ID	Activity	Description	Deliverables	Duration (Days)	People	Resources	Predecessors
1	**Power Design**						
1.1	Component Selection	Selection of initial components to be used to develop various systems	Develop fully itemized budget of parts	1	All		
1.2	Detachable Housing	Allow for the entire apparatus to easily attach and detach to a cane	Housing can attaches and detaches in an easy fashion	4	Arthur Helmen, Matthew Giuffrida	Collapsible cane, pvc pipe	1.1
1.3	Adjustable Clamp	Allow for apparatus to attach to canes of various diameters and lengths	Clamp should be able to attach to various cane diameters with ease	2	Arthur Helmen, Matthew Giuffrida	Pipe bracket, finished housing, collapsible cane	1.1
2	**Software Design**						
2.1	**Outdoor Navigation**						
2.1.1	Utilize GPS Information	Gather GPS information through either GPS module or IOS application	GPS info should be available and easily interpreted	3	Baltazar Guerra	GPS Module, Raspberry Pi	
2.1.2	Identify Campus Buildings	Utilize AggieMap or Google Maps to identify each campus building	Buildings should be able to be identified with their GPS locations	5	Baltazar Guerra	GPS Module, Raspberry Pi	2.1.1
2.1.3	Establish routes	Establish points along said map to guide users along set paths on campus	Points must be established to guide user to from a given building to another building along routes that currently exist on campus	7	Baltazar Guerra	GPS Module, Raspberry Pi	2.1.2
2.1.4	Provide Feedback	Trigger feedback systems that aid in the process of guiding the user	User should receive their choice of audio and haptic feedback at the appropriate times	3	Arthur Helmen, Matthew Giuffrida	RPi, ultrasonic sensors, vibrations motors	2.1.3
2.2	**In-building Navigation**						
2.2.1	Determine room orientation	Determine direction and orientation in respect to key points in buildings	Users should be able to determine direction relative to how they entered and exited the building	7	Jonathan Williams	RPi, GPS Module	
2.2.2	Establish routes	Allow users to set destinations and guide them along paths that they have previously traveled along	Users should be able to traverse 'bread crumb' trail that they have set to guide them back along the same path	8	Jonathan Williams	RPi, Xcode	2.2.1
2.2.3	Provide Feedback	Trigger feedback systems that aid in the process of guiding the user	User should receive their choice of audio and haptic feedback at the appropriate times	3	Arthur Helmen	iphone app accelorometer functionality, vibration motors	2.2.2
2.3	**IOS Application**						
2.3.1	Establish connection with RPI	Allow the communication of data through a bluetooth connection between IOS device and RPI	IOS device and RPI can share basic information	4	Shawn Popal, Baltazar Guerra	Xcode	
2.3.2	Collect and send GPS data	Send GPS information gathered by IOS device to the RPI	IOS device can gather GPS information and deliver it to the RPI	8	Shawn Popal, Baltazar Guerra	Xcode	2.3.1
2.3.3	Trigger feedback from navigation systems	Interpret information gathered and trigger the appropriate feedback systems	GPS location is interpreted and feedback systems are triggered accordingly	4	Shawn Popal	Xcode	2.3.2
2.4	**Obstacle Detection**						
2.4.1	Determine distance from objects	Through the use of OpenCV, gather distance information from cameras and determine distances to detected objects	Gather and interpret information from OpenCV software	2	Jonathan Williams	Cameras, RPi	

2.4.2	Evaluate distance thresholds	Compare gathered values to set thresholds	Compare interpreted information against preset values	1	Arthur Helmen, Matthew Giuffrida	Sensor/motor network	2.4.1
2.4.3	Provide feedback when necessary	Trigger feedback systems if threshold limits are met	Trigger feedback systems at the appropriate times	3	Arthur Helmen, Matthew Giuffrida	sensor/motor network	2.4.2
3	**Power Design**						
3.1	Power delivery	Provide power to the RPI through the use of a battery	RPI should be powered when toggled so	1	Matthew Giuffrida, Arthur Helmen	Battery Pack, wires	
3.2	Rechargeable system	Allow the battery to be conveniently recharged	Battery is rechargeable and easy to do	1	Matthew Giuffrida, Arthur Helmen	Wires, wall plug	3.1