uOttawa
Faculté de génie
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TEAM 3
GNG 1103 PROJECT

Deliverable E – Project Schedule and Cost

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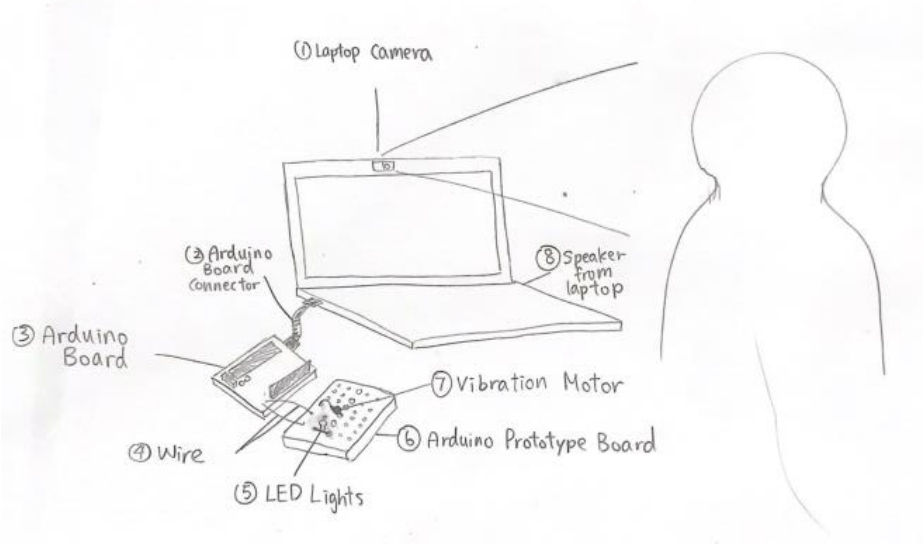
27th October 2024

1. Parts for the Prototype



Hardware Components

1. **Laptop Camera**
   Function: To detect distance and speed of user from target object.
2. **Arduino Board Connector**
   Function: To connect Arduino board to software commands
3. **Arduino Board**
   a. **Function**: Read input and release output accordingly
4. **Wiring**
   - **Function**: Connect Arduino with Arduino prototype Board
5. **LED Lights**
   a. **Function**: Output flashing lights (on/off) according to speed and distance of object from camera
      - **Note**: Lights stop flashing when object is out of danger range.
6. **Arduino Prototype Board**
   - **Function**: For board circuit purposes
7. **Vibration Motor**
   a. **Function**: Output vibrations according to speed and distance of object from camera
   b. **Note**: Vibrations stop when object is out of danger range.
8. **Laptop Speaker**
   a. **Function**: Output noise signal according to speed and distance of object from camera

b. **Note**: Noise stops when object is out of danger range.

Software Components

1. **Python**
    c. **Function**: Controls logic and integrates hardware and software components.
2. **OpenCV Library**
    d. **Function**: A real-time optimized Computer Vision library, which provides users methods for object recognition, image processing, tracking and performing computer vision jobs
3. **Shabodi API**
    e. **Function**: API interface for enhanced functionality and integration of real-time data analysis.

2. Prototyping Object Recognition

Here we must set up the appropriate Python library within Shabodi to initiate the first step of our solution: object detection. Next, we will want to do a focused prototype on the function of the object detection software. In this focused stage of prototyping, the main objectives of the test will be to ensure that objects are being detected within a certain range of the camera. Said range is to be determined from testing as well. From these tests, we hope to improve our understanding of how to best configure the alerts to assist someone with visual impairment.
We hope to have this stage done in time to be able to document our findings in the next deliverable.

Possible risks include not being able to set up the APIs in time. At this point in time, no members of our group have access to Shabodi's platform. We have contacted the clients in the hope that they will aid. Additionally, we have connected with our TA to have documentation of our difficulties. In summary, we have taken the appropriate steps to handle this, but this is our greatest risk to our project right now.

3. Prototyping the audio warning text and image recognition

After having the software running smoothly for the object detection, we will now move into the next step: how that data is processed. When the camera detects an object in front of it, a signal will next be sent to an Arduino board.
This is where the second phase of prototyping will begin. Another focused prototype, this time on how the signal is processed to yield the most positive and effective response in assisting visually impaired individuals. Examples of data we hope to receive from this testing would be in the delivery of an alert, a visual alert such as a flashing light in the peripherals, or a chime noise in a speaker. Those ideas can then be expanded on such as how bright to make the flash? or how loud to make the chime.

The greatest risk to failure for this stage would be that our group cannot configure the code effectively. No one in our group has coding experience, and at this stage in the process, it would seem apparent that this could pose a threat. Our team is aware of this, and we are actively taking the steps and know to ask for help to avoid such an issue.

4. Final Prototyping

The last prototype we will conduct is a comprehensive prototype on both systems simultaneously. In this stage we hope to model the experience of an individual attempting to navigate. As much data will be collected as possible at this stage to make any possible adjustments to improve the user experience.

Item	Function	Link	Cost	Required
Webcam	Enable distance detection	https://www.walmart.ca/en/ip/1080P-HD-Webcam-with-Microphone-Streaming-Computer-Web-Camera-for-Laptop-Desktop-Mac-TV-USB-PC-Cam-for-Video-Calling-Conferencing-Gaming/4N2WMIXKWE95?offerId=4F18EE94A40C3FD88FA13C676B3EA54C&cmpid=SEM_CA_33355_HQH88E2IHJ&utm_id=SEM_CA_33355_HQH88E2IHJ&utm_medium=paid_search&utm_source=google&utm_campaign=always_on&gad_source=4&gbraid=0AAAADv6L0QnWJU-QuyuVk_Qta0jdvZeB&gclid=CjwKCAjwyfe4BhAWEiwAkIL8sEGoeGG8QFKUdkc3DkdY7392nWWfqTTqkzvLSMogAaW6ZvcqdTumzhoCk6oQAvD_BwE&gclsrc=aw.ds	$11.99	Yes
Arduino board	Enable system alerts	Hopefully in maker space	--	Yes
VPN	Allow on campus work	https://www.tunnelbear.com/account/checkout?couponCode=FALLSALE2024&ref_id=website_fall_sale&utm_source=website&utm_medium=direct&utm_campaign=fall_2024	$ 9.99 / month	Maybe

5. Prototyping Test Plan

Object Recognition Prototype Plan

- Prototype type: Focused, Analytical

An overview of the main concepts of the solution, that is executed through a simulation (computer code) of the model. The prototype will be executed through a series of code runs, to determine the efficiency and applicability of the prototype being simulated.

Prototype Attributes	
Fidelity (How close the prototype is to the final model)	High
Cost	Low

- Duration
  The test is conducted over several minutes, with different inputs, to have a more generalized overview of the model's action.
- Timing: The test starts when the object enters the camera's field of view and stops when the object is successfully recognized.

Execution

During the test, we observe and record how long it takes for the software to successfully recognize the object. If the results don't meet our standards, we adjust the code and run the test again.

Interpret

If the object isn't detected almost immediately when in range of the camera, we consider the test unsuccessful because the user needs to be aware of the object as soon as it comes into frame to avoid injury.

Audio Warning, Text and Image Recognition Plan

- Prototype: Focused, Physical
- Duration: The test is conducted over several minutes, to gauge whether the audio response is accurate or not.
- Timing: The test starts when an object is placed within a specified range of the prototype's camera, and ends the audio response (in the form of alarm) is given

Execution

For this test, we put an object in the field of vision of the camera and observe if an alert comes from the speakers or if a flashing light ensues. We also measure and record the response time for the alerts.

Interpret

If the alerts don't trigger almost immediately the object is detected, then the test is considered unsuccessful.