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“BLIND GUIDE STICK USING GPS AND GSM MODULE”

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Abstract: Currently, visually impaired people use a traditional cane as a tool for directing them when they move from one place to another. Although, the traditional cane is the most widespread means that is used today by the visually impaired people, it could not help them to detect dangers from all levels of obstacles. The primary objective of this work is to permit blind persons to explore autonomously in the outside environment. A buzzer and vibrator motor are also added to the system. It provides the direction information as well as information to avoid obstacles based on ultrasonic sensors and infrared sensors. The proposed work is to use stick including a GPS and GSM navigator. Nowadays, a stick is used with some features but in our project we are using GPS module with some other advance features. This work goes giving the route to blind person by designing a cost effective and more flexible navigation system. The proposed system consists of hardware and software. Here the components we are using are microcontroller, GPS module, etc. The project with help the blind people in improving their communication ability and not to depend on none during walking in even unknown areas.

I. INTRODUCTION

Vision is the most important part of human physiology as 83% of the information human being gets from the environment is via sight. The 2011 statistics by the World Health Organization (WHO) estimates that there are 285 billion people in world with visual impairment, 39 billion people with visual impairments are the walking cane (also called white care or stick) and guide dogs. The most important drawbacks of these aids are necessary skills and training phase, range of motion and very little information conveyed. With the rapid advances of modern technology, both in hardware and software front have brought potential to provide intelligent navigation capabilities. Recently there has been a lot of Electronic Travel Aids (ETA) designed and devised to help the blind to navigate independently and safely. Also high technological solutions have been introduced recently to help blind persons navigate independently. While such systems are suitable for outdoor navigation, due to the need for line of sight access to satellites, they still need additional components to improve on the resolution and proximity detection to prevent collision of the blind persons with other objects and hence subject his/her life to danger. However in comparison to other technologies many blind guidance systems use ultrasound because of its immunity to the environmental noise. Another reason why ultrasonic is popular is that the technology is relatively inexpensive, and also ultrasound emitters and detectors are small enough to be carried without the need for complex circuitry. The project is based on a theoretical model and a system concept to provide a smart electronic aid for blind people. Apart from the conventional navigation systems, blind aid systems can b used with depth measuring circuitry which will be helpful to measure the depth in case of dealing with the stairs and on stick vibration circuitry to inform the obstacle alert. These different units are discussed to implement the design of a “smart stick”.

II. PROBLEM STATEMENT

For most of us, who are normal and healthy at least can reach their destination somehow but for some unfortunates like the blind person finding a location becomes an extremely tedious process. They will b in need of continues help and companionship till they reach their desired destination. By this the problem can be overcome by the blind guide stick.

III. LITERATURE REVIEW

1. A smart stick has been built for the visually impaired people that help to detect obstacles with the use of infrared and ultrasonic sensors. GPS and GSM module helps them to navigate and reach his destination and also gives information to his guardian where he is located. The blind person can also send emergency message or make emergency call at risk, to his guardian through GSM module.
2. This is achieved through implementation of design for visually impaired, thus eliminating the problems associated with the existing solutions. This makes it to know the exact location, altitude at any given moments and current orientation of obstacles. This magic wand is preloaded with map information of street, position of potential obstacles and landmark, doorways, staircase and dangerous obstacles. The performance and functionally are also improved.
3. The idea behind the design of the stick was to keep it structurally similar i.e, their light weight and easy to handle. This smart blind stick uses ultrasonic sensors to detect obstacles, holes, pits, etc. This user is notified about the same by pre-recorded sound messages

and in the form of vibrations. This audio feedback will keep user alert. The intensity of vibrations is an indication of closeness of obstacles in the walking path of the user.

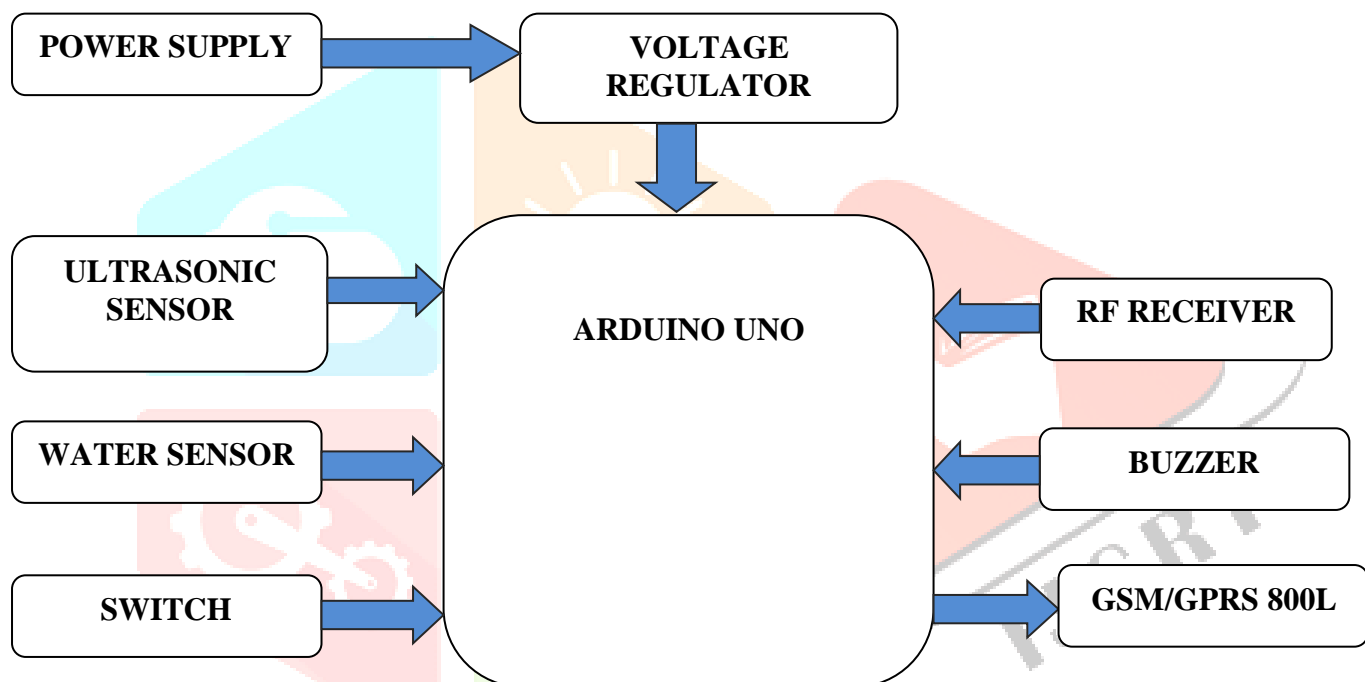
IV. METHODOLOGY

The microcontroller reads the distance of the obstacles using sensor and also commands the buzzer. The vibrator is also connected in parallel with the buzzer for vibration sensation. The microcontroller then processes this data and calculates if the obstacles are close enough. It also detects and sounds a different buzzer when obstacles are nearby. GPS module is used to know the current location where the blind person is present; he can also hear the audio message regarding the direction that is to be followed by the blind person. GSM module is used by the blind person to contact to mobile numbers stored in the microcontroller in case of any emergency.

V. WORKING

In this system the ultrasonic sensors are used to sense the obstacles. The sensors are set to threshold limit of any obstacle found within range, it gives beep through speaker. Ultrasonic sensors emit sound scopes with frequency lying in ultrasonic spectrum (20KHZ), which is inaudible to human ears. The sound waves hit the obstacle and bounces back to detectors. The ultrasonic sensor is used for detecting objects/obstacles. The signal is then sent to microcontroller to operate a buzzer/speaker. The microcontroller reads the distance of the obstacles using sensor and also commands of the buzzer.

VI. BLOCK DIAGRAM



• COMPONENTS

1. Ultrasonic sensor-HCSR04
2. Infrared sensor(LM358)
3. ATMEGA 16 μ c(Arduino uno)
4. GPS and GSM module
5. Buzzer
6. Vibrator motor
7. Water sensor
8. Light sensor

VII. COMPONENTS DESCRIPTION

Ultrasonic sensor-HCSR04

Also known as trans-receivers when they both send and receive, but more generally called transducer work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or soundwaves respectively. Ultrasonic sensors generate high frequency soundwaves and evaluate the echo which is received by the sensor. Sensor calculates the time intervals between sending the signal and receiving the echo to determine the distance to an object.

This technology can be used for measuring wind speed and direction (anemometer), tank or channel level and high speed through air or water. To measure tank or channel level, the sensors measure the distance to the surface of the fluid. Further applications include: humidifiers, sonars, medical ultrasonography, bulger alarms and non-destructive testing.

Systems typically use a transducer which generates soundwaves in the ultrasonic range, above 18000 Hz, by turning electrical energy into sound, then upon receiving the echo turn the soundwaves into electrical energy which can be measured and displayed.

Ultrasonic sensors HCSR04 provides an output signal proportional to distance based on the echo. The sensor here generates a sound vibration in ultrasonic range upon giving a trigger, after that it waits for the sound vibration to return. Now based on the parameters, sound speed (220m/s) and time taken for the echo to reach the source, it provides output pulse proportional to distance.

Infrared sensor

Photo diode is connected in reverse bias, inverting end of LM358 (pin 2) is connected to the variable resistor, to adjust the sensitivity of the sensor and non-inverting end (pin 3) is connected to the junction of photodiode and resistor. When we turn on the circuit there is no IR radiation towards photodiode and the output of the comparator is low. When we take some object (not black) in front of IR pair, then IR emitted by IR LED is reflected by the object and observed by the photodiode. Now when reflected IR falls on photodiode, the voltage across photodiode drops, and the voltage across series resistor R2 increases. When voltage at resistor R2 gets higher than the voltage at inverting end, then the output becomes high and LED turns on. Voltage at inverting end, which is also called threshold voltage, can be set by rotating the variable resistors. Higher the voltage at inverting end, less sensitive the sensor and lower the voltage at inverting end, more sensitive the sensor.

ATMEGA 16 μ c

ATmega16 is an 8-bit high performance microcontroller of an Atmel's Mega AVR family with lower power consumption. ATmega16 is based on enhanced RISC (Reduced Instruction Set Computing, Know more about RISC and CISC Architecture) architecture with 131 powerful instructions. Most of the instructions execute in one machine cycle. ATmega16 can work on a maximum frequency of 16Mhz. ATmega16 has 16KB programmable flash memory, static RAM of 1KB and EEPROM of 512 Bytes. The endurance cycle of flash memory and EEPROM is 10,000 and 1,00,000, respectively. ATmega16 has mainly used in embedded systems, medical equipment, hence automation devices, automobile devices, industrial automation, hence appliances, security systems and temperature-controlled devices, motor control systems, digital signal processing, peripheral interface systems and Arduino based projects and many more.

ATmega16 is the most popular and latest controller in AVR series microcontrollers. ATmega16 is an advanced version of the microcontroller category. ATmega16 has six different types of sleep modes. These are very helpful to save power when it is triggered. It has a huge memory unit which is very sufficient to do a lot of operations in within a short time and we can do projects with ATmega16 interfacing like GSM module interfacing with ATmega16, GPS module interfacing with ATmega16, Bluetooth module interfacing with ATmega16, temperature sensor interfacing with ATmega16, Wi-Fi module interfacing with ATmega16 and many more.

GPS and GSM module

GPS (Global Positioning System) technology is used to find the location of any object or vehicle to monitor a child continuously using satellite signals. Three satellite signals are necessary to locate the receiver in 3D space and fourth satellite is used for time accuracy. GPS will get the information of parameters like longitude, latitude and altitude. With the help of these parameters one can easily locate the position of any object. In this GPS technology, the communication takes place between GPS transceiver and GPS satellite.

GSM (Global System for Mobile Communications) is the technology that underpins most of the world's mobile phone networks. The GSM platform is a hugely successful wireless technology and an unprecedented story of global achievement and cooperation. GSM has become the world's fastest growing communications technology of all time and the leading global mobile standard, spanning 218 countries. GSM operates in the 900MHz and 1.8GHz bands GSM supports data transfer speeds up to 9.6Kbps, allowing the transmission of basic data services such as SMS.

Buzzer

The Piezo buzzer produces sound based on reverse of the piezoelectric effect. The generation of pressure variation or strain by the application of electric potential across a piezoelectric material is the underlying principle. These buzzers can be used to alert a user of an event corresponding to a switching action, counter signal or sensor input. They are also used in alarm circuits. The buzzer produces a same noisy sound irrespective of the voltage variation applied to it. It consists of piezo crystals between two conductors. When a potential is applied across these crystals they push on the one conductor and pull on the other.

Vibrator motor

A vibrator motor is essentially a motor that is improperly balanced. In other words, there is an off-centered weight attached to the motor's rotational shaft that causes the motor to wobble. The amount of wobble can be changed by the amount of weight that you attach, the weight's distance from the shaft, and the speed at which the motor spins. This type of motor can be used affixed to all kinds of objects, which will cause them to vibrate and move freely about. Vibrating motors can be found inside cell phones, pagers, gaming controllers and personal massagers.

Water sensor

A water sensor is an electronic device that is designed to detect the presence of water and provide an alert in time to allow the prevention of water damage. A common design is a small cable or device that lies flat on a floor and relies on the electrical conductivity of water to decrease the resistance across two contacts. The device then sounds an audible alarm together with providing onward signaling in the presence of enough water to bridge the contacts. These are useful in a normally occupied area near any infrastructure that has the potential to leak water, such as HVAC, water pipes, drain pipes, vending machines, dehumidifiers, or water tanks.

Light sensor

The LM358 chip in the circuit is used as a comparator to make decisions. Photoresistor changes its resistance based on the ambient lighting in an environment. Exposed to darkness, a photoresistor has a tremendous amount of resistance. Depending on the specific photoresistor in use, its resistance can be anywhere from over 100K Ω to well over 2M Ω . When exposed to bright light, a photoresistor's resistance drops drastically. Therefore, less voltage will fall across it. So when it is hooked up to comparator, the voltage divider circuit will produce a voltage less than the reference voltage.

VIII. Advantages

1. The system enables the blind person to move with the same ease and confidence as sighted people
2. Since the system is linked with GPS and GSM module, it provides the direction information through voice signal
3. Avoid the obstacle based on ultrasonic sensor
4. Efficient low cost design
5. It is portable
6. Accidents can be reduced
7. Low power consumption
8. Auto detection
9. Simple to use
10. With little software and sensor up gradation, can be extensible to any other application and specification.

IX. Limitations

1. Requirement of power source
2. Stairs cannot be guided

X. CONCLUSION

As more people realize the value of these inventions the field will grow without bounds. This can be demonstrated by the design specified. It's practical, cost efficient and extremely useful. If all of these characteristics weren't enough to warrant investigation into this field of study, these inventions will also make the inventor very wealthy. This project is applicable for blind people. It can be further improved to have more decision taking capabilities by employing varied types of sensors and thus could be used for different applications. It aims to solve the problems faced by the blind people in their daily life. The system also takes measures to ensure their safety.

XI. FUTURE SCOPE

It can be further enhanced by using VLSI technology to design the PCB unit. This makes the system further more compact. Also, use of active RFID tags will transmit the location information automatically to the PCB unit, when the intelligent stick is in its range. The RFID sensor doesn't have to read it explicitly.

XII. REFERENCES

1. Larisa Dunai, Guillermo peris Fajarnes, "Victor Santiago Praderas, Beatriz Defez Garcia, Ismael LenguaLengua-Real-Time Assistance Prototype-a new Navigation Aid for blind people".978-1-4244-5226-2/10©2010IEEE.
2. Shamsi, M A.; Al-Qutayri, M.;Jeedella, J., "Blind assistance navigation system Biomedical Engineering(MECBME)"1st Middle east conference on 21-24 Feb 2011.
3. Borenstein J. and Ulrich I, "The Guide Cane-Applying Mobile Robot Technologies To Assist The Visually Impaired"IEEE.

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