



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

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Project Title Wearable Device for the Visually Impaired	
Abstract Objectives/Goals The visually-impaired don't have many tools in the market to use that make them really self-dependent. The available tools can not be available to those who are in developing countries for they may cost too much. Our goal is build a device that is user friendly and can function better in these kind of user scenarios. The device is a low-cost hands-free wearable that can be worn on the wrist. It alerts the user if there is anything that may come in their way, if there is a change in ground level, and the magnetic direction they are facing. Our design criteria is that it must be under \$100, light, accurate, easy to use, and a normal size. Methods/Materials Our approach to solving this problem was to see what was available for the visually-impaired in the current market. We then tried to see how those products could be changed to help solve our problem. Next thought of what we could use to solve our problem. We came up with ultrasonic sensors because we figured that they were low-cost and could get our job done reliably (sensing objects and ground level). We tested ultrasonic sensors and how we could use them in the most efficient way and figured out their limitations. With this we calculated that one ultrasonic sensor would be at a 60-degrees and the other one at 15-degrees. We build the circuitry on a breadboard and once we had a working model, moved it into a waist pouch. Next soldered the ultrasonics on a perfboard and connected them to an arduino and a wave shield. Finally, we connected a battery with a toggle push button and the arduino. Results We were able to achieve our goals of creating a device that would be able to navigate the user through obstacles. It can easily sense all the things it is supposed to sense accurately and is the size of a normal waist pouch. It is easy to use and can be turned on push of a button. Conclusions/Discussion Our device has the potential to help visually impaired people around the world have a much easier and self-dependent life. It will help them do many of their daily tasks in a more efficient fashion and will turn their lives into something closer to the life of a person gifted with good vision. If we build more of the devices, building them in bulk will reduce the materials price of the device.	
Summary Statement We created a wearable device for the visually impaired which detects objects ahead, stairs/uneven ground, and alerts them of magnetic direction.	
Help Received Parent Supervision; Eye doctor feedback;	