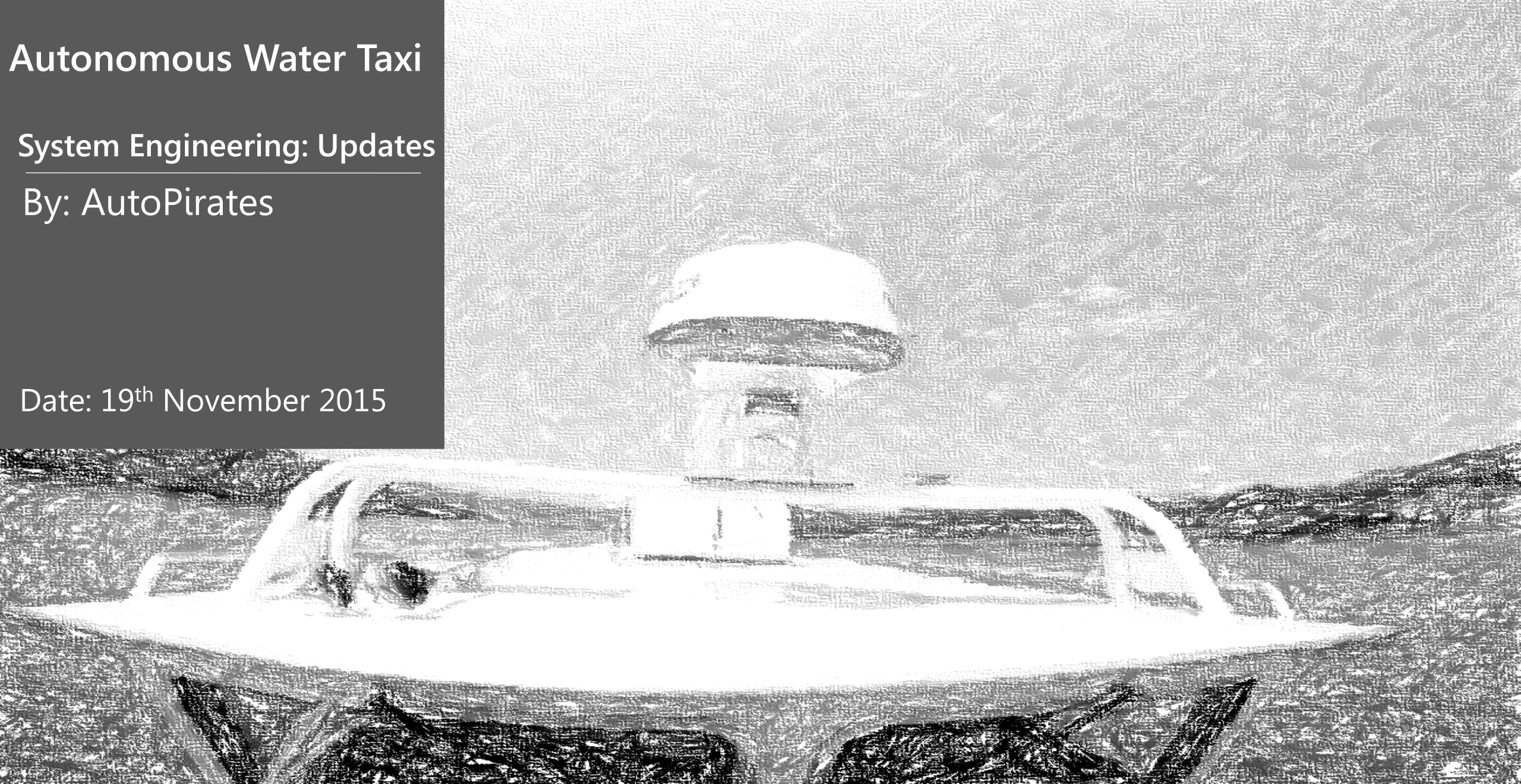


Autonomous Water Taxi

System Engineering: Updates
By: AutoPirates

Date: 19th November 2015



Team B: Tushar, Shiyu, Bikramjot, Tae-Hyung, William

Project Sponsors:



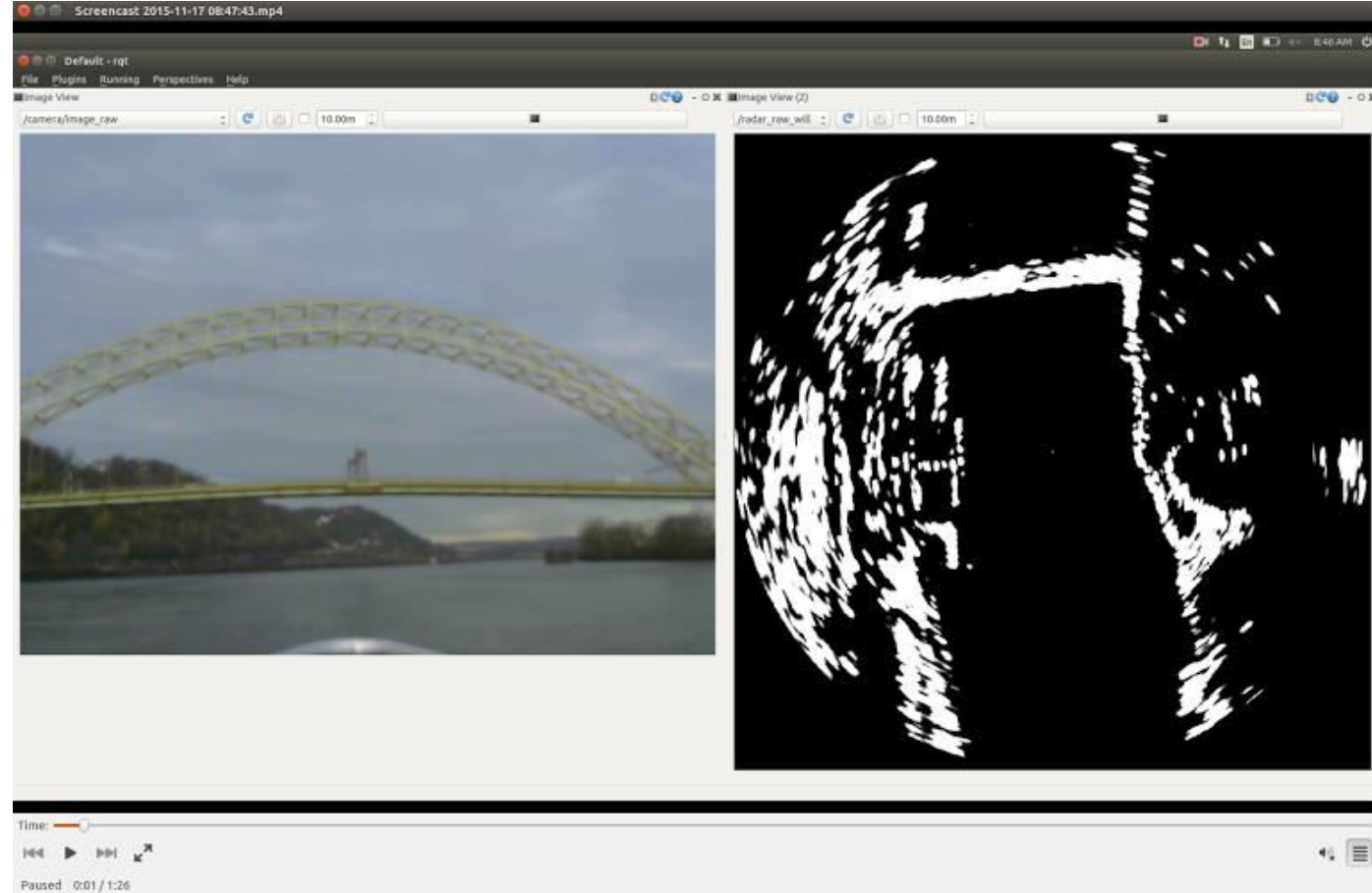
Project Updates | Current Status | Updates

Project Status: Latest Updates | Perception

First Field test Successful

Tons of data collected for processing

Radar data is of good quality so

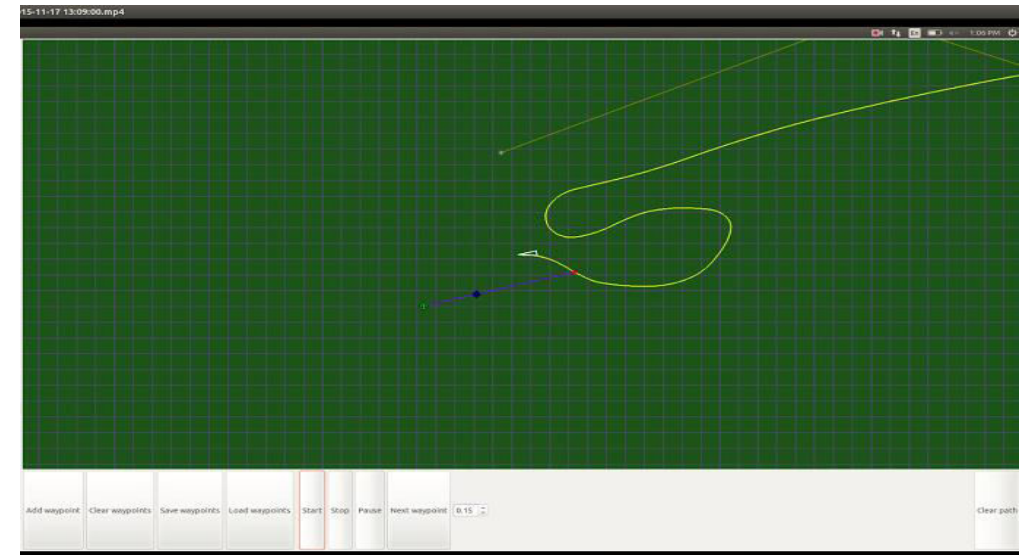
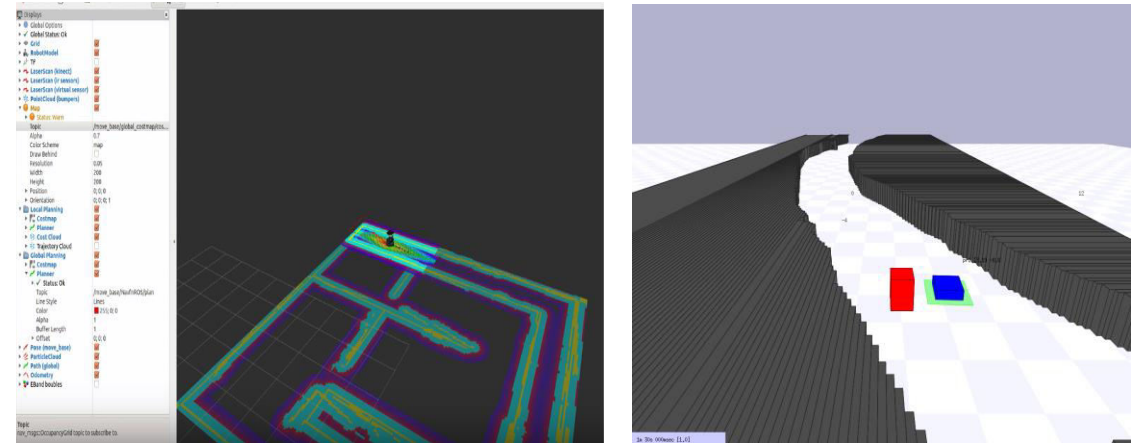


Project Status: Latest Updates | Path Planning and Simulation

Waypoint following tested

Created Occupancy Grid Map

Tested STAGE Simulation



Project Status: WBS Milestones for FVE

Perception				Path Planning		
Acquire data using OpenCPN	10/12	Tests and Demo's		Interface with IMU	10/12	
Interface Radar with ROS	10/29	PR1	10/15	Build and explore SBPL	10/26	Legend
Basic Data Filtering	11/07	PR2	10/12	Generate Occupancy Grid Map	11/10	Finished
Morphological operation	11/14	PR3	10/12	Test Occupancy Grid Map on STAGE Simulator	11/13	In progress
Contour Extraction	11/18	PR4	10/12	Run planner on OGM to plan the path	11/24	Not started
Object Detection (Boundary box)	11/24	Field Test1	11/17	Create waypoint following interface	11/28	
Start with overlaying radar data on maps	12/01	FVE	12/03	Tune motion primitives and OGM	12/02	

Project Status: Challenges and delays

DELAYS

Path planning needs more efforts to complete tasks before FVE

Shifting one person from perception to path planning

More visits to NREC planned

Challenges

Navigating through bridges. Radar only gives 2D data

Resolution of OGM created from Google Maps is not high

Updates on Systems Engineering/PM

RISKS MITIGATED

Radar performance (It was our biggest risk)

RISKS ADDED

Navigating the boat under the bridges

- Will add a RGB camera. This would be tackled in spring
- Add the data of bridges to OGM beforehand

Creating OGM from radar data would be challenging and time consuming

Create our own OGM map using Radar data

No changes in requirements and FVE

Questions?

Fall Validation Experiments: Perception

Step ID	Step Description	Success Criteria	Conditions
PE.1	Start RGB video of field test	This is our ground truth	Location: NSH Demonstration on laptop (Simulation), Projector required
PE.2	Simultaneously replay and visualize saved raw radar data in ROS	We can see plots of the radar image	
PE.3	Show filtered data	The filtered image has less noise than the raw image	
PE.4	Demonstrate obstacle detection	Draw bounding box around the obstacles.	
PE.5	Show detected objects from radar image while showing recorded video	The radar should detect obstacles that are in the video, at least the boats	

Fall Validation Experiments: Path Planning and Simulator

Step ID	Step Description	Success Criteria	Conditions
PL.1	Interfacing with IMU/GPS	Display logged data from IMU/GPS which we would be collecting during a field test	Location: NSH Demonstration on laptop (Simulation), Projector required
PL.2	Generate Environment Map	Display occupancy grid map for 2 miles with filled blocks depicting obstacles (For one of the rivers of Pittsburgh)	
PL.3	Demonstrate Path Planning	Boat successfully navigates from Point A to Point B in simulator which are 1 mile apart	
PL.4	Show obstacle avoidance	Boat successfully avoids obstacles in simulator in the above task. Obstacles are static and are simulated through occupancy grip map	