BAT-STICK

PROBLEM STATEMENT:

Navigation always been a difficult & challenging time for the People with visual impairment. They always have to be more attentive in sensing every movement in the environment than a normal human being. Intermittently they are in danger which can cost their gifted life at few motions like while crossing the road. In many EMERGENCY situations they are unable to communicate instantly with their family for taking instant actions. They always feel a need to be accompanied by a helper but it's not affordable by majority of people.

Objective:

1. Normalise the difficulties while walking for the people with visual impairment :-

    - Bat-Stick **uses the ultrasonic mechanism** (which is inspired by BAT) for sensing the safe distance for movement.
    - The ultrasonic sensor in front of the stick continuously interprets with the environment by measuring the distance of the possibly next barrier on the path.
    - In case if some obstacle exceeds the safe distance from the user, Stick send the signal to the user with the help of the BUZZER-ALARM embedded on it.
    - Water sensing mechanism is used to notify the user for the presence of the wet floor which can prevent from slipping by giving vibrations (using mobile vibration sensors) within the stick.

2. Maximize the safety while crossing the road with the special "**ROAD CROSSING MODE**" :-

    - Bat-Stick consist of special ROAD CROSSING MODE which guides the user throughout the Road crossing.
    - The same Ultrasonic sensor which is present on the **stick will behave differently and more efficiently** throughout the road crossing.
    - This is one of the one of most crucial/ life-saving feature for the user, so **it can easily be turned on / off by giving GOOGLE ASSISTANT commands** on our device while walking. For example: Okay Google!! Turn on/off Road Crossing Mode. And we will also get the confirmation from our google assistant after execution.
    - This feature have potential to reduce the chance of the unfortunate road accidents significantly for the user.

Working mechanism behind **ROAD CROSSING MODE** which enhances the same sensors to work more productive and efficiently :-

- The Servo Motor which is fitted under the **Ultrasonic sensor will rotate twice, uniformly in every case**.
- According to Indian Traffic rules while crossing any road **we always have to face the traffic first right -> left & then left -> right.**
- So the servo motor will first set to 0° and measure distance d (d=x1) and then set to 60° (d = x2).
- If (x1 – (x2 * cos60°) < 100cm it means the vehicles are not moving, and signal is RED. (similarly, for left to right(360° to 300°)

- If the signal is red, the buzzer will produce different frequency output indicating it's safe to cross the road.
- But there could be case when there is no such situation of red signal, for that the ultrasonic sensor will sense around the safe distance and produce a loud sound with a bright LED to if some obstacle comes near to safe crossing range.

3. Connecting Immediately to the family/ relatives when they are in serious need:

- Many times People with visual impairment are unable to communicate to their family/relatives when they had some Emergency situations like an road accident, Robbed, or some sickness where they feel hopeless and need someone for them.
- Bat-Stick has an **SOS** button embedded on it which can send the live location of the spot and a telegram alert indicating the user is in trouble. (method of reaching can vary according to the need) when pressed.

Novelty:

There are very few similar products already existing in market but they are not much famous and they need to evolve more to secure the comfort level of the people with visual impairment. In our Product we had provide some extra needful features to maximize the safety and comfort of the user. The following features which makes the Bat-Stick **more secure than existing technology** for the user are :-

- Inbuilt **ROAD CROSSING MODE**
- Can be operated with **Google Assistant.**
- **SOS** button for sending instant messages and location to the Relatives / needful

Target Community:

Bat-Stick is **developed mainly for the people having visual impairment for enhancing their self-confidence and comfort while moving.** The main aim of the product is to replace the need of the helper with the BAT-STICK.

Bat-Stick can be easily accessible and affordable for the visually impaired People **Belonging to the MIDDLE and LOWER MIDDLE class**, And easily giftable to the Lower class community, and its capable of giving them a new life.

Technical Implementation :

PLEASE FIND THE MENTIONED VIDEO LINK FOR SAMPLE PROTOTYPE OF WORKING OF MODEL → https://youtu.be/E-LGpTcJqWQ or click here

BAT-STICK uses the methodology which are used by the BAT (i.e. navigate through the ultrasonic response) in similar way Bat-Stick navigate with the help of the **HC-SR04** (ultrasonic sensor) embedded on it.

- With the **HC-SR04 sensor** we can send and receive the ultrasonic signal and for calculating distance we use our basic formula (d = speed * time) and we can fetch the response time easily and speed is constant i.e.343KM/H . By using these parameter we can calculate the distance.
- Implementation of IOT played a significant role in providing some important features (e.g. SOS alert service, synchronization with GOOGLE ASSISTANT).
- Microcontroller (NODE MCU 8266) is used as an main processing unit of the system to give the required command and taking multiple decisions.
- **Mobile vibration sensor** is used to in **Water Detection Mechanism**(a power source is connected to a vibration device and the circuit is broken in between and extended up to the bottom most part of the stick. To ensure, whenever the stick comes in contact with the wet surface the circuit will complete and give the vibration signal to the user about presence of watery surface).
- **Blynk API + IFTT** is used for synchronization the stick with GOOGLE ASSISTANT.
- **Telegram BOT and GPS sensor** is used for sending telegram alerts for SOS service.
- **Arduino IDE** is used for programming into the microcontroller.

Components Used :-

HC-SR04 (ultrasonic sensor), NODE MCU 8266, Mobile Vibration Sensor, Servo motor, Buzzer , LED, GPS sensor, Push Switch, Stick, Rechargeable DC Battery/ power bank, thin wire, 2 conductive pin

System Integration tools used :-

Arduino IDE, IFTT, Blynk API, Telegram, Google Assistant



Estimated Price of the final product will be in range (**₹1000 - ₹1500) **

Outcome / Social Impact :-

After establishment of this product BAT-STICK, it can be the revolution for the people with visual impairment. This one stick can change their life by supporting them everywhere, that's what every such person feel to be. But unfortunately every section of society can't afford to keep helper with them all the time but this product can be the robotic helper in their life which can stay with them whenever its needed. But every product has some great advantages and few disadvantages.

ADVANTAGES :-

- Reduce the stress for sensing the environment for movement.
- Help the user to regain the self-dependence and confidence.
- Enhance the safety of the user specially during risky moments like crossing the road.
- Early detection of wet floors, as they can't be sensed to prevent from sleeping.
- SOS Button can be the life saviour for EMERGENCY SITUATIONS by Instant delivering the Help Message and live location to the family.
- It can easily switch between the modes with the GOOGLE ASSISTANT while walking.
- Easily affordable to all classes of the society.

DISADVANTAGES :-

- It can stop Working if not charged properly and used for long.
- SOS services and Google Assistant will only work when it is in range of network.
- navigation signals may be confusing while waking in crowd.

Future aspects :-

Following changes could be made to turn our product more feasible and sustainable in the future are as follows :-

- Add Virtual assistant to guide and navigate the user to reach the destination , also synchronize with the google map.
- Robotics Wheels can be added to the stick which will sync with movement of the user and has feature to stop immediately if there is presence of some obstacle in front of the user to provide more comfort to the user and to enhance the accuracy of Ultrasonic sensor.
- Bluetooth feature which can connect to the headset, which will ease the user to listen to the commands of the Bat-Stick device assistant easily.
- Use more optimal micro controller to ensure power efficiency and work with offline assistant too.

BY :- DEBUG ARMY

1. MOHIT ANAND (bt20cse067@iiitn.ac.in)
2. SWARIT DEEPAK PATEL (bt20cse093@iiitn.ac.in)
3. YASH ANAND (bt20cse186@iiitn.ac.in)
4. ASMIT RAJ (bt20cse205@iiitn.ac.in)