



Blind Aid Stick with Alert System using Image Processing

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May 21, 2018

Abstract

Technology has always tried hard to make daily life simple and can be useful in every part of the society. Especially for those who are visually impaired persons because they have to rely on others for their all other activities. This paper is written in order to have some awareness about their issues and regarding the sensors that could make their issues solved. For this we are using latest technologies which are having different sensors to sense and detect the hurdle for the blind person. It is also having panic alert system that sends message to any relative of that blind person. We have used IR sensors along with ultrasonic range finder circuit for hurdle detection. Bluetooth module which along with GPS technology and an android application for blind people, will provide voice assistance to desired location. The basic objective of the system is to provide convenient and easy way to modify their way of living and giving a way of sight for the unsighted people. It will provide an information about the surrounding environments that could help them to guess the correct scenario and have an artificial vision toward the society. In an estimation about 253 million people live with

vision impairment out of which 36 millions are blind and remaining of them are partially blind, from our country we alone are having 15million blind people, so this work not only gives awareness to blind. it is also for the development of the nation. **Key Words:**Ultrasonic sensors, GSM, Adruino, Panic Alert System

1 INTRODUCTION

Vision is one of the most important thing in humans life to get information of all its surroundings and could get the correct idea of scenario. There is all about 19.70

2 LITRATURE SURVEY

Blind Aid Stick has been a popular project with constant enhancements and modifications. Currently the commercially available of blind stick are not that popular due to high cost and lack of accuracy. Previous projects on the same idea are only their to detect obstacles not to recognize the obstacles type which does not help to blind people to guess the current environmental scenario. Prof. A. Sakhare (2011) [1] method proposed for using smart stick for blind visionless: obstacles estimation, artificial vision and real time assistance via GPS. This system works with GPS, artificial vision system, obstacle detection and audio circuit. This project is fitted with a camera on the persons head; the camera will use an algorithm to detect obstacles. The model also includes ultra-sonic sensors to detect the obstacles. GPS system helps in reaching required destination. This system has low cost. Ultrasonic Spectacles and Waist-belt for Visually Impaired and Blind Person by Shripad S. Bhatlawande, Jayant Mukhopadhyay and Manjunatha Mahadevappa, Indian Institute of Technology. This paper presents an electronic navigation system for visually impaired and blind people. Accuracy is high. But, the design complexity is high. Similar study for unsighted uses pulse echo technique for provides a warning sound when detecting the obstacles. These techniques are used in submarines by navel forces to detect obstacles and put awareness about the hurdle, these technique is opted by many important coun-

tries like USA,INDIA and many more.They pulses are of ultrasound range from 21 KHz to 50 KHz when hit the hard surface they tend to generate echo, But the power requirement is high.The NavbeltA Computerized Travel Aid for the Blind Based on Mobile Robotics Technology by ShragaShoval, Johann Borenstein,* Member, IEEE, and YoramKoren, Senior Member, IEEE.This paper presents a new concept for travelling with aid for the blind. A prototype device, called the NavBelt, was developed to test this concept. The device can be used as a primary or secondary aid for the blind, and consists of a portable computer, ultrasonic sensors, and stereophonic headphones.This paper presents a new concept for a travel aid for the blind.

3 SYSTEM DESIGN

The proposed design for smart stick consists of the ATMEGA328P Micro controller Unit, the Obstacle Detection Unit, BUTTON link with Mobile (GPS and android) and Voice IC interface unit.

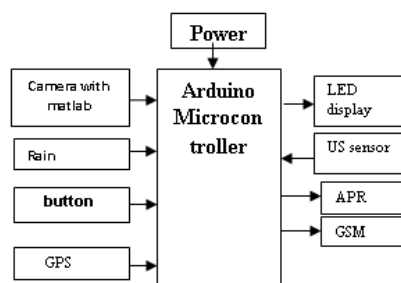
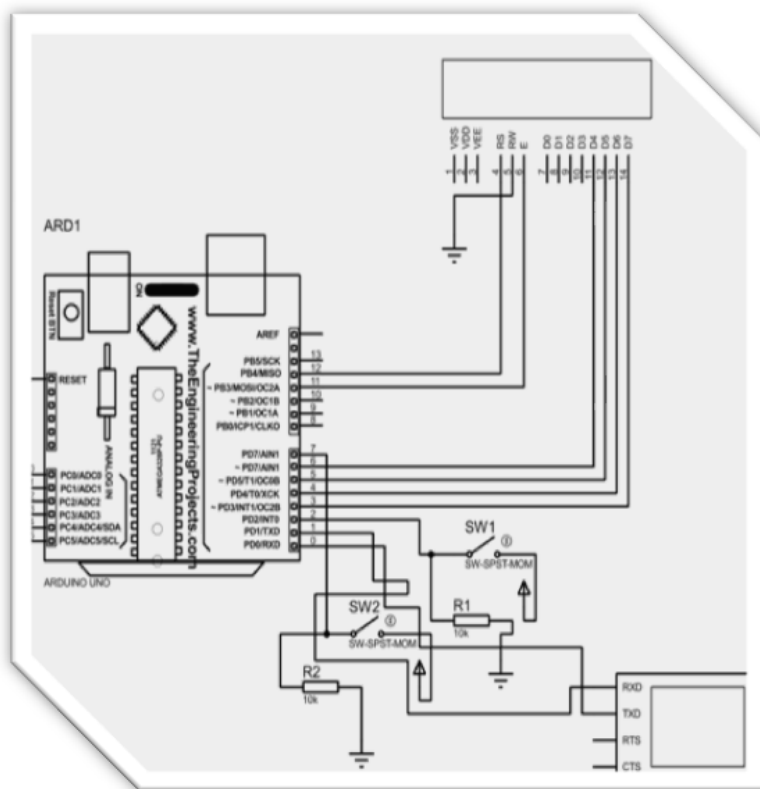


Fig.1. BLOCK DIAGRAM

ATMEGA328P Microcontroller :

-Key reason of selection of this component is 32KB ispFlash memory with read while write capability,1kb EEPROM,2kbSRAM,23 general purpose working registers,three flexible timers and counters with compare modes,internal and external interrupts,serial programmable USART,a byte oriented 2 wire serial interface,SPI serial port ,6 channel 10 bit A/D converter,programmable watchdog timer and 5 power modes. which is 1000 times reprogrammable .This device operates between 1.8-5.5 volts.The device achieves throughput approaching 1mips per mhz



The Obstacle detection unit: It consists of Ultrasonic range detector and sensors. Ultrasonic sensor uses 40 KHz signals to detect obstacle up to 180cm and on detection based on speed of sound waves, and then will send Binary serial signal on TABLE1.

Rx Pin of Microcontroller. Based on different distances the apr will tell for different objects. The Rain sensors consist of variable resistor and photo detector circuit. Which use Infrared beam to sense surrounding objects and on reception send perceived data to Microcontroller .The different durations of vibration helps the vision less to understand whether the obstacle is left or right direction and hence is more reliable and efficient. The range of sensors can be increased but for proposing model we prefer to keep system simple so that it is easily implementable and concep tually easy to understand.Its range can be calculated.

As we know ultrasonic sensors are only to detect hard objects so

to detect soft objects like water, petrol, etc we need one more detecting sensors that is a rain sensor. We have modified our project to detect hard and soft objects. Some more modifications like for rain and ultrasonic sensors we are using variable resistors which will work on varying resistance of the object for different potential of the body for different body resistance resistors are varying to show different characteristics as if for soft and hard objects. Variable resistors are connected to PQ2/INT0 and PQ1/AIN. Its other pin are grounded and with these variable resistance switches are attached some codes for the sensors:

Camera interfaced with matlab programs :

A simple camera with matlab coding helps the blind people to detect the obstacle by IMAGE PROCESSING method used. Digital image processing allows the use of much more complex algorithms and hence can offer both more sophisticated performance at simple tasks and the implementation of methods which would be impossible by analog means .some important things is dip is image editing, image restoration, gray scale image, scaling image and many more. Camera generally includes image processing hardware i.e either chips or dedicated circuit to convert the raw data from their image sensors into a color corrected and correct image. Here for camera interfaced with matlab image acquisition tool box is required which contains all the data and supports many file. Here we have to use camera as input argument with camera names and recognition, acquire the images and find whether the image is matched from my codes and images saved in the matlab library.

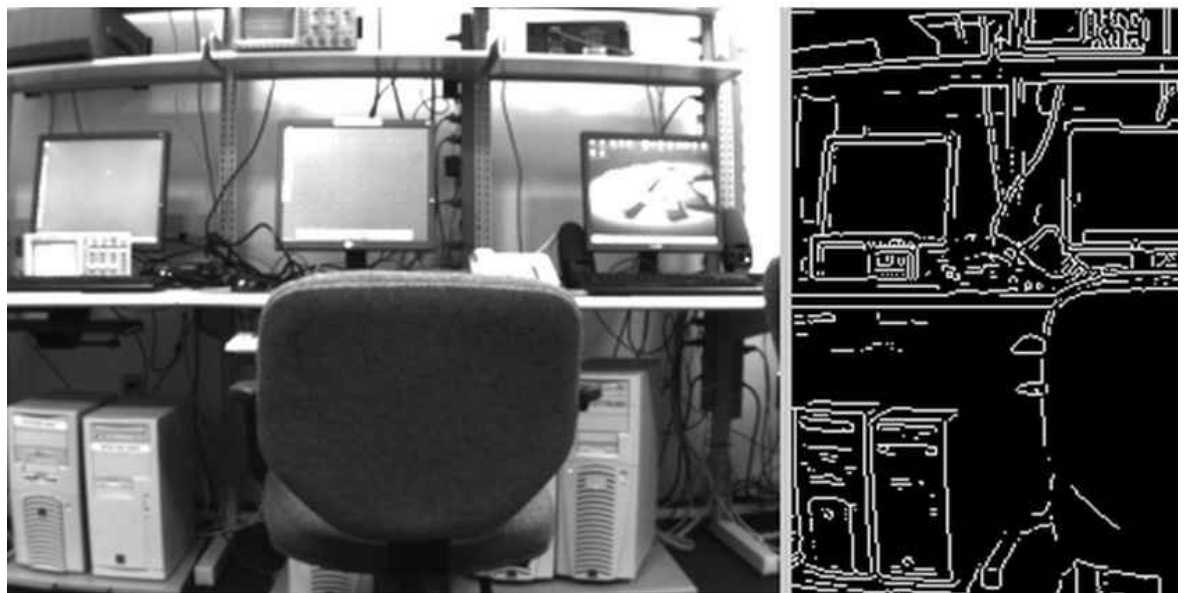
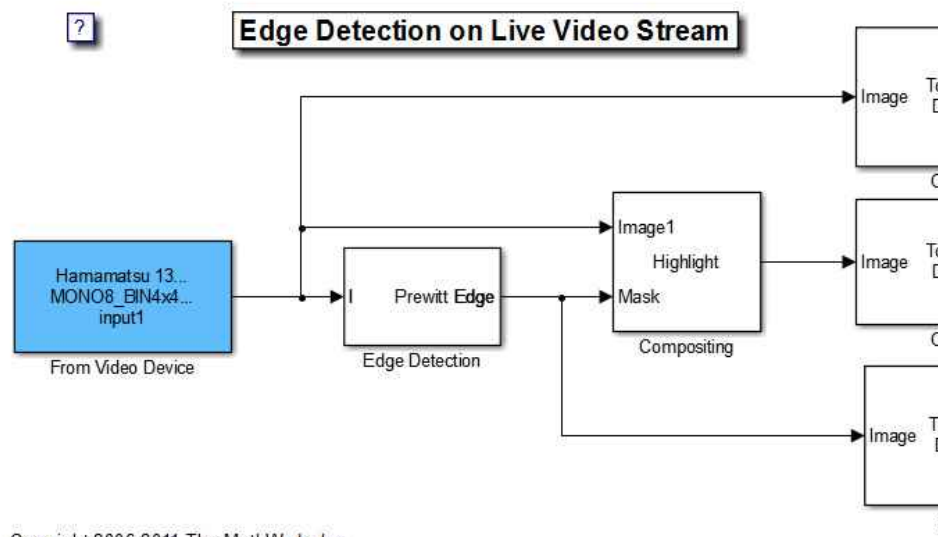


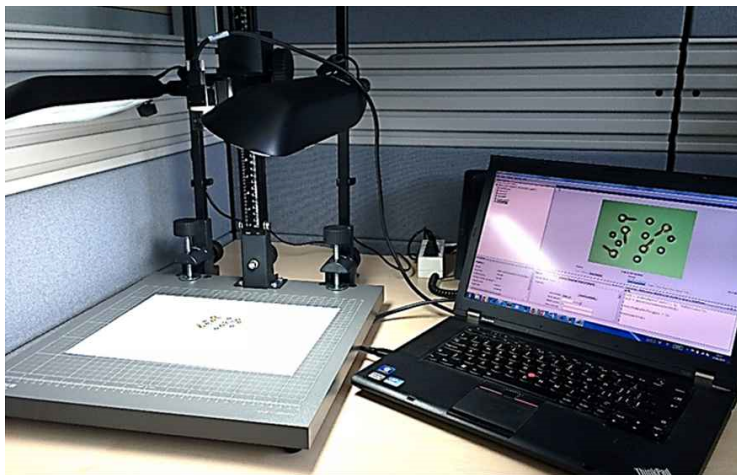
Fig.2. image capturing and processing

LCD DISPLAY: Here we are using lcd display lmd016l which

are having 16 pins. mostly alphanumeric display are used in a wide range of application, the 16*2 intelligent alphanumeric dot matrix are capable of displaying 224 words. All LCD commands are transmitted serially via a single microcontroller pin. It has mainly four power supply, data bus line, two input signal, one read and write signal.

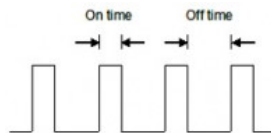
Voice IC interference unit:

It consist of IC station mega2560 compatible with adruino which is powered by 5v dc . It is connected to the adruino and like a buzzer it tells about the obstacle. Based on signals from port 2 the relay circuit coil magnetizes and apr9600 starts recording and playback voice. Thedeaigned circuit control is easy,high quality sound and big volume.it can be recorded and



playback so many times. For example, the leaving message, response of the telephone, game machine and toy voice recording and playback, telling time of clock and many more.

Power supply circuit: 12V lead acid battery provides power to relay contacts along with apr voice module. Current limiting diode along with Voltage regulator IC7805 with filter capacitors 100 micro farad and 1 micro farad help in the stable 5V output which powers the micro controller along with various



components. The battery is rechargeable and as the stick is used only during navigation time, by efficient usage the stick can function for a day. A power supply is used to reduce the mains electricity at 240 volts AC down to something more useable, say 12 volts DC. There are two types of power supply, linear and switch mode. A linear power supply uses a transformer to reduce the voltage. The ratio of primary windings (connected to the mains) to the number of secondary windings (connected to the output) would give the ratio of how much the voltage is reduced by, in this case a ratio of 20:1 reduces the 240 volts AC input into 12 volts AC on the secondary windings. A switch mode supply works by turning the mains electricity on and off very quickly to reduce the voltage. In this case the reduction in voltage depends upon the ratio of the on time and off time. Switching takes place very fast, at 10,000 times a second or quicker. Using this technique the bulky transformer found in a linear supply can be replaced with a smaller one.

Calculation for distance with sensor:

Time taken by pulse is actually for to and from travel of ultrasonic signals, while we need only half of this. Therefore time is taken as $\text{time}/2$. $\text{Distance} = \text{Speed} * \text{Time}/2$ Speed of sound at sea level = 343 m/s or 34300 cm/s Thus, $\text{Distance} = 17150 * \text{Time}$ (unit cm).

Motivation and problem identified Trouble reading is the most commonly reported problem of people with low vision, regardless of the underlying cause of their vision loss, according to a study. The Low Vision Rehabilitation Outcomes Study recruited 819 patients seeking low vision services at 28 clinical centers in the India. When walking with someone with impaired vision, try to walk a few steps ahead, at a pace that is slower than usual. This way, the individual with impaired vision has to travel with impaired leg that can demotivate a blind person to travel. Alert them to steps, curbs and other potential problems, you are approaching that might be difficult to see. So to overcome their life condition I am presenting my projects which had several problems identified like the distance prob-

lem between that blind person and obstacle. To choose the correct sensor to recognize the hard object and soft object, during matlab also limited data can be stored in the library. so we cannot include all the objects for this, a limited and important data is collected in library for blind like car, bed, dog, bottle etc. which are used in daily life and can be life compatible. these are the problems identified. Objective and uses: It offers a completely new user experience for braille and non-braille readers via touch navigation, text-to-speech output. It also enables the direct conversion of any text file into braille and obtains information via APR voice module. It will also produce output images and graphics and combine the tactile experience with text-to-speech capabilities. This system alert via voice based commands. And it will alert the blind people relatives if the blind have any critical any situations. Advantages: Easy to understand the commands, Cost level low, Easy to installation.

Working: This system used for blind people to avoid obstacles on path. The main hardware and control part is arduino uno controller. The additional hardware parts are Ultra sonic sensor, lcd, camera, gps, gsm, APR voice module. If any ultrasonic sensor will detect obstacles it will alert the blind people via APR voice module. And one more main advantage of the system is the blind people will press the emergency button if they blocked in any critical situations the system will automatically send the emergency message to his relatives or family members.

Some programs used with algorithms:- Here we are initializing the two variable resistors. Now define the two sensors and set the inputs to high for read. Run the loop and see whenever motion detected. Again run the loop if rain is high. Finally the result should be sent to the registered mobile number which should be defined in codes.

4 CONCLUSION AND FUTURE SCOPE

This paper hence presents the system design and concept of a smart and easy to use Blind Aid Stick for the blind people. The key features are the simple design, efficient yet easy to use and modify architecture and system design. Hence it can provide a low cost device for millions of blind people in the entire world. The pro-

posed system combines various existing easily technologies and real time system sensors that help in monitoring the position of user and also help in effortless navigation. The different duration buzzer further improves the efficiency and reduces complication. The project can further be modified to increase ranges for obstacles and as the GPS technology continues to grow the accuracy will improve. The Advancement in Mobile technology will further help in developing better applications for continuous assessment of surroundings. Technology of Wi-Fi and can also be include along with IOT so that features like Whether and traffic prediction can help the blind to further evaluate better.

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