Florida Tech IGVC Milestone 1 Report

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Task Completion Matrix

	Task	Completion	Will Nyffenegger	Adam Hill	Chris Kocsis	Brent Allard
1	Sensor Configurations	90%	25	25	25	25
2	Software Structure	100%	25	25	25	25
3	Mapping and Navigation	100%	20	40	0	40
4	Maximizing GPU & Vision	75%	0	0	100	0
5	Prototype GUI & Main	50%	30	20	0	50
6	Simulation & Communication	75%	100	0	0	0
~~7~~	~~Position Estimation Sensors~~					
8	Create Requirements	100%	30	10	30	20
9	Create Design	100%	30	20	30	20
10	Create Test	100%	10	25	25	40

Milestone Task Summaries and Member Contributions

Requirements

Will drafted and edited the overall document. Adam and Brent wrote sections pertaining to navigation and the GUI. Chris wrote the sections pertaining to computer vision.

Design

Chris drafted the design document. Will filled in the introduction, overall structure, and communication framework. Adam and Brent filled in the GUI and pathfinding sections. Adam edited the final document before submitting it.

Test

Brent drafted and edited most of the document. Individual sections were completed by other team members.

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Florida State University Trip

On September 23rd the Florida Tech team traveled to FSU to iron out details concerning the robot. Many details concerning tasks, vehicle structure, software structure, and navigation algorithms were discussed. This trip solidified both team's understanding of the competition and tasks required to successfully compete.

Sensor Configurations

One of the details determined during the trip concerned sensor configurations. While the stereoscopic camera previously decided on will remain, the camera data will be supplemented by Lidar data to improve the range and accuracy for identifying obstacles.

Software Structure

Long discussions at Florida State University led to conclusions about the overall software structure by Adam, Brent, and Will.

- Java & C++ will be the main languages used
- RabbitMQ Server clients will support the communication framework
- Two components shall control and log robot behavior. They shall be named Control and IOP (interoperability)
- Pathfinding and motion planning shall be combined into one navigation unit based on an advanced algorithm discussed at FSU
- Position shall be implemented by FSU
- The GUI shall be its own subsystem
- Motor control shall be implemented by FSU; but, be commanded by pathfinding over the communication framework
- Computer Vision shall be implemented in C++ and CUDA and shall also handle Lidar data

Mapping and Navigation

An advanced sampling/modeling algorithm called SBMPO shall be used to navigate the space. The algorithm combines motion planning and path optimization. Basic implementations will be written by Adam and Brent before the next milestone.

Maximizing the GPU

Chris has found libraries for transforming and filtering point clouds on an NVIDIA GPU. He is currently using data from our stereoscopic camera to evaluate the algorithms.

Prototyping GUI and Main

Brent and Will have yet to prototype either because the priority has been on determining the algorithms and tools that will be used for pathfinding.

Simulation & Communication

Will focused on this area. The simulation needs to be tested more thoroughly; however, it is basically complete. The communication framework is implemented in Java and now needs to be implemented in C++. Client libaries in C++ shall be used to do so. Standards for communication were developed over the month.

Position Estimation and Sensors

At FSU, a decision was made to give FSU the responsibility for implementing an accurate and precise position finder. FSU has hardware from other projects that is superior to Florida Tech's.