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Design and Implementation Of A Smart Stick and An Alert Device For People With Visual Impairment

Atyaf Ayman Euyz Hashem[1*], Duaa Hassan Hamza Ali[2], Ruqaya Hassan Abdul Amir Mohammed Saleh[3], Ahmed Abdel Hadi Mohammed Reda Ali[4] , Tamara Ali Abd Al Ameer Abd Ali[5]

[1,4]Department of Biomedical Engineering , Al _Mustaqbal University, College of Engineering

[2,3]Department of Biomedical Engineering, University of Karbala, College of Engineering

[5]Department of Biomedical Engineering,University of Baghdad, Al- Khwarizmi College Engineering,Iraq

atyafaymn41@gmail.com[1*], duaahassan739@gmail.com[2], ruqia78166@gmail.com[3], tmaraalsbak@gmail.com[4]

Korespondensi Penulis: atyafaymn41@gmail.com[*]

Abstract*.Electronic cane: It is an electronic cane designed in the shape of a long white cane, but it provides the blind with ultrasonic frequencies that he can feel under his hand and through an audible alarm when it hits a certain obstacle in its path{1}. It can also detect obstacles in all directions at a distance of five meters. The ends of this cane are made of lead. The International Federation of the Blind, which is one of the organizations affiliated with the United Nations, has declared October 15 of each year as the International Day of the White Cane for the Blind, due to the utmost importance of the white cane for the blind, as it makes him depend on himself after God. This dependence is foldable and is stronger and lasts for a long time. It is important to note here that the white cane with a red stripe placed on the lower part of the cane symbolizes the person's suffering from loss of vision with deafness or hearing impairment. Regardless of the type and shape of the white cane, it has become a symbol of the blind person's independence and his ability to move, work and integrate into society like other individuals. It guides him to directions, barriers and obstacles and spares him the need to touch things that may be difficult or dangerous to touch, thus protecting him from many harms, in addition to providing him with a lot of information that he lacks due to his lack of sight and the inability of the other senses to provide him with it.*

Keywords: *Design..Implementation..Smart stick..Alert device..Visual impairment.*

Abstrak.Tongkat elektronik: Merupakan tongkat elektronik yang didesain berbentuk tongkat putih panjang, namun memberikan frekuensi ultrasonik kepada tunanetra yang dapat ia rasakan di bawah tangannya dan melalui alarm yang dapat didengar ketika menabrak rintangan tertentu di jalurnya{ 1}. Ia juga dapat mendeteksi rintangan di segala arah pada jarak lima meter. Ujung tongkat ini terbuat dari timah. International Federation of the Blind (Federasi Tunanetra Internasional) yang merupakan salah satu organisasi yang berafiliasi dengan PBB telah menetapkan tanggal 15 Oktober setiap tahunnya sebagai Hari Tongkat Putih Internasional bagi Tunanetra, karena betapa pentingnya tongkat putih bagi tunanetra. , karena itu membuatnya bergantung pada dirinya sendiri setelah Tuhan. Ketergantungan ini dapat dilipat dan lebih kuat serta bertahan dalam jangka waktu yang lama. Penting untuk diperhatikan di sini bahwa tongkat berwarna putih dengan garis merah yang diletakkan di bagian bawah tongkat melambangkan penderitaan seseorang karena kehilangan penglihatan karena tuli atau gangguan pendengaran. Terlepas dari jenis dan bentuk tongkat putih, tongkat putih telah menjadi simbol kemandirian penyandang tunanetra dan kemampuannya untuk bergerak, bekerja dan berintegrasi ke dalam masyarakat seperti individu lainnya. Ini membimbingnya ke arah, penghalang dan rintangan serta menghindarkannya dari kebutuhan untuk menyentuh hal-hal yang mungkin sulit atau berbahaya untuk disentuh, sehingga melindunginya dari banyak bahaya, selain memberinya banyak informasi yang kurang karena kekurangannya. penglihatan dan ketidakmampuan indera lain untuk menyediakannya.

Kata Kunci: Perancangan..Implementasi..Smart stick..Alat peringatan..Gangguan penglihatan.

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1. INTRODUCTION

The term visual impairment refers to people who have a high degree of vision loss and cannot sense the vision of light.

The electronic cane for the blind guides is a symbol of the independence of the blind. The cane is a stick made of wood or other materials that performs many functions for humans. They use it as a weapon to defend themselves and may use it to lean on when they get old or suffer from a movement disability. For the blind, it represents one of the most important tools they need for their mobility and movement and for enabling them to be independent and self-reliant in many matters. Therefore, it is no wonder that this tool has become a symbol for blind

The cane for the blind appeared in ancient Egyptian drawings and was also mentioned in some heavenly books. In modern times, historical sources refer to the year 1921 when the British James Biggs designed the electronic cane for blind guides {3}, which is still used today. This photographer lost his sight after an accident and needed a tool to help him move around. In 1931, a French socialite named Peguilly d'Herbemont founded the Blind Guide Cane Movement. This lady devoted all her effort and time to the blind and noticed how difficult It was for the blind to move on the roads and in public places after the number of vehicles increased and because of her strong desire to integrate the blind into society. And provide them with means that help them move and travel freely and attract the attention of others to help them cross the street. So she wrote to one of the daily newspapers and demanded that the blind in Paris be allowed to carry a stick similar to those carried by the police who regulate traffic in the streets of Paris. A large number of the newspaper's readers supported this idea and supported it. They regulate traffic in the streets of Paris. A large number of the newspaper's readers supported this idea and supported it a number of ministers were also appointed, and thus all the blind in Paris were provided with an electronic cane. Then this cane spread to other European cities and was distributed to a large number of the blind. In 1964, US President Johnson decided to consider October 6th of each year as the National Electronic Cane Day in the United States. Six years later, in 1970, October 15th was designated as the International Electronic Cane Day by the International Federation of the Blind. Electronic

Usually people with blindness use traditional crutches to guide them and move from one place to another {4}.In 2013, the regular cane was developed to have an ultrasonic sensor to detect obstacles in front of it {5}

In 2017 it was further developed using vibrations and alerts attached to the stick as well as an Arduino connected to it {6}

Project objectives: . 2

It can be said that the most important functional tasks that the smart crutch is required to perform automatically or with the help of the user are represented in the following points:

a) The crutch detects obstacles facing the user while walking.
b) The crutch senses the lighting to determine the condition of the place surrounding the user in terms of lighting.
c) The alarm device attached to the crutch determines its location in case it is lost, by issuing an audible alert.
d) The crutch alerts the user with audio messages in case there is an obstacle or the surrounding place is dark

Components and Design:

Figure (1) shows the general structure of both the smart crutch device and the alert device attached to the crutch, and contains the physical and technical components necessary for the operation of the two devices.

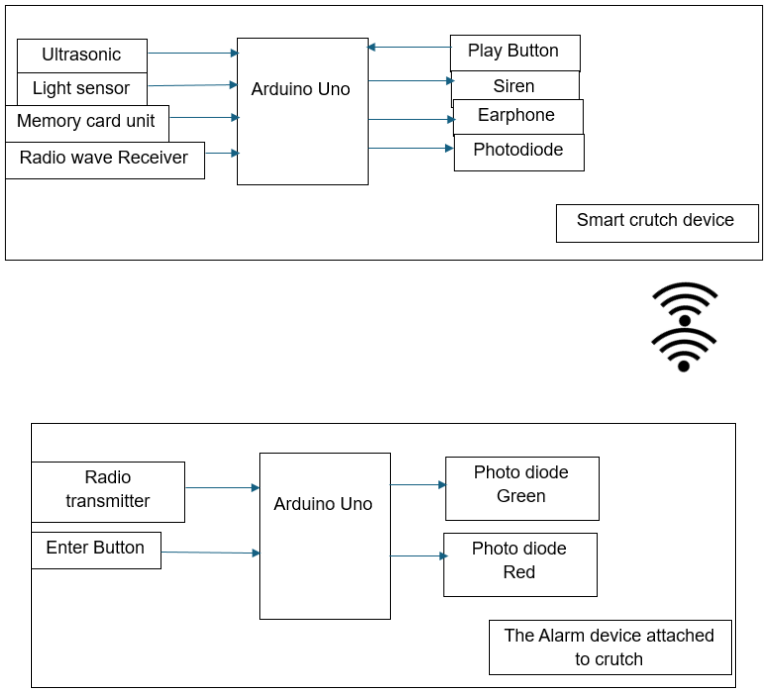

Figure 1 shows the general structure of the crutch device and the attached alert device.

The above explains the design of the device and its components, as it consists of the Arduino and several specific parts, as well as the connecting wires that are connected and the project is programmed. This is done through the Arduino, which designs the devices through a microcontroller and enhances innovations and programming {7}

2. RESULTS AND DISCUSSION:

After completing the analysis phase, this design was made for both the crutch device and the attached alarm device and the operation of the electrical circuits connected together in the installation of these two devices. They were assembled and programmed as shown in Figures 2 and 3. It shows the internal parts and their connection and programming of the ultrasonic wave sensor that sends and receives waves according to the number of distances {8}. By implementing this crutch, we clearly see how much facilities this device provides to people with visual disabilities. It works as a guide for them while they walk and gives them a lot of freedom, comfort and confidence in knowing the environment around them. For the purpose of developing the efficiency of this device and making it easier to use by people with visual disabilities.

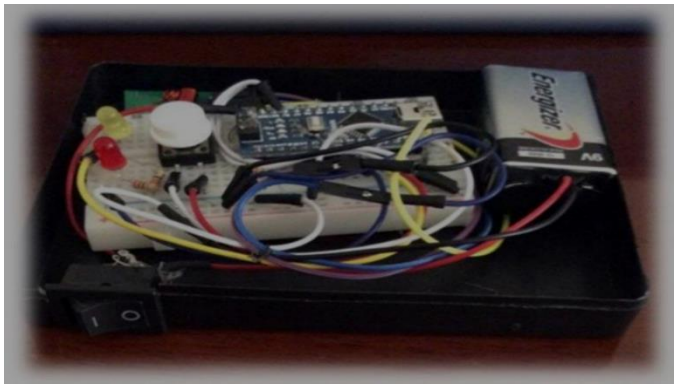

Figure (2): Smart Crutch interior

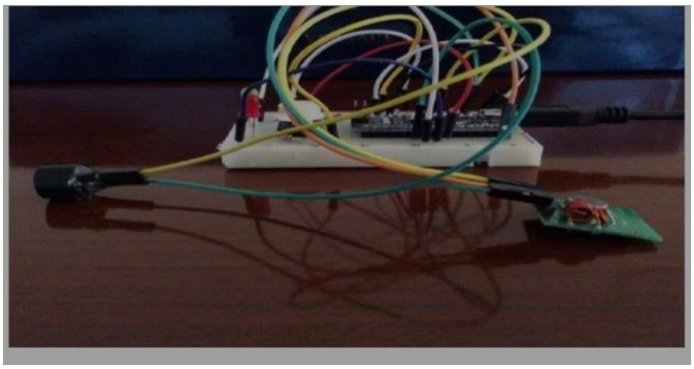

Figure (3): inner part of the alarm device

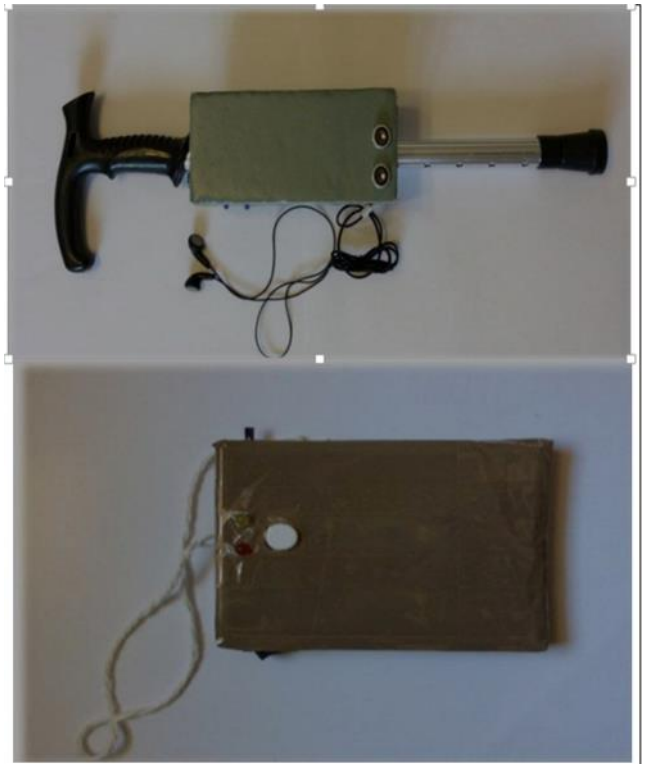

Figure (4): External Appearance of the project

The results showed that the effective decisions read by the sense were close to the real distances and sending signals to activate the alarm.

3. CONCLUSIONS

Through this research, a model of a smart crutch for the visually impaired was developed. It helps them detect obstacles and corresponding thresholds and issues audio messages and alerts that reach the user's ear via a headset when any obstacle is detected. It also senses the intensity of the lighting and alerts the user in the event of a dark place. In addition, the system was linked to an alarm device that determines the location of the crutch if it is difficult for the user to know its location.

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