Object Detection & Recognition Software for the Visually Impaired (Software Development Project)

Aim:

The aim of this project is to develop software/hardware that can accurately detect and recognize objects in front of the user, in order for them to safely move from point A to point B. Many visually impaired people have falls and injure themselves due to these accidents, see [1], I believe that if they had software/hardware to aid them (to tell them that there are stairs are in front of them, or a wall, etc.) then this would greatly reduce injuries and increase safety among the visually impaired.

Objectives:

1. **Research** and **acquire** the best hardware to be used in the project.
2. **Learn** the appropriate software needed to send & retrieve data to/from the hardware.
3. **Design** prototype for the device, and make important design choices, for example: where the sensor(s) are going.
4. **Research** object recognition algorithms & choose the most appropriate.
5. **Research** proximity detector algorithms and get an approximation of how high the threshold should be at.
6. **Build** the prototype.
7. **Implement** the algorithms using software.
8. **Test** the prototype in an appropriate environment.

Pros/Cons:

Pros	Cons
It could have a very positive impact on people with visual disabilities and drastically improve their lives.	The act of software/hardware failure could be catastrophic for the user. This could also end up causing legal issues too (users suing).
Even if the software is not perfect, it could still potentially help or inspire companies to create this project with the aid of my research and data.	Object recognition is difficult to make accurate for a wide range of things – hence it may have to be specialized for use around the house or in one specific environment so that test data can be specialized to improve accuracy.
The project would use many techniques learned from the course (AI, software design, using hardware – Arduino, efficient algorithms, etc.)	Hardware could come at a substantial monetary cost to the user if it ever came into market (however this project will probably not create a finished product, more like a prototype).
It would be very challenging.	It would be very challenging.
I have lots of experience with software design and feel very confident with it.	I have limited experience with hardware, hence I may not create a quality product/prototype.

References:

[1] https://iovs.arvojournals.org/article.aspx?articleid=2187178 - Risk of Falls, Injurious Falls, and Other Injuries Resulting from Visual Impairment Study.