Product design and development of googles and hand stick for blind people

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Abstract. Project vision to world focuses on the field of medical science, which paves a way to the next level of medical technology. The theme of the vision to world is to bring back the vision to the blind people, with the help of this gadget. It is a blind helper device. The Gadget is engaged with UV emitter and receiver, sound sensor, LED, circuit board, spectacles. It can be used by all kinds of people. It doesn’t need much knowledge. The device works by detecting the signals outdoor through the UV signals and that signals were converted into electric signals through which the sound and light signals were produced. The sound signal is used as an indicator to the blind and the light signal is used as an indicator to the normal people. It creates a mutual understanding with the blind and the normal people. This helps to rectify the visual problem of blind people. The gadget is in the shape of normal spectacles so it would be easier to carry everywhere. The origin of this device is bionic eye; the concept of bionic eye is to fix an electrode in the eyes. But in order to rectify that this project vision plays a major role in serving blind. The main objective is to give vision to the blind with artificial means without any side effects. Keywords. Visually Impaired, Goggles, Hand Stick, UV Sensor, Buzzer, And Micro-Controller.

1. Introduction

In the modern world, electronics plays a major role in all fields. Some of the fields like medical, space, science, and so on. This project holds on to the field of medical science. This is completely operated with electrical device. The project mainly focuses on the struggles of blind people. It holds a good hope for the blind people to lead a normal life. It is just a simple project but with more effective means. The technique used in this device is not that difficult, so that it could be handled by any engineers. The cost to manufacture the device is very much low when compared to other devices. Hence it is more affordable to the people of all criteria. This is just a small step taken to help the blind but in future it would be more powerful with new designs and technologies included in it. To help the visually impaired person several steps were taken. The following were the part of steps explained. When obstacle is ahead over the visually impaired people, automatically [1] the device helps to avoid the upcoming obstacles. Blind used to travel to different places from their native places, the travel guide [2] will help the blind people to
move on to the exact location. The blind cannot read the text in front of them, as a text recognizing technology [3] will be very much helpful for the blind people to interact with the texts over the surroundings. The blind will suffer a lot inside their houses; hence to help the blind to walk in safely without hitting over the wall an indoor blind assistant [4] plays a major role in helping them. To make the gadget easily wearable [5], all the electronic components are attached over a belt for easy wearable. The neuro science paved the way for the development of brain waves that help the blind people to get back the vision with the help of new [6] neurological researches. To identify the person speaking with the blind people, the 2D and 3D face recognition system is useful. By identifying the depth of the face [7] the person’s identity is verified and is known to the blind with the help of the device. An electronic aided device [8] greatly helps the visually impaired to move themselves safe over the surroundings. They were guided with the help of smart glasses [9] with ultrasonic sensors for identifying the obstacles. The blind device holds some sensors with the help of the sensor [10] the blind is guided to the direction. To rectify the problems faced by the blind peoples, therefore to make their life peaceful. This project has the power to change the view of society about the blind peoples. In order to give a helping hand to the blind, this is designed to show a way for blind to lead a better life.

2. Existing design

The principle mechanism of bionic eye figure 1 is to generate artificial visuals, by operating the nervous system by doing surgery. An electric plate is implanted inside the retina of the sensory system. It acts as a mediator between the surrounding and to the brain. This is the mechanism used in abroad for the welfare of blind people. As it mainly involves in the surgery process, more advanced technology would be required additionally. Some time it also becomes failure. The principle mechanism used by the eye stick figure 2 is to detect the stairs case while walking. It is capable of identifying the distance of the upstairs and sends the data according to that. This mainly helps only for climbing purpose and not for other purposes, for the blind people. The sensor used in it is expensive. Currently available devices were bionic eye, eye Stick, etc. Every device always has some drawbacks among huge benefits. The draw backs of the bionic eye are implanting an electrode inside the retina of eye, so that the cost of the implanting is very much high. The surgery done in the retina of eyes will cause some side effects in eyes. The drawbacks of eye stick are, it can’t detect the water stokes on road sides and also drainages. This makes them to stumble when they step on these waters stokes or drain, they get fell down.

3. Proposed design

The device V gear we have implied the mind signals which carries the digital signal produced by sensors and digital gadgets. Through this we can make the blind to get real visuals by artificial means. Additional
features like detection of water depths, detecting human bodies. In the device we have used several principles to enhance the quality of artificial vision helper. Doppler Effect takes a major role in the detection of humans or any object movements around the blind. Figure 3 photoelectric Effect is also used along with the Doppler Effect, which carries the digital signals. Our device holds the main unique of transferring signals from an artificial external device to natural internal device (brain) without causing any damage to the system. This is why it gives a unique identity among other all products. We have the concept of transmitting and converting one signal into other signal in to the brain, without doing any surgery. Also the stick figure 4 helps mainly in guidance of the blind people. That’s the main highlight of this device. The component table 1 details are used for proper fabrication of the product. This concept is not an existing one. It is a new thought of innovation for blind people. It provides a solution, which other devices failed to give. It provides vision to blind people without any surgery or side effects. This solution shows difference among other existing devices.

3.1. Product development
3.2. Design of goggles
The main principle of this project is echo location; this is what bats use to catch prey. The design of the project is made on a simple spectacles design, which is most frequently used by all the people who have defects in their eye. Figure 5 shows that goggle holds all the circuit boards and other accessories. In the Figure 6 detects the object to a particular distance so that the objects at long distance will not interrupt the UV signals, hence forth there won’t be any interference in the signals while transmitting and receiving. The source of ultraviolet radiation emitter and receiver is placed over the front face of goggle so that it covers the whole 180’ angle, which is equal to the human eye.

When the circuit is on the source starts to emit UV signals when it strikes the objects in front, the signals were retreated and falls on the receiver, thereby it receives the signal which is transmitted from the object. These signals were converted in to electric signals and were feed to a Figure 6 Shows splits up the signals
according to the program. These signals make the work function of the sound generator and light emitting diode (LED).

![Figure 7. Mother board](image1)

![Figure 8. Sound Producer](image2)

The signal detected by the source from the object produces different frequency at particular distances. Figure 7 produces the sound at different tones with high pitch and low pitch. That helps in analyzing the distance of the object from the blind people. It produces a beep sound that will not make irritation to the blind. So, there is no defect while sound is produced. Figure 8 starts to blink when the blind is close to some obstacles; this indication of light helps normal people to understand that the person is blind and that would be easy for normal people to give way to the blind. The sound is also produced at the same time when the light starts to blink.

![Figure 9. Light Emitting Diode](image3)

![Figure 10. Power Source](image4)

Therefore, both the process takes place at a time and there won’t be any mistakes by the surroundings. The main problem arises now only, the Figure 9 for the device must be rechargeable, must with stand for long duration time period. So that initially power bang is used at this stage but we can alternate a better source for the power distribution. But for better cost and for easy recharging power bang is used. The overall methods were taken from simple science, which is known wide. This project is a combination of all signals and sources that are simple and known.
Table 1. Bill of materials

| S. No | PARTICULARS         | SPECIFICATIONS                                      | USES                                  |
|-------|--------------------|-----------------------------------------------------|---------------------------------------|
| 1     | ARDUINO NANO       | Circuit Board, Microprocessor, and Resistor, Capacitor. | Acts as a mother board.              |
| 2     | UV SENSOR          | Circuit board, UV HC-SR04, IC chip.                 | Detects external specimens.           |
| 3     | LED                | Light Emitting Diode, Tungsten Filament.            | Produces Light signal for identification |
| 4     | BUZZER             | Copper Plates, Magnet.                               | Produces Sound signal for identification |
| 5     | COIL MACHINE       | Copper Wires, Foam Sheet.                            | Indicates water level in pits.        |
| 6     | VIBRATIONAL MOTOR | Magnet, Coil windings.                               | Generates vibration for identification. |
| 7     | PIPES              | Poly Vinyl Chloride (PVC)                            | Holds the particulars of stick        |
| 8     | SPECTACLES         | Glass Frame, Lens.                                  | Holds the particulars of Goggles.     |
| 9     | BATTERY            | Li – ion electrolyte                                 | Acts as a Power supply.               |

3.3. Design of hand stick

The hand stick is mainly used for the detection of obstacles at the ground level, such as troughs, craters, water pits, lakes, etc. It uses vibration to indicate these obstacles, where a coil mechanism is used for the indication of water depth or flow.

The Figure 10 has a simple mechanism in it, in which two coils are placed using a foam sheet at a certain distance. One coil is fixed rigid, and the next coil is placed in a floating sheet. The two coils were connected in an incomplete circuit. When the stick enters the water, the floating sheet gets floated due to the density of sheet is less than the density of water. At that time the incomplete circuit gets completed and the power transmission takes place. The Figure 11 gives the indication to the blind that carries the stick with him. This works with the principle of electromagnetic induction, the repulsion between the magnet and the coil windings makes the vibration to be produced.
4. Result and discussion
The result of the project would be positive if it reaches the blind people figure 12 at right time and right place with all affordable commitments. The drawbacks present in this project would be rectified in the next stage of this project vision because the stages of this project won’t stop until it gives a solution which will rectify all the problems of blind.

![Figure 13. Complete Model](image)

5. Conclusion
Here by I conclude that this is the start of a new era. This invention is just an initial level this will make the world turn around one day. This device will help the blind to get relief from all their struggles and sufferings. Compared to all other inventions in the field of creating a solution to solve the problem of blinds, this project would probably be the best of all. Even though all other projects were in advanced level they have much more side effects than this. Some inventions are pretty much expensive and some were too risky like operating the eye system and placing some electronic devices in to it, at times it may become very worst and would lead to the loss of eye. Though our device may have some disadvantages that are not harmful to the people and also to the environment, the risk factor is zero percent in this project. This device has the capacity to withstand at all stages and will get succeed in all ways. We have been still working in this field to improve its rate of efficiency and to make a real artificial visual device.

6. Future scope
In future the technology will be more advanced so that the technical facilities will be used wider and deeper. In future the mechanism, the UV signals which were received from the object by the ultraviolet radiation emitter and receiver is send to the mother board were these signals are transferred as electric impulses, so that those generated impulse were directly transmitted to the nerves system which is located at the back of the head. These signals which is transmitted to the nerves and enters to the eye system where is provides black and white image of the object in the present world, detected by the UV signal. This type can be made colorful by using photocell to capture image as it is and transfer those signals into the mother board and then it enters in to the nerves of eyes and the brain will receive the actual image of the outer world like the same as natural eye, the rate of electric impulse passed is very much low so that it won’t be harmful for the people.
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