

Attadance system using infrared sensors

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Abstract. This study aims to design and develop a system for student counters in the room. This Attadance System is based on the Arduino Uno R3 microcontroller by using an IR sensor to detect the object. This system is expected to facilitate the work of teaching staff in conducting attendance activities in the classroom that will not cut the time of teaching and learning. The main purpose of this Attadance System is to help student counting in the room automatically. The automatic student counting attendance system that uses a microcontroller and IR sensor is designed and built through several stages, namely: (1) analysis and identification of attadance and component system requirements and other tools that support the success of system assembly; (2) designing components and mechanical design as containers and supports; (3) system implementation; (4) system testing and evaluation of the overall Attadance System. The testing of the automatic student counter attendance system shows the results in the form of performance consisting of the experiment number, IR sensor detection distance, and the state of the light and environmental conditions of the light intensity. The sensor is able to detect distances of up to 6.5 cm if in good light intensity conditions. But in conditions of poor light intensity the sensor can only detect up to 5.5 cm.

1. Introduction

Currently infrared sensors are not only found on mobile phones to transfer data, but infrared sensor technology has developed rapidly into advanced technology [1]. Infrared sensor technology is still used as supporting features of smartphones in the digital era today. For example on the IphoneX smarphone there is an infrared sensor feature as a face detector. Without this technology, the feature will not run successfully and well.

Most schools have not used this technology to help with academic activities in schools, most of them still use the old method, which is collecting parents' students or giving circulars to provide academic information. So that information sometimes does not arrive at parents because not all students give or deliver it.

During the development of this automated technology, Attadance Systems were needed especially in classrooms and attendance systems of workers in the company. Application technology needs to be developed so that Attadance Systems can work automatically. So it is very likely that the problem of being present or being present can be overcome using this tool. So there needs to be an automation system developed so that everything becomes optimal to support online learning systems [2].

The automation technique can be supported through the use of sensors [3]. One type of sensor is infrared. The use of infrared sensors is an alternative. Infrared technology is an electromagnetic ray technology whose wavelength is more than visible light, which is between 700 nm and 1 mm. Infrared



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light is an invisible light. If seen with a light spectroscope, infrared light radiation will appear in the electromagnetic spectrum with wavelengths above the wavelength of red light [4]. With this wavelength, this infrared light will not be visible to the eye but the heat radiation it causes is still felt / detected [5].

With these problems, a device that has a built-in RFID reader is needed. One mobile device that has these criteria is a handheld telepong that has been equipped with Near Field Communication (NFC) technology. NFC is a technology that utilizes short-range wireless communication and operates at a wave of 13.56 MHz in a distance of less than 10cm [6].

The implementation and development of a system for detecting the arrival of people in a space has been carried out through the use of AT89S52 Microcontroller based Passive Infrared (PIR) sensors [7]. In this study, it has been proven that PIR sensors can work to detect the arrival of people and count them. The use of infrared sensors as sensors uses finger biometrics through a comparison of local binary pattern (LBP) algorithms, local derivative patterns (LDP), and Gaussian high-pass filters through binarization methods [8]. The implementation of electronic sensors in this Attadance System can also be used as a learning media [9].

Now the technology is also being developed on various technological devices as applied by Apple and other infrared sensors. In this study, the use of infra red sensors for Attadance Systems was automatically explained. The automatic student counter attendance system in this study has been implemented for classroom learning activities so that it can automatically count the number of students present. The implementation of the attendance system for the number of people entering in this space shows results in the form of performance consisting of experimental numbers, IR sensor detection distance, and the state of the lights and environmental conditions of light intensity. The sensor is able to detect distances of up to 6.5 cm if in good light intensity conditions.

2. Method

In the concept of design and preparation of the Attadance System, the method used is the design method. This process is intended so that the attadance of the system design can be arranged and organized properly, so that the results obtained according to the design that has been made before. In the planning and preparation of the Attadance System itself requires a process and the stages carried out. Figure 1 shows the process and the stages can be seen in the form of a flowchart.

This Attadance System is useful as a daily attendance tool in the world of education to simplify and shorten the time in the process of calculating students in the classroom. This Attadance System functions automatically when the infrared sensor reads objects in front of them, then the microcontroller will work counting and producing results on the LCD monitor. Therefore the purpose of preparing this Attadance System is expected to be a development of technology to assist the attendance process in the classroom automatically and not to cut down on processing time or too much learning.

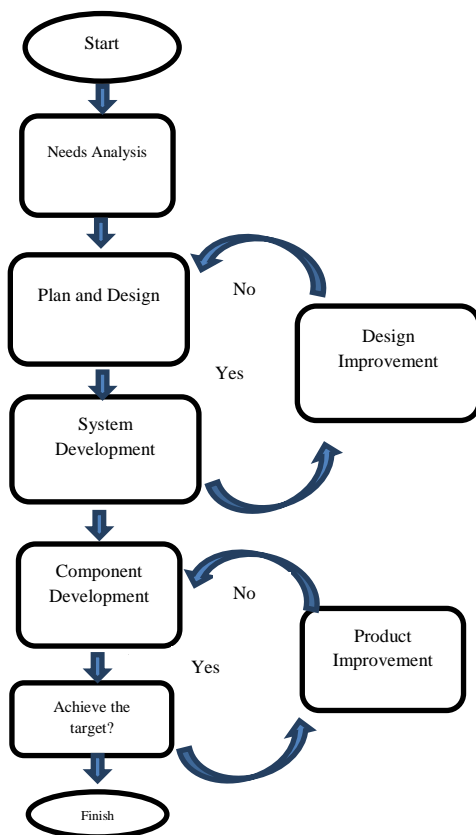


Figure 1. Diagram for lecture attendance system using infrared sensors

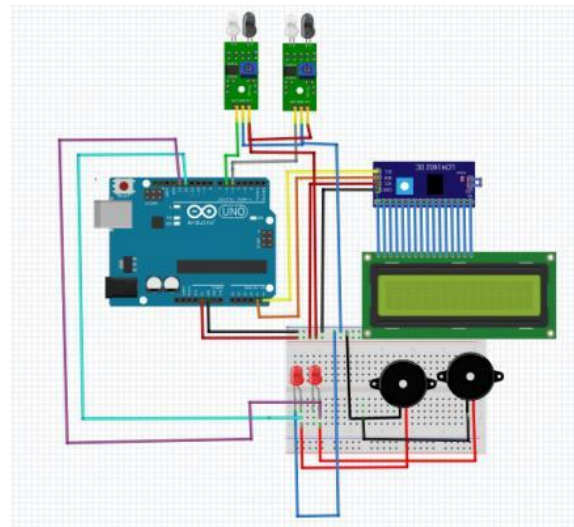


Figure 2. A series of lecture system systems using infrared sensors

The steps in testing the Daily Lecture Attendance System Using Infrared Sensors are as follows: (a) Prepare tools and computers or adapters as power, (b) Connect the Attendance System with a laptop or adapter, (c) Make sure all components are installed properly and correctly, (d) If it is properly connected, connect with the power supply from the laptop or socket (e) If it is on, make sure the LCD monitor displays the writing "SELAMAT DATANG" (f) If the words "SELAMAT DATANG" appear, the sensor is ready to function to detect, (g) After the sensor reads make sure the readable amount matches and appears on the LCD monitor, (h) Note: If the green LED is on, the IR sensor that works is the IR sensor enters, if it is red then the IR sensor that works sensor IR comes out. The amount will increase and decrease according to the sensor readings, (i) After the Attendance System works well which is marked by the appearance of "SELAMAT DATANG" on the LCD monitor, then the next step refers to the IR sensor distance test table for the object to find out the capability of sensor readings coverage IR on the object, (j) The suitability test of the tool is to find out the ability of the IR sensor to the object when lighting the room is lacking.

3. Results and discussion

As planned, the physical form of the Attendance System uses acrylic material with the following sizes: 1) size down front 13 cm, 2) bottom side size 12.25 cm, 3) height of tool 10.24 cm, 4) width front 7 cm, 5) the size of the upper side width of 8 cm, 6) the size of the 5mm LED hole, 7) the size of the hole length of the sensor 1.5 cm and width of 1 cm, 8) the size of the speaker hole width 5 mm and 3 cm long.

The process of designing a circuit consists of various components such as a microcontroller in the form of Arduino UNO R3, LM393 IR sensor, LED light, LCD monitor, passed QC buzzer. This tool also uses the I2C ICPCF857 module which is intended to facilitate the installation of devices so that LCD monitors do not take up too much space. The cables and pins used also become smaller, only requiring 4 cables in the connection. Whereas LCD monitors that do not use the ICPCF857 I2C module will have more emphasis on the connector and pin connector on Arduino, which is around 7 to 8 pins and cables. Figure 2 shows the series designed in the attendance system in this study.

In accordance with what has been planned, which consists of the main components of the Arduino Uno R3 microcontroller to process sensors and data obtained from sensors. The main sensor used in this device is the LM393 IR sensor which works at a 5 volt DC voltage. In addition to the main components of this tool are also supported by supporting components, namely: 1) LCD monitor 16X2 which serves to display data from IR sensors, 2) Green and red LEDs as sensor indicators work properly and correctly, 3) Buzzer as a sound indicator that the sensor works with well, 4) I2C as a support device for LCD monitors to make it simpler and not take up many cable pins. Figure 3 shows the appearance of the machine's attendance counter for a room.



Figure 3. Outer view of the counters' attendance machine

Table 1. Test Results data distance of IR sensors to rooms with bright light intensity

Trial Number	Sensor Detection Distance (cm)	Lamp state
1	1	Turned on
2	1.5	Turned on
3	2	Turned on
4	2.5	Turned on
5	3	Turned on
6	3.5	Turned on
7	4	Turned on
8	4.5	Turned on
9	5	Turned on
10	5.5	Turned on
11	6	Turned on
12	6.5	Turned on
13	7	No flame

The purpose of testing the tool is to realize this automatic student counting device in terms of technical, function and performance. The testing of tools, observations and data retrieval is expected to be able to know the performance conditions of this tool, so that the data taken from the testing of these tools can be used as reference material to draw conclusions about this tool itself.

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The system testing of automatic student calculators is done by c how to measure sensor detection. This test is intended to know the distance detection that can be reached by an IR sensor. Tests are carried out on sensors in and out with human objects as displays for sensor readings and carried out on light intensity in the room. The incoming IR sensor will work properly when the sound is heard from the buzzer and the hijai led lights up, while the IR sensor will work out properly if the buzzer sound also sounds and the LED merha lights up. If the sensor goes well the LCD will display the amount of

student data detected according to the sensor reading. Table 1 shows the results of the Attendance System test.

While Table 2 shows the results of testing the distance of infrared sensors to the room and light intensity. Based on these data, it can be concluded that the infrared sensor can detect a maximum range of 5 cm.

Table 2. Test result data distance of IR sensors to rooms with low light intensity

Trial Number	Sensor Detection Distance (cm)	Lamp state
1	1	Turned on
2	1.5	Turned on
3	2	Turned on
4	2.5	Turned on
5	3	Turned on
6	3.5	Turned on
7	4	Turned on
8	4.5	Turned on
9	5	Turned on
10	5.5	No flame
11	6	No flame
12	6.5	No flame
13	7	No flame

From the results of follow-up testing above, it can be seen that the sensor works well with the intensity of bright light in the room, namely the sensor detection distance can reach 6.5 cm. In less light intensity, the sensor works less well the sensor detection distance is only able to travel 5 cm. On the IR sensor entering it works, the green LED lights up along with the sound of the buzzer and the number of students detected increases on the LCD monitor. When the IR sensor exits, the red LED is accompanied by the buzzer sound and the number of students detected is reduced on the LCD monitor. If the number of students in the LCD monitor is counted 0 then the IR sensor, the red LED light and the buzzer sound will not work and the number of students on the LCD monitor is still written 0.

4. Conclusion

Based on the test results it can be concluded that: (1) Automatic student counting system consists of an Arduino Uno R3 microcontroller, IR controller, 16X2 LCD monitor, I2C as supporting components for LCD monitors, LEDs, and Buzzers. (2) When the IR sensor enters works, the green LED light is lit accompanied by the buzzer sound as a sign that the tool is working properly and correctly, and the number of students on the LCD monitor is increasing. (3) When the IR sensor exits to work, the red LED lights are accompanied by the buzzer sound as a sign that the Attendance System is working properly and correctly, and that the number of students on the LCD monitor is reduced. (4) The limitation of the sensor working distance detection covers a distance of 1 cm to 6.5 cm in bright light intensity conditions and working sensors cover a distance of 1 cm to 5 cm at a light intensity less bright.

5. References

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