Florida Tech IGVC Milestone 4 Report

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Milestone IV

Task Matrix

#	Task	% Complete	Brent	Adam	Chris	Will
1	Line Detection	85%	0%	0%	100%	0%
2	Software/Hardware Integration	67%	15%	25%	15%	45%
3	Motion Planning	85%	70%	30%	0%	0%
4	INS Troubleshooting	20%	0%	0%	50%	50%
5	AMQP Setup	100%	0%	0%	0%	100%
6	Motor Control Comm.	100%	0%	0%	0%	100%
7	Startup, Control, Logging	75%	10%	60%	0%	30%
8	GPS (for Demo)	0%	0%	0%	0%	100%

Discussion

Task 1

Chris has worked exceptionally hard to produce line following software. During January, he has achieved edge detection and line detection accurately in heavy sunlight. Different shading conditions still cause problems, and the actual reports of lines as line segments still need some work, however, the result is close.

Task 2

Everyone worked hard on software integration, especially during the demo. While our software works decently well together, there are still bugs to fix; hardware integration is providing our main obstacle. Testing software on platforms that accurately mimics our hardware has been impossible. Recently, Adam set up static IP's between our Buffalo router and the other devices we are using. With networking, multiple people may connect wirelessly to devices for testing at the same time.

Task 3

Motion planning software runs accurately in simulation but has not been tested extensively to prove function. Additional hardware tests are necessary. Though FIT does not have a physical robot for the next month, tests can be conducted using our ZED and a prototype cart. Forthcoming information on the performance of the robot's motors will also help improve accuracy.

Task 4

Troubleshooting the INS proved to be a bust. The device needs ROS to run because its drivers on windows are out of date and drivers do not exist for plain linux.

Task 5

The communication framework has been set up. While the framework itself needs to be cleaned up a little to make testing easier, messages are reliably sent and received in both languages and perform accordingly.

The introduction of ROS into the system requires building another component for the framework; however, that component will build off already written code directly.

Task 6

Motor control communication has been difficult, but the issues with synchronization have been handled. Some improvements still need to be made, including multi-threading some code; however, the motor control is basically complete.

Task 7

Programmatic ways of controlling the state of software components have been written for the robot. Logging reports have also been written. Detailed logs will be written to files as necessary. The logging component for Java needs to be replaced however that should require changing one field.

Task 8

The demo GPS was working fine until we effectively "bricked" it by attempting to update firmware that was already up-to-date, which erased part of the bootloader. A JTAG device is being purchased by FSU to reflash the GPS. With the ill performance of the INS as well, we are considerably behind on position.

Contributions

Adam Hill

Adam wrote scripts and logging procedures that will apply to IOP in the future. He also created build scripts and began working on process start up scripts for actually starting the robot with one command. Additionally, Adam also worked with the router and devices to establish a standardized networking setup for both Ethernet and wireless connections.

Brent Allard

Brent completed and integrated his motion planning software into the communication framework which was a difficult task. The model and tests for the motion planning need to give way to integrated testing on the TX1 with vision.

Chris Kocsis

Chris finished line following and contributed to the decision to use ROS. Chris spent a significant part of the demo time trying to "un-brick" the GPS. His expertise also helped with motor control. Chris will complete a video for the fourth milestone.

Will Nyffenegger

Will completed the communication framework and began developing the logging software. Additionally, Will collaborated with FSU to get motor control working. Will organized FSU's visit.

Milestone V

Task Matrix

#	Task	Brent Allard	Adam Hill	Chris Kocsis	Will Nyff.
1	Lidar & Lines	0%	25%	75%	0%
2	Software Integration	25%	25%	25%	25%
3	Software Testing	25%	25%	25%	25%
4	Hardware Integration	25%	25%	25%	25%
5	Motion Planning	100%	0%	0%	0%
6	GUI	100%	0%	0%	0%
7	Startup, Control, Logging	10%	60%	0%	30%
8	Comm. Maintenance	10%	10%	10%	70%
9	IOP	0%	70%	0%	30%
10	Create Poster	25%	25%	25%	25%

Discussion

Task 1

Line detection needs to be refined for different line levels and to optimize the length of line segments. Lidar will be developed using a ROS driver so ROS launch files and build commands must be written.

Tasks 2, 3 & 4

Software integration with hardware is the priority. With wireless networking set up for both the TX1 and Pi, multiple people can test software at the same time. Testing will occur multiple days a week basically when anyone has time to go to the FabLab. Specific functionality tests shall be conducted until the full robot arrives during the first week of Spring break. Hardware integration will be limited until the physical robot arrives for the month before the showcase; however, tests regarding communication with the motors and motion planning will be conducted on all available devices as well as coordinated with Florida State University.

Task 5 & 6

Motion planning and GUI development will shift to accommodating the error involved in the position of the robot and the execution of commands. GUI development will shift away from writing tests and more towards wirelessly controlling the robot. Extensive testing of the motion planning software will be conducted with a mock set up of the motors and motor controller.

Task 7

Controlling the state of the robot through scripts for starting and stopping processes on all of the hardware devices will be written. Additionally, state control will be conducted through software run with RabbitMQ. The hardware and wireless stops are now functional. Logging software shall be updated.

Task 8

The communication software has become more complicated. The introduction of a new computer and ROS means that an interface with ROS and RabbitMQ must be written. Testing of messages must also commence and additional messages added as necessary.

Task 9

Contact with the competition planners shall be conducted to determine the status of the IOP competition. Regardless, the bare bones functionality shall be implemented to support overall code.

Task 10
Team members shall collaborate to produce a professional poster.

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Evaluation:

William Nyffenegger	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Chris Kocsis	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Brent Allard	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Adam Hill	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10