



Object Identification For Blind People with Temperature Monitoring

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Abstract. A blind person must be protected from direct contact with unknown high-temperature objects in the surrounding environment. A system is needed to be able to detect the location and temperature of objects without direct contact. Ultrasonic sensors are used as object distance detectors and infrared temperature sensors are used as object temperature detectors without any direct contact. This system is processed with ATmega328 and information is conveyed to the user via buzzer sound signals and DC motor vibrations. The system as a whole is planted in a glove designed specifically to facilitate the user in using the tool.

1. Introduction

Based on global data, of 7.33 billion people living in 2015, an estimated 36 million were blind, 216.6 million had moderate to severe visual impairment, and 188.5 million had mild visual impairment. Estimated number of blindness sufferers increased by 17.6%, from 30.6 million in 1990 to 36.0 million in 2015. This change was caused by three factors, namely an increase due to population growth, aging, and a reduction in the age of a certain prevalence. The number of people with moderate and severe visual impairments has also increased, from 159.9 million in 1990 to 216.6 million in 2015 [1]. People with the highest risk of blindness are those aged 50 years and over and children under 15 years [2]. One percent of the population in Indonesia or around 3.5 million people suffer from blindness and occupy the third position in the world [3]. Blindness in Indonesia today is not only a health problem, but also a social problem that must be a priority of the national program. The cause of blindness is an old problem in Indonesia, which until now has

not been resolved. The problem of blindness in Indonesia still receives less attention from the government. This can be seen from the lack of assistance and public facilities provided by the government to help blind people.

Blind people have several limitations, namely: not being able to see hand movements at a distance of less than 1 (one) meter. The sharpness of vision 20/200 feet is the sharpness that is able to see an object at a distance of 20 feet and the field of vision is not wider than 200 [4,5]

The problem that is often complained by people with visual impairment is the lack of tools for them to be able to recognize and detect objects around them except with a walking stick. Blind people use a device or stick that helps them in the movement process. The stick is used to find the direction of the road and to help the blind to deviate from various obstacles encountered [6].



People with visual impairment can not distinguish the temperature of an object before touching or memorizing it based on its location. This becomes a problem for them, because the condition makes their fingers get a lot of injuries due to lack of assistive devices. Until now, they have been helped by training and quarantine held by social institutions and health institutions, although not yet effective. Therefore, we need a tool that can help blind people use ultrasonic sensors and temperature sensors.

The prototype was made using the Melexis MLX90614 type infrared sensor. Melexis MLX90614 is a family of infrared thermometer sensors designed for temperature detection without direct contact with the object being detected. The principle works by capturing the heat energy generated from infrared rays owned by each object and then converted in the form of a 17-bit internal Analog to digital converter (nADC) temperature and a strong Digital signal processing (DSP) contributing to the high accuracy and resolution of the MLX90614 [7].

The MLX90614 infrared temperature sensor provides two output methods: PWM and SMBus (TWI and I2C). The 10-bit PWM output provides a resolution of 0.14 ° C, while the TWI interface has a resolution of 0.02 ° C. The infrared temperature sensor MLX90614 has a wide temperature range: - 40 to 85 ° C for ambient temperatures and - 70 to 382.2 ° C for the temperature of the object. The measured value is the average temperature of all objects in the sensor reading area. The MLX90614 infrared

temperature sensor offers a standard accuracy of 0.5 ° C at room temperature. This sensor has a 4 foot pin configuration that is the SCL pin as the clock input on the sensor, the SDA pin as the input data on the sensor to be read. There is also a VCC as a voltage input pin and balanced with a GND pin for grounding.

In addition to using a temperature sensor, this tool also uses an ultrasonic sensor. This has the possibility to intercept surface types with an infrared one that cannot intercept glass or mirrors [8]. An instrument system that uses an effective ultrasonic sensor is used to detect any obstacles encountered in front of the blind while walking

$$s = \frac{340 \times t}{2} \quad (1)$$

Where S is the distance between the ultrasonic sensor and the reflecting plane, and t is the time difference between the transmission of the ultrasonic wave until it is received back by the ultrasonic receiver.

Based on data from the Directorate General of Social Rehabilitation in 2010, it was stated that there were 40-45 million people suffering from blindness / visual impairment. It is said that no less than 7 million people experience blindness each year, or there is one person on earth who experiences

blindness. Ironically, it is the poorer regions and countries where the majority of the population experiences blindness and visual impairment, which is around 90% [10].

If this condition is left without concrete action, WHO calculates that in 2020, the number of blind global population will double by around 80-90 million people.

With physical disabilities experienced by blind people, we need a tool that helps their daily activities so that the device can help understand the environment around them. They can understand and detect whether there is an obstacle, gap or other disturbance. With the help of sensors mounted on the device can be used, blind people become able to understand something around them.

The sensor chosen in this study is an ultrasonic sensor. Ultrasonic sensors are electronic devices whose ability can convert from electrical energy into mechanical energy in the form of ultrasonic sound waves. This sensor consists of an ultrasonic transmitter circuit called an ultrasonic transmitter and receiver called a receiver. This tool is used to measure ultrasonic waves. Ultrasonic waves are mechanical waves that have longitudinal characteristics and usually have frequencies above 20 KHz. Ultrasonic Waves can propagate through solids, liquids or gases. Ultrasonic waves are waves of energy propagation and mechanical momentum that propagate through these three elements as interactions with molecules and the nature of the energy of the medium through which they pass.

In the study developed a tool that can be used such as ultrasonic sensors, Arduino, buzzer and motor pagers. By utilizing an ultrasonic sensor that will be connected to the microcontroller, the distance to the obstacle can be determined to provide vibration output in accordance with the proximity of the object to the sensor. The sensor itself will be mounted on the front,

right, and left of the device, so that the area coverage is able to provide good object distance information to the user. To get a good response, the Arduino is given Fuzzy logic for the strong intensity of vibrations that occur.

2. Method

Block diagram designed to simplify the design of the installation tool. This is used to show the workflow of the system designed, as in Figure 1.

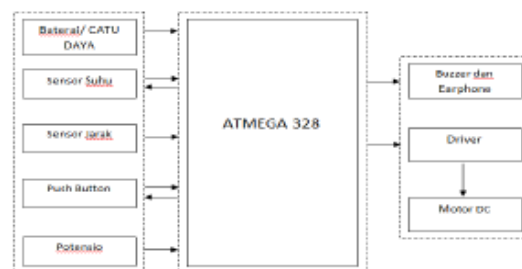


Figure 1. Block diagram

In general, the block diagram consists of 4 blocks, namely: 1) The power supply is sourced from a 9-12 volt battery; 2) the input block consists of a proximity sensor, temperature sensor, push button, and potentiometer. The proximity sensor functions to detect the distance of the nearest object that is in range then the data will be sent to ATmega328 for processing. The temperature sensor functions to detect the temperature of objects that are within range then data will be sent to ATmega328 for processing. Push button functions to start or stop the process carried out by ATmega328. Whereas the potentiometer functions to adjust the buzzer volume; 3) The processing block, in the form of ATmega328, functions as a command and data processor; 4) The output block is in the form of three indicators namely buzzer and earphone as sound indicator and DC motor as vibration indicator.

Each electronic circuit requires a stable input voltage and a voltage value that matches the system's requirements. The power supply in this tool is obtained from a 9-12 volt battery which will be used to provide power supply to the ATmega328 and DC motors.

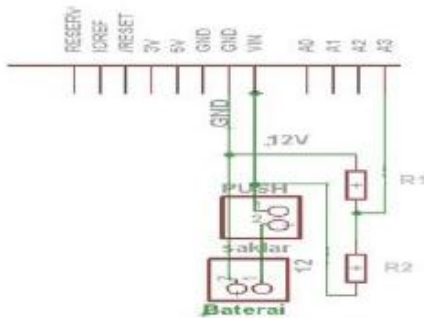


Figure 2. Power Supply Circuit

3. Results and Discussion

This tool can function as a tool for blind people. This tool can detect obstacles. The sensor is very efficient because it can inform the user where objects and obstacles are in front of them. The way of working on this tool is easy and the basic material for making blind gloves is relatively inexpensive compared to the high-tech sticks that have been circulating on the market. The blind gloves are expected in the future there is a development of components that are far more practical, easy and sophisticated, for example with technology-based Global Position System (GPS) to be able to inform others when the user is in an emergency, even record objects in front using the camera and inform sound through the headset.

3.1. Fuzzification

Fuzzification can be seen in Figure 3.

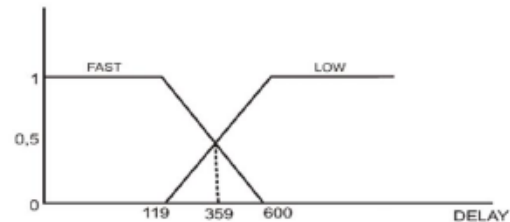


Figure 3. Membership association

From the above value data, we take a distance of 8 meters and a voltage of 14 volts and then entered into the set, can be seen in Figure 4.

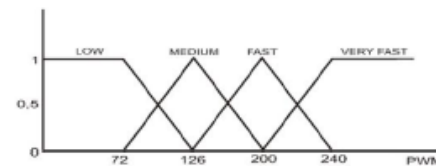


Figure 4. Distance and Voltage Membership Association

Table 1. Rule Base

Rule	Set input		Key
	Distance	Voltage	
1	Small	Small	OFF
2	Small	Medium	ON
3	Small	Large	ON
4	Medium	Small	OFF
5	Medium	Medium	ON
6	Medium	Large	ON
7	Large	Small	OFF
8	Large	Medium	OFF
9	Large	Large	OFF

When the system is running, all sensors and indicators will work. The HC-SR04 ultrasonic sensor and the MLX90614 temperature sensor work directly to detect the location and temperature of the object. Detection can be done by directing the glove to the front or side. If the buzzer or earphone produces sound, it means that right in front of the user's hand there is an object with a distance of no more than 60 cm. The distance from the object to the user's hand can be known from the sound produced by the buzzer or earphone. The closer the object is to the user's hand, the shorter the interval between sounds.



Based on the discussion and testing, the strengths and weaknesses of the temperature detection device and the location of the ATMEGA328-based blind object can be determined using the fuzzy method. The advantage of this tool is its efficiency in use, practical to use. Users can control this electronic device within a certain distance that has been tried, safe and feedback in this system makes it easy for users to determine and know the location of objects and the temperature of objects that are detected. The disadvantage is that glove material or fabric does not protect the components from water when used during rainy conditions.

4. Conclusion

Based on research that has been done, there are a number of things that can be concluded, namely: the device made has been running in accordance with the design planned. Based on the tests conducted, the HC-SR04 ultrasonic sensor has a fairly accurate distance reading level. Sensors are also able to detect distances from porous objects such as cloth. Based on testing conducted on the temperature sensor MLX90614 also has a fairly accurate temperature reading level with an error factor of no more than 5% at a distance of 7 cm without making direct contact with the object against the sensor, the reading results will be more accurate. Based on the application that has been done to one of the blind, this tool is quite very helpful to carry out their daily activities because of its practical use and can detect objects and

object temperatures before they really have to touch it.

Suggestions for further research are making prototype tools with waterproof materials so that they can be used even in rainy conditions.

References

- [1] Bourne R R A, Flaxman S R, Braithwaite T, Cicinelli M V, Das A, Jonas J B, et al 2017 Lancet Glob Health. 5 p 888
- [2] Vision impairment and blindness [Internet] 2018 World Health Organization cited 2018 (Available from: <http://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment>)
- [3] Kasus Kebutaan di Indonesia Peringkat 3 di Dunia | lifestyle [Internet] 2018 (Bisnis.com)
- [4] Heward W L, Orlansky M D 1988 Exceptional children: An introductory survey of special education 3 ed. (Columb OH Merrill Publ Co.)
- [5] Nugroho A B 2011 Perancangan tongkat tuna netra menggunakan teknologi sensor ultrasonik untuk membantu kewaspadaan dan mobilitas tuna netra (Surakarta: Universitas Sebelas Maret)
- [6] Pereira A, Nunes N, Vieira D, Costa N, Fernandes H, Barroso J 2015 Blind Guide: An Ultrasound Sensor-based Body Area Network for Guiding Blind People. *Procedia Comput Sci.* 67 pp 403–8
- [7] Sheet M D 2009 MLX90614 family, single and dual zone infrared thermometer in TO-39
- [8] Pratico F, Cera C, and Petroni F 2013 Sens Actuators Phys.15 p 363



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- [9] Bousbia-Salah M, Bettayeb M, and Larbi
A A 2011 J Intell Robot Syst. 1 p 387
[10] Website Kementrian Sosial 2019
(<http://rehsos.kemsos.go.id/modules.php?name=News&file=article&sid=1077>)