO

(Minawal & Amri, 2021) Servo motor is a device that has a DC motor that can rotate 360^0 . This servo itself is run by using an encode programming that can give commands for how fast the motor rotates and how far the turning point is from the servo itself.

2.7 THE PATTERN INTRODUCTION OF MASK DETECTION

(Hanuebi, Axl. Sompie, 2019) The researcher has 3 ways of pattern searching and input in this pattern introduction, herewith as below:

1. OpenCV

OpenCV is an open source computer vision library that is often used to process and analyze image data. OpenCv itself supports several programming languages such as C, C++, Python, Java, and PHP. The application itself is usually applied in several software such as Human-Computer Interaction (HCI), Object Identification and Recognition, Face Detection and Recognition, Gesture Recognition, Movement Tracking, Image Processing, and Mobile Robotics.

2. Haar Cascade Classifier

The Haar cascade algorithm is commonly used in several face detection processes or objects in the form of digital images. Where the algorithm applied is a mathematical function in the form of a box by displaying an RGB value for each pixel, after that Viola-Jones developed this algorithm, where each box is processed and produces several values in the form of dark and light areas. And these values will be used as the basis for image processing, so it is known as the Haar-Like Feature.

3. Local Binery Pattern Histogram (LBPH)

This is a process where data retrieval or face recognition starts from the results of streaming webcam detection obtained from the Haar Cascade training results which will be matched with the Local Binary Pattern Histogram (LBPH) Algorithm. For the experiment itself, it is usually used by using binary histogram values that have been extracted from image to get predictive value in identifying the owner of the face.

2.8 CONTROL ACCESS SYSTEM

The control access system is a system that works as a system to provide boundaries between a device or a barrier for users. The control access system itself is usually applied to several devices such as doorstop guard systems, borders, and security personnel automatically.

METHOD OF THE RESEARCH

In this study, researchers will describe the research stages in the design of a mask detection and warning device:
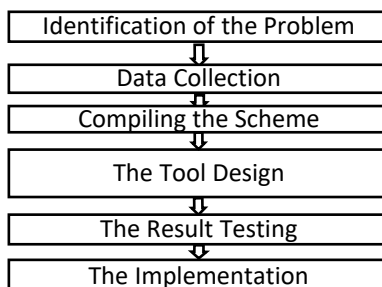

Picture 1. The Research Design

(Source: The Processed Data by Researcher, 2020)

1. Identification of the problem is where the researcher will look for any problems that occur in the field which will be developed and concluded and applied data into a data solution.
2. Data collection is the stage where the author will collect data from the development of the previous problem. Where researchers will collect data from books, journals, and expert sources.
3. Compiling the scheme is the stage where the author will make a

scheme in the design of the tool where the scheme becomes a reference for the author in the design of the tool and the manufacture of the tool.

4. The tool design is where this stage will make a design of a warning and detection tool for the use of masks that has been developed and the data can be obtained from the data that has been collected previously. Where this design starts from making a circuit schematic, which is followed by making a coding program, after that inputting the program into the Arduino Uno, after the program has been inputted it can be done assembling the tools according to the schema that has been made and can be tested.

5. The Results Testing is the stage where the tools that are made and designed will be tested and evaluated for anything that is inappropriate or wrong in testing the designed tools.

6. The Implementation is the stage where the tools created are applied directly in the field and can be used directly.

The following is an overview of the work system flow of the mask detection and warning tool:
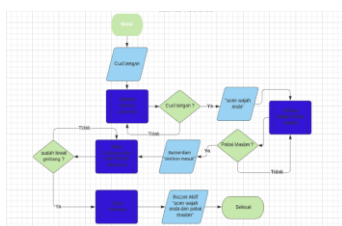
Picture 2. *Flowchart*
(Source: The Processed Data by Researcher, 2020)

From the diagram above, it can be seen that the flow of the road or the working system starts from us through the infrared sensor as a start where we wash our hands automatically after that we enter the scanning stage or detecting the use of masks where we will be detected whether to use a mask if we do not use a mask. then the buzzer will sound and the door will be locked automatically and if we have used a mask the buzzer will stop ringing and the door will automatically open, after the door is open we can go through it and if after going through the door the ultrasonic sensor will detect and give the order to automatically close the door enter and the detection system will reactivate to detect people who will enter the room again.

THE RESEARCH ANALYSIS AND FINDING

This mask detector and warning device is designed using Arduino Uno and several other supporting devices such as ultrasonic sensors, infrared sensors, relay pins, jumper cables, buzzers, servo motors, breadboards. Where the circuit could be seen as follows:

A. The Electrical Design
In the following illustration, we can see in the electrical design the components used are Arduino Uno, 1ch relay, ultrasonic sensor, infrared sensor, servo motor, buzzer, dc water pump, jumper cable, breadboard, dc power socket.
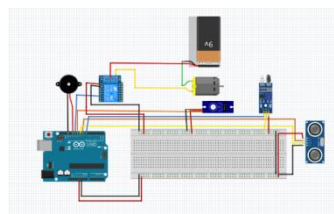
Picture 3. *Electrical Design*

B. The Design Plan

For the prototype design, the tool is made using the Sketchcup application. The description is as follows:

Picture 4. *The Design Plan*
(Source: The Processed Data by Researcher, 2020)

C. The Hardware Design Result

The components used in this hardware design consist of Arduino Uno, 1ch relay, ultrasonic sensor, infrared sensor, servo motor, buzzer, dc water pump, jumper cable, breadboard, dc power socket.

D. The Arduino Design Layout

The following is a table that describes the sequence of control block circuits:

Tabel 1. *Arduino Design Layout*

The Component	Function
Arduino Circuit	As a central database
Ultrasonic Sensor	To activate the system when it has passed the door and closes the door automatically
Infrared Sensor	To activate the Dc water pump for automatic hand washing
Relay	As a divider of distributed electric current
Buzzer	To warn those who do not wear the mask
Adaptor/ *Powersupply*	As a resource that will provide additional power to the system so that it can run
Motor Servo	As an automatic door mover that will close and open the door automatically

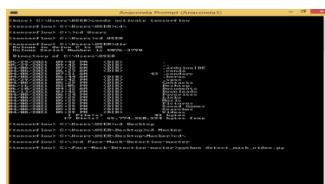(Source: The Processed Data by Researcher, 2020)

E. The Software Result

Picture 5. *The Software Result*
(Source: The Processed Data by Researcher, 2020)

Where Arduino Software IDE is software that will become a program maker to run the device where this software uses the C programming language to run it.

Picture 6. *Anaconda Code*
(Source: The Processed Data by Researcher, 2020)

The picture above uses the Anaconda program to run a program that will be able to monitor or detect the use of masks using a camera.

Where this software is a python program where this program will tell whether the person is wearing a mask or not. This program uses the python programming language to run it.

F. The Research Finding

at this stage, this tool will be tested in several ways as follows:

1. The testing by wearing a mask

In the first test, the researcher will use a mask in front of the designed tool. Where this test gets a result where if someone uses a mask, the system will notify that the person is wearing a mask and the buzzer will be deactivated and the door will automatically open. Herewith the following picture as below:
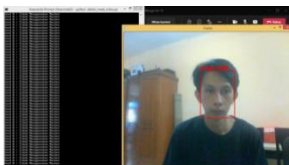

Picture 7. *The Testing By Wering A Mask*
(Source: The Processed Data by Researcher, 2020)

2. The testing by not wearing a mask

In this second stage of testing, the researcher does not use a mask. Where the results of this test the program will give a notification if someone is not wearing a mask and the buzzer automatically activates and sounds and the door is automatically closed. Herewith the following picture as below:


Picture 8. The testing by not wearing a mask

(Source: The Processed Data by Researcher, 2020)

3. The testing by using a book

In this third testing stage, the researcher uses a book as a face cover. Where the results obtained with a program that responds to someone not wearing a mask, the buzzer device is active and sounds and the door is automatically closed. Herewith the following picture as below:
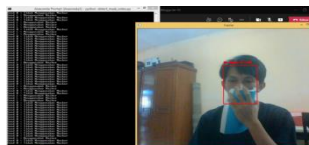
Picture 9. The testing by using a book
(Source: The Processed Data by Researcher, 2020)

4. The testing by using the hand

In this fourth stage of testing, the researcher uses his hands as a face covering. Where it can be concluded that by using the hand the program will still respond to someone not using a mask and the buzzer automatically activates and sounds and the door will automatically close. Herewith the following picture as below:

Picture 10. The testing by using the hand
(Source: The Processed Data by Researcher, 2020)

5. The testing by using the clothes

In this fifth test, the researcher uses clothes where the clothes are used as masks to cover the face.

Where can be obtained results where the program informs someone not to use a mask and an active buzzer and the door automatically closes. Herewith the following picture as below:

Picture 11. The testing by using the clothes
(Source: The Processed Data by Researcher, 2020)

THE CONCLUSION

From the results presented in Chapter I, Chapter II, Chapter III, and Chapter IV regarding the design of detector tool and the use of Arduino-based that have been compiled by the author, the researcher can draw the following conclusions:

1. This tool can raise the awareness for many people as well as the researcher himself about the importance of complying with health protocols and the use of masks.
2. This tool can be a solution in order to create a comfortable workplace and comply with health protocols.
3. The tool designed by the researcher can be a solution for both the government and the researcher in creating an environment or place that adheres to the use of masks.

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