Project: `Smart-cane' for Visually Impaired and Blind People
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Problem: Visually impaired people can only travel under constant observation and escort. Moving around and orientation in space are the main issues the people with significantly worse eyesight deal with. The white canes they use won't be helpful in new places of visit and safe enough to solely rely on, due to constant infrastructure growth. Always depending on other people lowers their self-esteem and ambitions.

Goal: to help to visually impaired people to travel safely and independently. Introducing the system of color lines and the `smart-canes' into public places will give them independence in traveling and minimize any traveling risks. Schools, hospitals, airports, shopping malls, and city life in general will be more accessible for visually impaired people to function on.

Concept: The idea is to implement colored line-paths in public places. Each color line leads to a certain destination (e.g. red line in an airport leads to gate 1, blue one to gate 3, etc). The smart-cane will guide user along chosen line. The color sensors of cane detects chosen line, and if user strays from the line, the cane's handle will vibrate. With the vibration made by electric motor in the handle, the user will be warned of straying away from path and will turn back to the right direction. The vibrating system will stop only when the color sensors of the cane would again detect chosen color line. Destination (i.e. color line) can be chosen by buttons (left, right, OK/select, cancel) and audio messages, announcing the choices through headphones.

Figure 1 - concept of color line-paths in public places

Prototype: built using Arduino Nano microcontroller and basic electronic components: color sensors TCS3200, MP3 Module, Audio connector, digital buttons, 3.7V batteries, transistors, female-female and male-female wires.

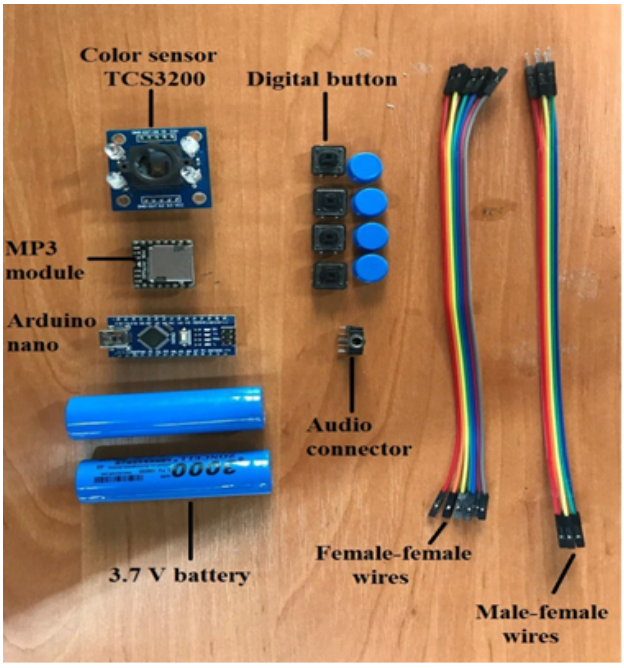

Figure 2 - electronic components

Frames for electronics was designed in SolidWorks and printed on 3D printer. Frames consist of handle (main electronics and microcontroller put here) and `header' (frame for color sensor).

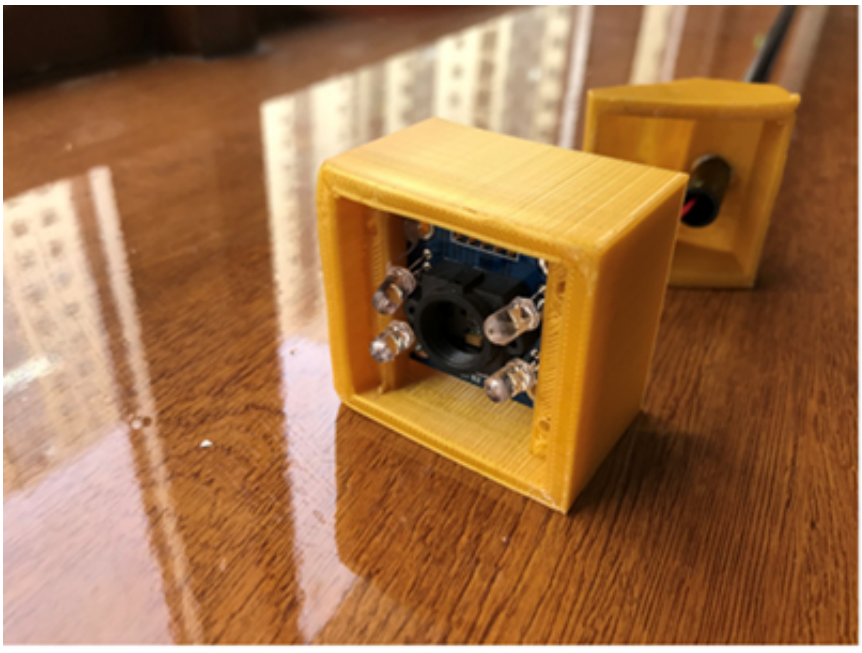

Figure 3 - header of the cane (with color sensor TCS3200)

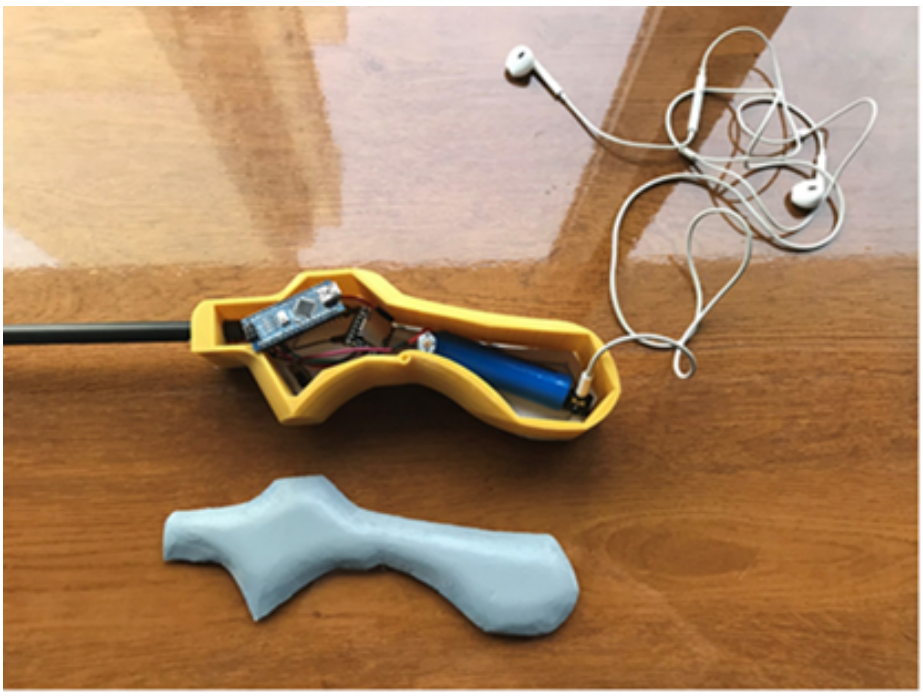

Figure 4 - handle of the cane (with main electronics, microcontroller, batteries, and headphones)

Code for the prototype was developed on Arduino IDE for downloading on Arduino Nano microcontroller and can be found on the same repository.