SMART ASSISTANT FOR BLIND

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***Abstract*— Independence is how you build to achieve your dreams, goals, and goals in life. According to the World Health Organization (WHO), worldwide, 285 million people are blind, of which 39 million are blind, and 246 million are partially sighted. Blindness is the lack of smart vision caused by physiological or neurological factors, resulting in visual impairment. The planned model integrates distance and water detection with an ultrasonic sensor and a rain sensor. Our proposed project first uses an ultrasonic sensor to detect obstacles using ultrasonic waves. Upon detecting an obstacle, the sensor transfers this data to his Nodemcu. Nodemcu will process this data and calculate if the obstacles are close enough. If the obstacle is not too close, the circuit does nothing. When an obstacle approaches, the Nodemcu will send out a signal and sound a buzzer. It also sounds another buzzer when it senses water to warn the visually impaired. Using web-based servers our model also includes the provision of getting help in case of emergency. Electric walking sticks help the visually impaired by providing more convenient living opportunities. The main purpose of this paper is to make our knowledge and services accessible to the visually impaired and people in the disabled community.**

Keywords—Blind Stick, Nodemcu, IFTTT, Ultrasonic Sensor

I. INTRODUCTION

Vision is one of the most important parts of human physiology. Our eyes are the key to our environment. According to the World Health Organization, approximately 285 million people have some form of visual impairment, of which 86% are partially sighted and 14% are blind. Sight is one of the most important senses in human life. It helps you connect with your environment. Mobility and freedom for the blind can be defined as the ability to move confidently, quickly, and safely through an environment, which is not possible without technology. Blind people rely on other dependencies, such as simple walking sticks and others. In familiar places like your home, it remembers directions and obstacles and moves accordingly. However, it is not always safe for blind people to rely on their memory to move from one place to another. Especially when they are outside. Not all the time blind people offered help from others and hence there is a need for a device, such as a stick, which can assist the ally impaired people in all forms of life. The main aim of this paper is to assist blind persons without human need. Notably, the visual impaired individuals convey a hand that stays with them at whatever point they need help. Once in a while in any event, when they utilize this stick, there is no assurance that the visually impaired people are protected and get in arriving at their destinations. There might be a deterrent in their way yet isn`t experienced by the individual with the assistance of the stick. Notably, the ally impaired individuals convey a hand that stays with them at whatever point they need help. Once in a while in any event, when they utilize this stick, there is no assurance that the visually impaired people are protected. There might be an obstruction in their way however isn`t experienced by the individual with the assistance of the stick. Thus, the person may be got injured if the obstacle is big enough or dangerous. Thus, in this paper, a blind stick is designed and developed to assist blind person and provide them with a clear path. The system consists of an ultrasonic sensor attached to the user's stick. There is also the very important aspect of using an "If Then That (IFTTT)" server to protect people in an emergency.

Some research is also underway to help those in need. In [1], the authors have the beam angle of the ultrasonic sensor for long-range obstacle information. The system can be used on straight, curved, and right-angle paths. The author of [2] designed the system using PIC16F876. A co-author of [4] used various sensors to steer a wearable stick for those in need. Above all, the authors of [3] and [5] emphasized human security and self-sufficiency. In [6] the author used GPS and GSM to locate the individual. The author of [7] economically designed the stick for adult users. The system was tested at different heights and optimized it for safety. In this series of hustle to help the distressed author of [8], the PIC controller was used with an ultrasonic sensor. GSM integrates GPS with RF modules and some sensors are used by the authors of [9]. They were very consistent in finding different obstacles of different sizes and mounting prototypes to PVC pipe. In this sequence [10], we designed the live video recording and tracking part to make life safer and more comfortable for those in need.

We have also designed the prototype and contributed towards the betterment of needy ones. This paper is organized as follows. The introduction is in Section 1, Section 2 presents the block diagram of the circuit , followed by Section 3 presents the methodology implemented in the circuit , and Section 4 discuss about conclusion .The system was developed using both hardware and software implementations. This device is a better solution to overcome the problem of visually impaired people in walking .

II. BLOCK DIAGRAM

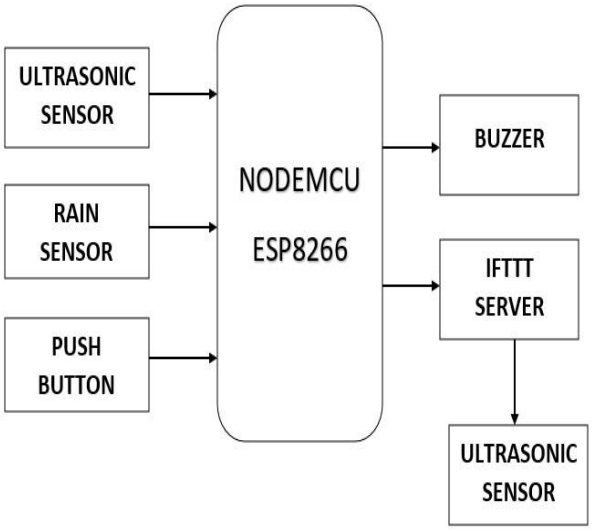

Fig.1: Block Diagram

III. SYSTEM REQUIREMENT

A. NODEMCU(ESP8266)

Node MCU is an open-source IOT-based firmware developed for the ESP8266 Wi-Fi chip. As Arduino began developing new MCU boards based on non-AVR processors like the ARM/SAM MCU used in the Arduino Due, they needed to modify the Arduino-IDE so it would be relatively easy to change the IDE to support alternate toolchains to allow Arduino C/C++ to be compiled for these new processors. They did this with the introduction of the Board Manager and the SAM Core. A "core" is the collection of software components required by the Board Manager and the Arduino IDE to compile an Arduino C/C++ source file for the target MCU's machine language. Some ESP8266 enthusiasts developed an Arduino core for the ESP8266 Wi-Fi SoC, popularly called the "ESP8266 Core for the Arduino IDE". This has become a leading software development platform for the various ESP8266-based modules and development boards, including Node MCU.

Fig.2 NODEMCU (ESP8266)

B. ULTRASONIC SENSOR (HC-SR04)

The HC-SR04 Ultrasonic Distance Sensor provides very short (2CM) to long-range (4M) detection and ranging. It can be easily interfaced with any microcontroller. It consists of a transmitter and receiver. These waves can travel at the speed of 343 m/s in the air.

Fig.3 Ultrasonic sensor

C. RAIN SENSOR

A raindrop Sensor is a tool used for sensing rain. It consists of two modules, a **rain board** that detects the rain and a **control module**, which compares the analogy value, and converts it to a digital value. The raindrop sensors can be used in the automobile sector to control the windshield wipers automatically, in the agriculture sector to sense rain and it is also used in home automation systems.

Fig.4 Rain module

D. BUZZER

An audio signalling device (buzzer) is piezoelectric type. The main function of this is to convert the signal to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarms, music, bell & siren. The positive terminal is powered through 6Volts whereas the negative terminal is connected to the GND terminal.

Fig.5 Buzzer

Fig.6 Voltage regulator

E. VOLTAGE REGULATOR

A voltage regulator is responsible to maintain the ideal voltage needed for the device. The power supply unit of an electronic device converts incoming power into the desired type (AC-DC or DC-AC) and desired voltage/current characteristics.

IV. METHODOLOGY

This stick is designed in such a way that it is used for a special purpose as an assisting device for blind people in their walking and navigating related activities. The circuit provides a 9V power supply for the circuit and maintains its output at constant level. the ultrasonic sensor in the circuit is used widely to detect object, also the distance between the object and the stick is measured and alert the user by buzzer sound.

To determine the distance of the object, time is measured between sending and receiving back the signal.

Distance = (time * speed of sound)/ 2

The command condition for ultrasonic is given as follows:

- If the distance is less than 20 the, buzzer will sound with 1 sec of delay in between the beep sound of the buzzer .
- If the distance is less than 15, the buzzer will sound with 0.5 sec delay in between the beep sound of buzzer.

The rain sensor in circuit will also trigger the buzzer to beep continuously if it sense any presence of water droplets. .

The nodemcu plays an important role in this circuit by establishing a strong Wi-Fi connection between the circuit and the user smartphone, which further used to connect with the IFTTT server .

In case of any emergency, if user feels any danger they can send an alert message to their dearest one, for that a trigger (push button) is placed in circuit which after pressing gives command to esp8266 to trigger the IFTTT server and alert the email-id which are already given to the server .

V. PROTOTYPE

After many iteration this stick come out to be more reliable and feasible for the user, the ultrasonic sensor mounted on stick will assist the blind person in walking and alerting them with buzzer sound if they are going to collide with something .The push button will help them to alert their dearest in case if they feel some unfavourable condition or any danger situation .

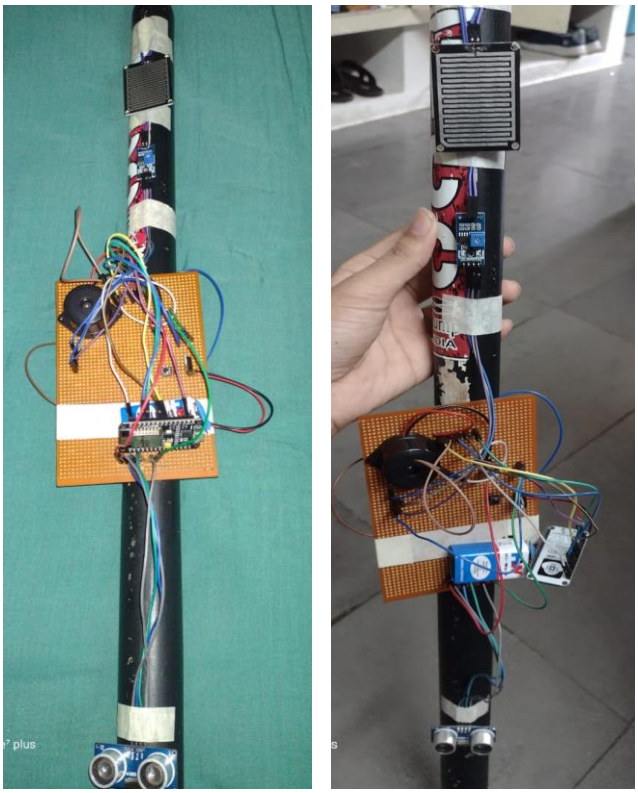

Fig.7 Smart Assistant for Blind (prototype)

VI. CONCLUSION

In this article, we created a concept prototype of a walking stick for the blind that uses sensor technology to support the attention, protection, and movement of the blind. At this point, it should be noted that the main purpose of the research to develop and market an intelligent walking stick for the visually impaired has been fully achieved. The Smart Stick is a next-generation assistive technology building block that enables blind and visually impaired people to move safely indoors and outdoors. It's effective and powerful. Despite being wired to sensors and other components, the system is lightweight. Ultrasonic sensors with large beam angles can detect various obstacles. The system has advanced features that help blind people call for help when they are in danger. The system also takes steps to ensure security.

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VIII. REFERENCES

[1] Bele, S., Ghule, S., Gunjal, A. and Anwat, N., 2020, April. Design and implementation of smart blind stick. In 2nd International Conference on Communication & Information Processing (ICCIP).

[2] Nahar, V.V., Nikam, J.L. and Deore, P.K., 2016. Smart blind walking stick. International Journal of Modern Trends in Engineering and Research, 2349, pp.645-652.

[3] Dhanuja, R., Farhana, F. and Savitha, G., 2018. Smart blind stick using Arduino. International Research Journal of Engineering and Technology (IRJET), 5(03).

[4] Grover, S., Hassan, A., Yashaswi, K. and Shinde, N.K., 2020. Smart blind stick. Int. J. Electron. Commun. Eng., 7(5), pp.19-23.

[5] Tirupal, T., Murali, B., Sandeep, M., Kumar, C. and Kumar, C.U., 2021. Smart Blind Stick Using Ultrasonic Sensor. MAT Journals, 7, pp.34-42.

[6] Elsonbaty, A.A., 2021. Smart blind stick design and implementation. International Journal of Engineering and Advanced Technology (IJEAT), 10(5).

[7] Srinivas, G., Raju, G.M., Ramesh, D. and Sivaram, S., 2019. Smart Blind stick connected system using Arduino. IJRAR-International Journal of Research and Analytical Reviews, 6(2), pp.934-939.

[8] Dey, N., Paul, A., Ghosh, P., Mukherjee, C., De, R. and Dey, S., 2018, March. Ultrasonic sensor based smart blind stick. In 2018 international conference on current trends towards converging technologies (ICCTCT) (pp. 1-4). IEEE.

[9] Kunta, V., Tuniki, C. and Sairam, U., 2020, June. Multi-functional blind stick for visually impaired people. In 2020 5th International Conference on Communication and Electronics Systems (ICCES) (pp. 895-899). IEEE.

[10] Desai, S., Bichukale, M., Kamthe, S., Borate, A. and Nadaph, A.G., 2016. Smart blind stick for visually impaired people with live monitoring. IRJET, 3, pp.39-41.