Ultrasonic sensors measure the distance to the target by measuring the time between the sending and receiving. We find out that ultrasonic sensors send out high frequency sound waves and receive the echo which bounces back from objects. The time interval between sending and receiving the signal is used to calculate how far the object is.

We choose ultrasonic sensor due to following reasons.

These sensors:

- Are inexpensive
- Have low power consumption
- Can operate in environmental conditions For example, smoked filled environment.
- The resolution can be as low as 60 degrees.

- **Laser sensor:**

Figure 1-2

The laser sensor emits electromagnetic waves such as light to the environment. The emitted light is a narrow beam. When beam hits the object, the signals then come back to the sensor to determine the obstacle distance. Laser sensors sends out (emits) electromagnetic radiation through light to the surroundings. This light is a narrow beam that is amplified to give off more intense light waves.

These sensors:

- Have long range
- Are not wide area can be used for indoor
- For small object.

- **Radar sensor:**

[8] The proposition is to plan a wearable separation sensor that encodes and transmits the data to an cluster of vibrating engines on the client's arm. Ultrasonic or infrared rangefinders would be the doubtlessly sensor decision because of their ease and scope of utilization, up to a few meters. A microcontroller and engine controller will be expected to encode the sensor contribution to an upgrade the client can feel and decipher. Contingent upon time and assets, a beneficial expansion is fuse an accelerometer chip to give haptic criticism to the client just when mentioned, for example, by moving the sensor. An accelerometer could likewise add industriousness to the haptic input: for example, the client could utilize the sensor to check an object out yonder and the accelerometer would quantify how much the sensor in one movement, mapping the detected separations over the vibration engines.

[9] This paper considers issues significant for the plan and utilization of haptic innovation for assistive gadgets for people who are visually impaired or outwardly weakened in a portion of the real territories of significance: Braille perusing, material illustrations, introduction and versatility. We demonstrate that there is an abundance of conduct look into that is profoundly pertinent to assistive innovation structure. In a couple of cases, ends from conduct tests have been legitimately connected to structure with positive outcomes. Contrasts in cerebrum association and execution capacities between people who are "early visually impaired" and "late visually impaired" from utilizing the equivalent material/haptic housing, for example, the utilization of Braille, recommend the significance of preparing and surveying these gatherings separately. Pragmatic confinements of gadget structure, for example, execution constraints of the innovation and cost, bring up issues with respect to which parts of these confinements are really essential to defeat to accomplish superior. When all is said in done, this brings up the issue of providing useful identicalness rather than tactile proportionality.

One of the most important aspects to appreciate in designing assistive technology for individuals who are BVI is the diversity of the population in terms of medical condition, experience, opinions, preferences and motivation. Vision impairments range from low vision through light detection only to no vision at all [10].

The pieces of the eye influenced may likewise change; in any case, this is for the most part connected with low vision furthermore, of more significance while thinking about visual improvement as opposed to haptic presentations. An individual may likewise have different disabilities which could influence structure choices. For instance, hard of hearing visually impaired people may likewise differ in their level of hearing, which may result in the requirement for a solely haptic (versus sound haptic) arrangement [11]. In any case, a visit reason for visual deficiency is diabetes that can likewise create neuropathy in the fringe furthest points bringing about a need of affectability in the fingertips and toes [12]. These people may require an answer that, in any event, requires the arrangement of haptic input nearer to the focal center of the body (e.g., wrist or middle).

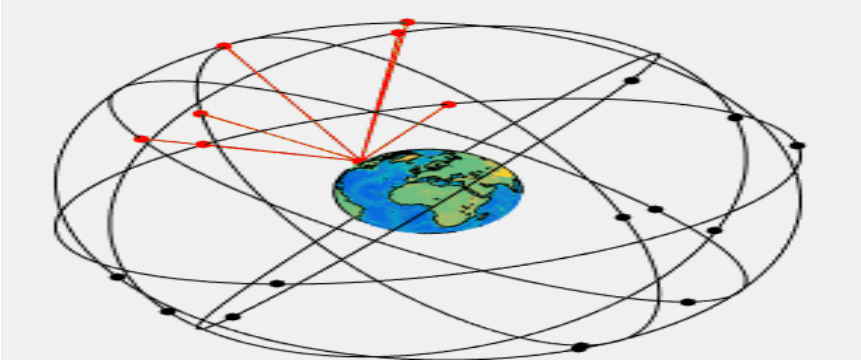

Figure3-9

GSM communication module/android:

GSM is standard communication system for the most of the world. GSM means Global System for Mobile Communication.it basically works on the principal of TDMA (time division multiple access) TDMA allow different user to share the same station channel by dividing the signal into different time slots, so multiple station can use same frequency by it only a part of its capacity. In order to know which user is using network the module or device use identification card or SIM card. SIM card is one of the GSM feature. These cards are also used to assign time slot for which device can transmit information or communicate by storing address book and service which is needed to be accessed. They can even be used to pass information between devices if a carrier allow it. GSM allows communication anywhere, with anyone, and anytime. In these days GSM is one of the mobile services we use and keep with us contantly.it provides communication channel with which we can communicate to world

SIM800L GSM/GPRS Module:

This module has the following feature computer debugging USB to TTL serial port, it has 5v input voltage and 800MA power supply output current, TTL serial port compatible with 5V and 3.3V MCU.

Figure 3-10 a

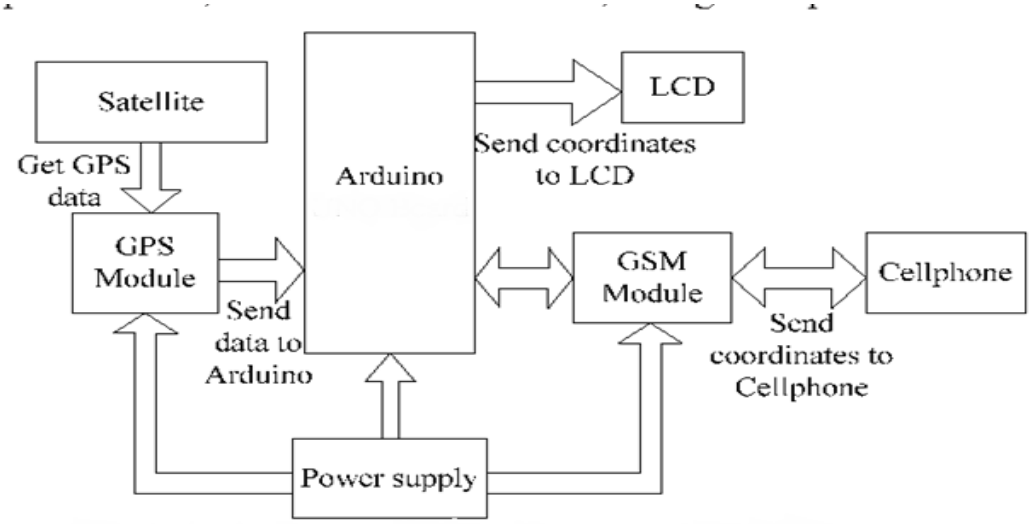

Figure 3-20

Connecting feedback system and sensors

The third unit we implemented in our system is feedback system which gives output on the measurement of the sensor which is IR sharp sensor.

Positioning of sensor:

For bag pack device we need to detect the obstacle at medium level so we used 2 sensors instead of one and place them in an array. IR sharp sensor is capable of sensing obstacle at the distance from 10cm to 80 cm. The sensors are made up of IR LED equipped with lens that emits narrow light beam. After reflection from the object, the beam is directed through the second lens on a position-sensible photo detector (PSD). The conductivity determines the voltage. The output of distance sensor is inversely proportional to the distance of object, which means when the distance grows the output decreases. The voltage from the sensor is used directly to the analog pin of the micro controller. Controller or ardiuno process this information according to the command and send the signal to the pins of vibratory motor .vibratory motor rotate when sensor detect an obstacle in its direction .

The speed of the vibratory motor is inversely proportional to the distance of the object that is higher the rotation speed if the distance become smaller.

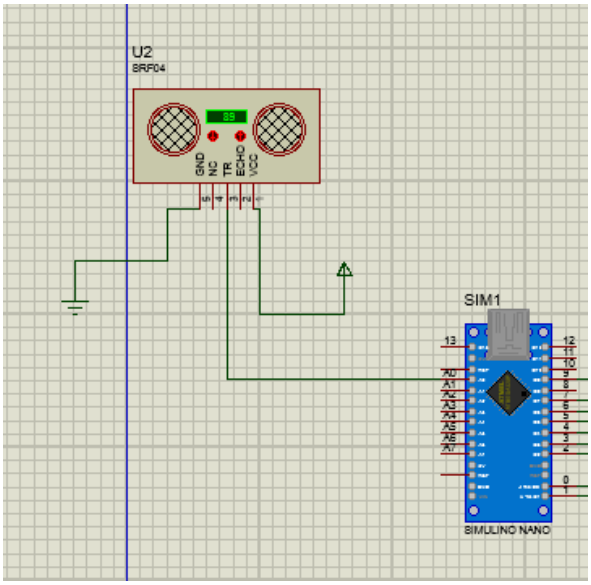

Figure 3-24

3.3.3.3 Hardware:


Figure 3-25

4. Results and Discussion:

Our project was to design three haptic devices for visually impaired people. We make 3 devices which are haptic cane, bag pack and headband, which detects obstacles at 3 different levels. Haptic Cane is to detect obstacles at low level, bag pack is used to detect middle level hurdles. Whereas, headband is used to detect upper level obstacles.

We draw different results while performing experiments. Following table shows advantages and disadvantages of different sensors

Comparison between different proximate sensor: