

Proposal for team project: robot to replace service dog for blind people

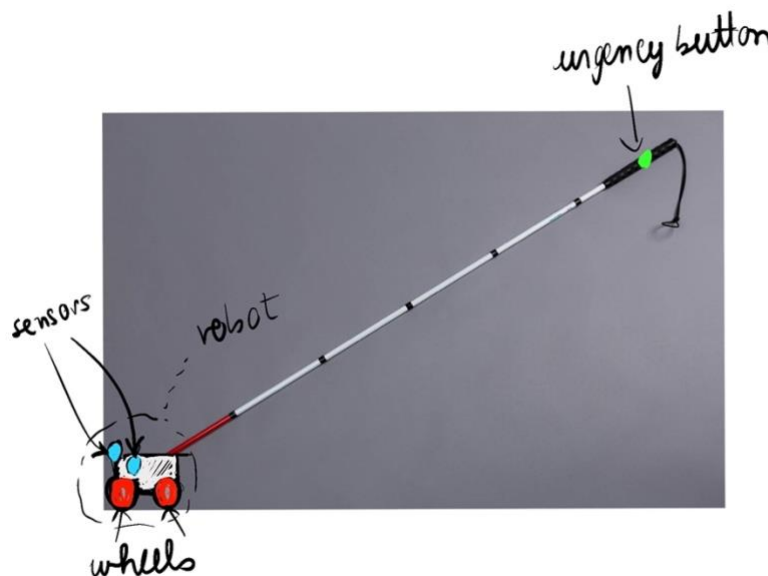
Sources :

Video about pros and cons – cane vs dog:

<https://youtu.be/Yd2O9qmq8qc?si=BIHAg77VrLom7WwL>

1. *A high-level description of the project idea. What do you want to make – what will it look like, what will it do*

I want to make a robot that will guide a blind person through the streets and other places. It will look like the image below. The idea is to attach a small robot on wheels at the end of a cane and his role is to detect obstacles and to give directions to the user to avoid it. The urgency button is here to give a feeling of safety to the user.



2. *Describe the features of your thing, ideally from the perspective of an end user*
Another user story is the one of the professor: *I would like it if part of the project (a software library, a vehicle platform, ...) is re-usable for other future projects.*

First story: As a blind person, I want to be recognized easily as someone with a disability so they will get around me on the street. I can't avoid them as easily as they can. The red and white cane is more universally recognized than a service dog.

Second story: As someone visually impaired with a service dog, when I want to go in a restaurant it can be cumbersome to find a place to sit big enough for him too and if it rains outside it can take time and stuff to dry him. The cane is more practical for this type of situation. So if we add an accessory at the end of the cane, as long as it is light it will be all right.

Third story: As a blind person, when I use a cane in the streets sometimes it can be stuck in cracks and injured me, or if there is grass it is difficult to move it. It would be great to have a tool for all terrains, the dog has this advantage. Maybe wheels adapted to a lot of terrains will do the jobs too.

Fourth story: As a blind woman, I feel safe to move in the streets at night with a service dog, more than with a cane, because people can be intimidated by him. When I don't have a dog anymore usually I don't go outside anymore because of fear. If there was a way to be more safe with a cane, like an emergency button that call cops I would be capable of getting in the streets without a dog.

Fifth story: As a blind person, I prefer the dog from the cane, because it needs less tactile skills (skills to detect the type of obstacles) and needs more auditory skills. We normally have to follow special training for orientation and mobility with the cane, so it can be a relief to rely on the dog to understand the obstacle and find the path. If the cane had for example a mechanism of vibration to alert the user if he has to shift right or left to avoid the obstacle I wouldn't need a dog. It is difficult to get a trained dog and if there existed an immediate alternative, while waiting to have the dog, it would be great.

Sixth story: As a visually impaired person that experienced the cane and the service dog, I find faster to move with a dog than with a cane. And the advantage with a dog is that I don't need to focus on what is in front of me and can enjoy more the walk. If at least the cane was able to find a path on its own, it would be an upgrade.

3. *Take a long-term viewpoint. What afterlife can your project have. What follow-up projects for future CS-358 students are there? Might your thing acquire "real", non-EPFL users? Is there a startup (company) waiting to happen?*

In a long-term perspective, this project can be optimized in the choice of materials to be useful to visually impaired people. The goal would be to have an alternative to the dog for a short time period, or for long time if the person prefers it. It would be less expensive and easy to maintain and would have functionalities that a normal cane doesn't have.

A startup at the EPFL could be interested in this type of project, there are already that create exoskeletons. I think innovations to help disabled persons is plenty in expansion.

4. *Budget:*

based on the video: https://youtu.be/1n_KjpMfVT0?si=saHt1Jj1AqFvx3qN

- Arduino Uno
- Motor driver
- TT Gears Motor
- wheels set
- Servo motor
- Ultrasonic sensor
- Batteries
- Battery holder
- Power switch

Remark: the special cane for blind person is not needed in this project, because the goal is to attach the robot to the cane of the user. So for testing we can take a simple stick (ex: broom handle)