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SMART STICK DESIGN WITH OBSTACLE DETECTION AND NAVIGATION AS THE HELPING TOOL FOR BLIND PEOPLE

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ABSTRACT

Smart stick designed for the blind people, this appliance can help detect obstacles with the use of infrared sensor, ultrasonic and water. The obstacles in a distance of about 3 m can be detected assistance from this sensor. In addition, we use GPS (Global Positioning System) to give the position and navigation on the stick. Using GPS (Global Positioning System) help the blind people reaches its destination. GPS (Global Positioning System) recipients to get the location of the latest and the coordinates of the location that is used to keep track of the blind people, security to the blind people can also send emergency messages or make emergency calls. This appliance using the module GSM (Global System for Mobile), used to give notification when the blind people have the threat.

KEYWORDS: GPS module, GSM module, Sensors, Smart stick.

INTRODUCTION

The sense of the blind people is the individual that the sense of vision (both) does not function as a receiver channel information in their daily activities as well as the normal visual. (Nugroho, 2018)

In fact the blind people cannot see normally, but through the training of science the vibration in introduce by Perguruan Pencak Silat Merpati Putih organize an empty handed dove white they are able to optimize the other visual. (Rasyidah, 2015)

Psychological welfare is a term used to describe the psychological health of the individual in their daily tasks as human development. Psychological welfare help a person to be able to survive and redefining difficulties faced as the experience of his life (Rahma, 2015)

Teenagers who experienced blind people, like blind people men can prove to all people that himself can also work as normal people in general. They should be able to create a view of society will himself with positive, not always underestimate the individuals who have the condition like this. (Fitriyah, 2013)

This including internal factors namely the factors that close relationship with the state of the baby during still in the womb. Possibly because of the factor of genes in the nature of the bearer of the descendants of, psychological condition mother, malnutrition, drug poisoning, etc. While this - things including external factors including factors that occurred at or after the baby is born. (Wardani, 2009).

THE PROPOSED SYSTEM

Smart stick, as shown in the **Figure 3.1**, is basically the embedded systems that integrate the following: a pair of ultrasonic sensors to detect obstacles in front of a user from the height of the surface of the ground to high level of the head of the staff in front of the 400 cm, infrared sensor to detect the stairs to the top and the bottom of the water sensor to detect water coverage. This Sensor to collect data in real time and sends it to the microcontroller to be processed. After being processed, microcontroller pops up a warning message the correct signal through the phones bluetooth. This system is supported with the rechargeable battery. The following is the design of the smart stick:

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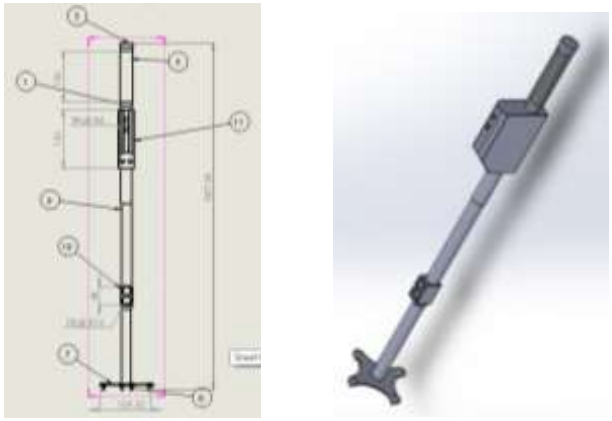

Figure 3.1 smart stick (Solidworks Design, 2018)

Description:

1. The battery cover
2. Hand grip
3. The battery
4. Box boards
5. Stick
6. Ultrasonic Sensor and buzzer
7. Water sensors
8. Accessible

THE METHODOLOGY

The blind man device based on the GPS with the user input signals can notify users to achieve its goals with the voice. It consists of the module microcontroller, GPS units and sound module to produce sound output. This gives the current location data received from the GPS system so that can take advantage of the data that is stored is then compared with the location of the purpose of the user. With this can navigate the distance from the purpose and an alarm to remind the first.

The implementation of the proposed design of the stick requires the following hardware components :

Ultrasonic sensors

Remote Sensing ultrasonic PING is 40 KHz production of parallax sensor is used for the application or the contest robot smart stick to detect the distance an object. (Tegar, 2012)

Figure 4.1 Ultrasonic Sensor (elangsakti.com)

In the proposed system we use a pair of ultrasonic sensor. The top on the height of 90 cm to detect obstacles over and other sensor at an altitude of around 30 cm to detect obstacles below the level of the knee. Each of the ultrasonic sensor to detect obstacles in the range around 200 - 400 cm. The distance that become constraint is determined based on the delay between the sound emissions and the coming of the resonance. The distance from the obstacles can be measured as, The Distance = (time * the speed of sound in the air) / 2 (1) Where, time is the duration of time of the ultrasonic waves that passed and the speed of sound in the air is 340m / s. We share the product of time and speed 2 because the total time is the time needed to reach the obstacles and return. (Radhika, 2016)

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Infrared sensors

The infrared is electromagnetic radiation from wave length longer than light appear, but be shorter than the radio wave radiation. His name means "under red" (from latin infrared, "bottom"), red is color from the visible light with the longest waves. Infrared radiation has a range of three "order" and has a wavelength between 700 nm and 1 mm. (Wikipedia, 2018)

Figure 4.2 infrared Sensor (wonderfulengineering.com, 2018)

Water sensors

The water sensor is used to detect the level of water in the tank and very expensive. Our goal is to detect the existence of water regardless of their levels. So we use an alternative without the cost. Three probing wire matches at the bottom of the stick to feel the obstacles such as water holes, water coverage and spread of water. Two cable used to complete The circuit and one of wire again used to short circuit. So the cable touch water, sirkuitnya short circuit, this interrupt mikrokontroler beep and the sound produced by the speakers to warn the blind people about water coverage. (Radhika, 2016)

Figure 4.3 Censorship water (autosweblog.com, 2018)

GPS module

GPS consists of a constellation of satellites that orbit around the Earth. Each satellite have hours of the atoms in its frames, so know the time. Because the orbit around the earth, each satellite continues to transmit the location in 1,575 GHz. With the help of the GPS receiver is pointed toward the heavens, we can listen to this transmission. Finally, with the help of the GPS receiver we can find the following: (Bojan, 2014)

1. The Location
2. Latitude and Longitude
3. The height of the
4. The Speed

Figure 4.4 GPS module (commons.wikimedia.org, 2018)

The GSM module

The Global System for Mobile Communication (GSM) is the most popular standard for blackberry in the world. GSM is used by more than 3 billion people in more than 212 those countries and regions. There are some technology that is available for GSM the determination of the position of the network, such as for example the signal strength, Cell-ID, TDOA, TOA, AOA, E-OTD or A-GPS. (Tian, 2009)

Figure 4.5 GSM module (Itead.cc, 2018)

Uno Arduino Microcontroller Board

Arduino Uno is mikrokontroler board based on the ATmega328P. This has 14 pin digital output / input (where 6 can be used as a PWM output), 6 analog input, crystal quartz 16 MHz, USB connection, the mains plug, and ICSP header and the reset button. It contains all that is needed to support the mikrokontroler; simply connect it to your computer with a USB cable or switch with the AC adapter to the DC or battery to start with UNO you without too worried about a mistake, the worst case scenario that you can change the *chip* for some of the dollar and start again. (Radhika, 2016)

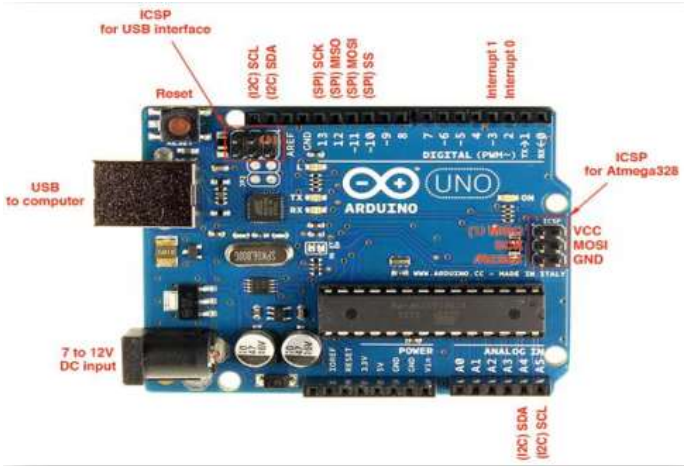

Figure 4.6 Arduino UNO (Radhika, 2016)

CONCLUSION

This journal presents the implementation of the stick smartphone that help the blind people against him the purpose of secure and guaranteed. We use a variety of sensors to detect obstacles in front of and warned the blind people about obstacles through a beep. The intensity of the beep increased when the person approaching obstacles that helped him to stay away from the obstacles. We use the GPS module and GSM / GPRS module, where the GPS module helps keep track of the blind people using data collected by him. In the case of the dangerous situation of the phone number has been stored is told that the blind people at risk with the current location of the blind people. Smart stick also make it easier for the blind people to call the emergency period all features are very useful in providing loans to make the blind people become independent when navigating.

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