

# SPRING PROJECT PLAN

Florida Tech IGVC

January 17, 2017

## COMPETITION GOALS

- Create a robot that can complete the random course
- Develop an interoperable system that satisfies SAE's J AUS standards
- Document and demonstrate innovative and professional design

# SOFTWARE GOALS

- Integrating and testing software components
- Implementing accurate position estimation
- Lidar obstacle detection
- Maintaining a framework that satisfies the JAUS standards and enables testing
- Refining line detection and motion planning
- Developing an extendable software framework

## WHAT WE ARE IMPLEMENTING

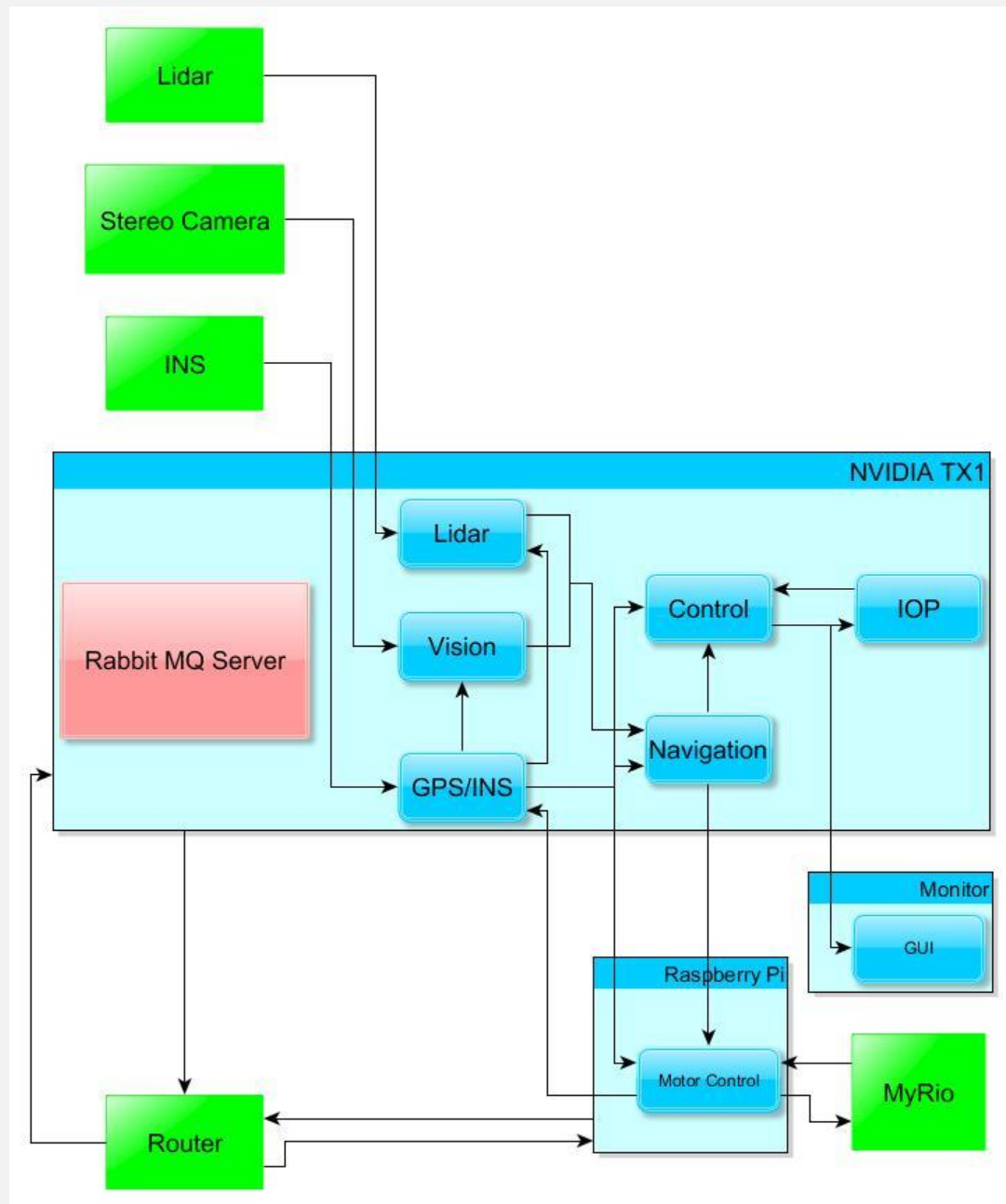
- Image processing for line detection using GPU programming
- SBMPO motion planning with support for navigation
- A communication framework for independent software components
- A control unit for managing the state of software components
- A software framework that supports testing and remote control
- Troubleshooting hardware issues
- The concurrency aspects of the software

## NOVEL FEATURES

- GPU programming to optimize obstacle and line detection
- Navigating a space in real time using SBMPO
- A robotic communication framework based on AMQP
- Position estimation accurate within one foot
- Experimental sensors and hardware with extraordinary capabilities

# TECHNICAL CHALLENGES

- Optimizing both hardware and software to achieve an extremely accurate position
- Refining image processing algorithms to clearly define lines without false positives
- Integrating Lidar for obstacle detection
- Translating high volumes of XML requirements into Java code
- Implementing an interoperability testing framework
- Controlling and monitoring many independent software components



DESIGN

## PROGRESS SUMMARY

Module/Feature	Completion %	To Do
Line Detection	67%	Remove false positives
Motion Planning	67%	Add units, finish D*, and add buffer for time to turn and stop
Communication	80%	Add messages
IOP	20%	Parse XML to Java and implement Control
Control	20%	Add logging messages for status of C++ units
Motor Control	67%	Set comm. protocol
GPS/INS	25%	Fix INS errors on Linux
Lidar & Obstacle Detection	0%	Obstacle and Lidar detection are synonymous



# SPRING MILESTONES

## MILESTONE FOUR

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

## MILESTONE FIVE

#	Task	Brent Allard	Adam Hill	Chris Kocsis	Will Nyff.
1	Lidar & Lines	0%	0%	70%	30%
2	Software Integration	25%	25%	25%	25%
3	Motion Planning	70%	30%	0%	0%
4	INS Setup	0%	0%	50%	50%
5	GUI	100%	0%	0%	0%
6	Startup, Control, Logging	10%	60%	0%	30%
7	Comm. Maintenance	20%	20%	20%	40%
8	IOP	20%	70%	0%	10%
9	Create Poster	25%	25%	25%	25%

## MILESTONE 6

#	Task	Brent Allard	Adam Hill	Chris Kocsis	Will Nyff.
1	Lidar & Lines Refining	0%	0%	70%	30%
2	Software Integration	25%	25%	25%	25%
3	Motion & GUI Cleanup	70%	30%	0%	0%
4	INS & Position Est.	0%	0%	50%	50%
5	Startup, Control, Logging	10%	60%	0%	30%
6	Comm. Maintenance	20%	20%	20%	40%
7	IOP	20%	70%	0%	10%
8	Create user manual	25%	25%	25%	25%
9	Create demo video	25%	25%	25%	25%
10	Create Competition Documentation	25%	25%	25%	25%