AutoCart Funding Proposal

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Purpose:

The purpose of the AutoCart is to convert a golf cart into a semi-autonomous vehicle, which will be used on the Sonoma State University campus. The AutoCart will use a variety of sensors to be aware of its surroundings and to adjust its driving to avoid any possible collisions. Current autonomous vehicle systems are extremely expensive and specialized - the nearest commercially available system costs 250,000$. One of our project's goal is to see if we can create an autonomous system for under 1200$. We surveyed 10 people to see what their thoughts were on the AutoCart and we found that 70% of people surveyed would purchase this or a similar device for their own campus or facility, and the majority of people thought that this technology would be beneficial to society.

The AutoCart will have a companion Android app that can be used to summon the vehicle to any location on campus. For example, if someone with a hurt ankle had just left the Green Music Center and needed to get to Darwin Hall in a hurry, that person could easily take out their phone and summon the AutoCart, and the vehicle would arrive and proceed to safely and quickly transport them to their destination. The possibilities for the AutoCart are infinite.

Method:

At the heart of the AutoCart will be a 32-bit microcontroller. Microcontrollers are, essentially, very small computers that can be programmed to run very specific applications very quickly. The microcontroller will take in data from a GPS receiver (to know its location), a bluetooth connection to a cellphone (to receive and transmit information to a user), and from multiple object detection sensors (to avoid collisions with objects and people). Below is a simplified diagram for the system architecture.

AutoCart System Architecture

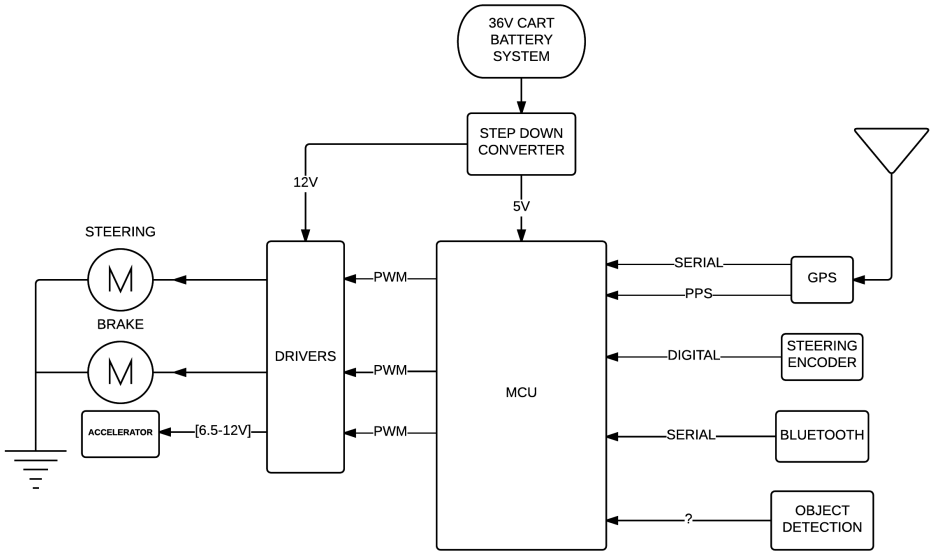

figure 1 - simplified system architecture

Timetable:

We are currently in the planning stage of the project and will be getting started by the middle of November, then a month later, we will be presenting our final project proposal to students and faculty. During the winter break we will finish the work on the mechanical parts needed to control acceleration, braking and steering. During the spring semester, we will shift our focus from the mechanical to the electrical and software side of the project and will start working on coding, GPS, object detection sensors, and on making the system controllable from a smartphone using an Android app. By the beginning of may, we expect to demo our project to the audience and ensure that all functionalities works as promised. The final task will be presenting our whole project to an audience.

Anticipated Results: We expect the cart to be able to be directed using the app that we developed. The cart will then be able to navigate to the selected location allow the passenger(s) to board the vehicle and then be directed to their destination.The vehicle will also have a level of object detection and avoidance as a safety feature. Other safety features this project will include will be: manual control override and a kill switch.

Motivation:

The AutoCart project should be funded because it will continue to provide research opportunities for Sonoma State students and will be a great platform for future Electrical Engineering students at Sonoma State University to continue work on autonomous technology systems such as RADAR and LIDAR, it will also benefit Computer Science students who would like a platform to develop advanced autonomy algorithms. In addition to this, autonomous technology in vehicles is exploding in popularity and having the ability to work in this area during school will give Engineering Science students a great opportunity to develop valuable skills in a growing field. The possibilities for the AutoCart are infinite, and with funding, the AutoCart could go from a plan to a reality.

References:

[1] Navyatech. (2015).Navya . Retrieved 22 October, 2015, from http://navya.tech/?lang=en

[2] Center For Automotive Research. (2012). KPMG.com . Retrieved 25 February, 2016, from https://www.kpmg.com/US/en/IssuesAndInsights/ArticlesPublications/Documents/self-driving-cars-next-revolution.pdf

[3] Google.com. (2015). Google Self-Driving Car Project. Retrieved 22 October, 2015, from https://www.google.com/selfdrivingcar/how/

Project Budget:

Part/service	**qt**	**part number**	**Description**	**Price ($)**
GPS antenna	1	ANT-GPS-SH-SMA	gps antenna for location	21.52
GPS reciever	1	EVM-GPS-F4	receives GPS signal	39.99
linear actuator	2	FA-RA-22-12-10	used to control steering/braking	299.98
mounting bracket	2	MB1	used to hold linear actuators	7.00
bluetooth modem	1	WRL-12577	used for bluetooth communication	24.95
PIC32 MCU	10	PIC32MX110F016B	microcontroller used in project	25.00
circuit board manufacturing	3	NA	Bay area circuits student special	90.00
Analog Discovery	1	410-244--kit	USB oscilloscope to check and verify our electrical signals.	159.99
electronic components	NA	NA	electrical components as needed	70.00
total				738.43