ULTRASONIC VISUALIZER TEAM

CUESEF PROPOSAL FOR EQUIPMENT PURCHASES

Ultrasonic Visualizer Team's CUESEF Funding Proposal

Abstract

We would like to request funding from CUESEF for the purchase of equipment for the 4th year engineering project to be conducted in the fall 2013 and the winter 2014 terms under a supervision of Dr. Yuu Ono at the Department of Systems and Computer Engineering. An Objective of the project is to create a low cost device to act as a guide for the blind to help them be more aware of their surroundings, enhance their visualization of the environment and increase their maneuverability in the streets. Below you will find a detailed list of the items we will acquire and the associated costs. The requested items are essential to conduct the proposed project and achieve the goal of the project. With four students being affected by this group, we feel it is important to purchase this equipment. The equipment purchased will be taken care of by the team members during the project and by Professor Yuu Ono after the project.

Group Introduction

We are a group of four undergraduate students at Carleton University working on a 4th year engineering project that will aid the visually impaired. Three of us are majoring in Biomedical and Electrical engineering and one of us is majoring in Electrical engineering.

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History of the Project

This is a new project using ultrasonic sensors that is aiming to surpass the white cane in assisting visually impaired individuals.

Funding

The Request

We are requesting funding for a microcontroller, a Bluetooth module, an ultrasonic range finder, a gyroscope, and a lithium ion battery. The items requested will be stored in the biomedical lab located in Minto 6030 and maintained by the group members of this project.

Microcontroller

The microcontroller will allow us to read and interpret signals coming from the ultrasonic range finder and the gyroscope and output signals through the Bluetooth module to a laptop which will be used to perform the heavy calculations and tell the blind user of surround obstacles. We have chosen the "Raspberry Pi Model B" as the microcontroller that will best perform the tasks that we need.

Ultrasonic Range Finder

The ultrasonic range finder is used to determine the distance the blind person is from objects. We believe that a range finder that is small has the largest range is best to help the blind user detect the distances. We feel that the "XL-Maxsonar EZ4" range finder is the best choice as it can provide readings from 0 to 765 cm with a 1 cm resolution and can be powered by 3.3 V to 5 V supply.

Gyroscope

The gyroscope is used to get information on the angle of the user's foot so that the software can know when the sensor is being angled towards the ground and take that into account when trying to figure if the blind user is near an obstacle. We feel that the "ITG-3200 Triple-Axis Digital-Output Gyro" is the most appropriate for our needs.

Bluetooth Module

The Bluetooth module is used to wirelessly transmit all data coming from the ultrasonic range finder and the accelerometer to the laptop. We feel that using Bluetooth technology, as opposed to other technologies such as WiFi and Zigbee, was the best choice because it is now as power hungry as WiFi is and because Bluetooth is a technology that is widely

present in smartphones and laptops. We feel that the "RN42-XV" Bluetooth module is the best choice for the project.

Battery

The battery is used to power the microcontroller, ultrasonic range finder, accelerometer, and Bluetooth module. We believe that a polymer lithium-ion battery with at least 2000 mAh capacity will be suitable to provide power to all the listed devices for at least a day without recharging.

The Budget

Part	Quantity	Unit Cost	Cost
Raspberry Pi Model B	2	$49.95	$99.90
Raspberry case	1	$19.95	$19.95
RN42-XV Bluetooth Module – PCB Antenna	2	$20.95	$41.90
Ultrasonic Range Finder – XL-Maxsonar EZ4	6	$49.95	$299.70
ITG-3200 Triple Axis Digital-Output Gyro	2	$49.95	$99.90
Polymer Lithium Ion Battery	2	$16.95	$39.90
		Subtotal	$601.25
		Shipping and Tax	$61.36
		Total	**$662.61**

Other Information

Problem

The white cane is an assisting tool used by the visually impaired to be able to maneuver in an ideal environment. Hence, assuming there are no potholes, curbs or any other unexpected obstacles, Our project is meant to be used as a replacement for the white cane in terms of environment awareness as well as hazard protection. Instead of the user having to feel the obstacle by getting close to it; our project should inform him of the obstacle's proximity from a much safer distance.

Objective

Our goal is to cover three main cases which are most commonly experienced by the visually impaired. Firstly is the case of warning the user when they approach a curb proposing the hazard of getting off the sidewalk and into the streets. This will be done by detecting the change of the pathway's elevation and then notifying the user of which direction to avoid.

Secondly is the case of approaching a nearby object. The user should be notified of the object's presence at range greater than what could be provided by a white cane. The user will then be notified of which direction to avoid until the obstacle is cleared.

Finally is the case of detecting stairs. This will be done by detecting a series of change in the pathway's elevation. The user will then be notified of the stair's location and whether they are headed upwards or downwards.

Conclusion

We would like to request funding for the equipment needed for our 4th year engineering project of the ultrasonic visualizer to be conducted in the fall 2013 and winter 2014 terms. It will cost $662.61 and we are asking CUESEF for $662.61. The items requested will be stored in the biomedical lab located in Minto 6030 and maintained by the group members.

Appendix A

Product		Quantity	Subtotal
	SEN-09801 Triple-Axis Digital-Output Gyro ITG-3200 Breakout RoHS✓	2 update remove **in stock** / Move to Wish List	$103.70 ($51.85 ea.)
	WRL-11601 RN42-XV Bluetooth Module - PCB Antenna RoHS✓	2 update remove **in stock** / Move to Wish List	$43.49 ($21.75 ea.)
	SEN-09495 Ultrasonic Range Finder - XL-Maxsonar EZ4 RoHS✓	6 update remove **24** in stock / Move to Wish List	$311.09 ($51.85 ea.)
	PRT-08483 Polymer Lithium Ion Battery - 2000mAh RoHS✓	2 update remove **in stock** / Move to Wish List	$35.19 ($17.59 ea.)
Calculate Shipping FedEx International Priority $31.15			**Subtotal:** $493.47