NAU AUVSI Robosub

Problem Definition and Project Plan

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Introduction

- Association for Unmanned Vehicle Systems International (AUVSI)
  - Student competition
  - 19th annual competition
- Complete the competition requirements by the due date
  - not yet released
- Other schools and universities are competing
  - Local
  - National
  - International

Needs statement

Northern Arizona University doesn’t have a Robosub project to submit to the AUVSI competition, so our team will build an autonomous underwater vehicle for the engineering department to participate.

Main goal

The AUVSI Robosub competition requires that we build a competitive robot meeting the design requirements that can complete all of the specified tasks autonomously.

Objectives

Objective	Units
Pass through gates	ft wide
Torpedo target	ft^ area
Bump target	ft^2 area
Remove lid	ft from handle
Drop Marker	ft from bin
Complete all tasks quickly	s

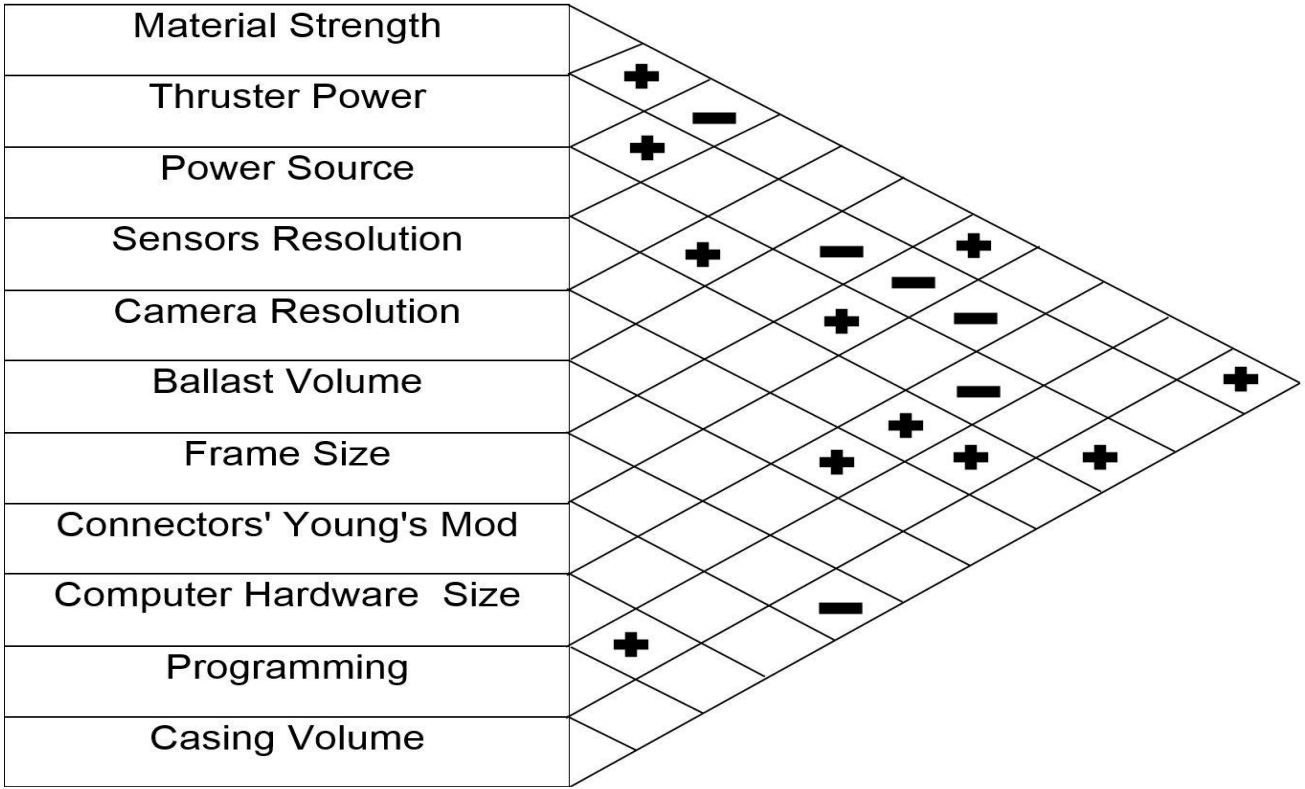
Constraints

- The robot is required to be Autonomous
- The weight limit of the robot is less than 57kg
- The size limit of the robot is within 1.83m x 0.91m x 0.91m
- The competition requires a Kill Switch
- The time limit is within 15 minutes
- The power source requires U.S 120V 60Hz 15A electrical for all the countries

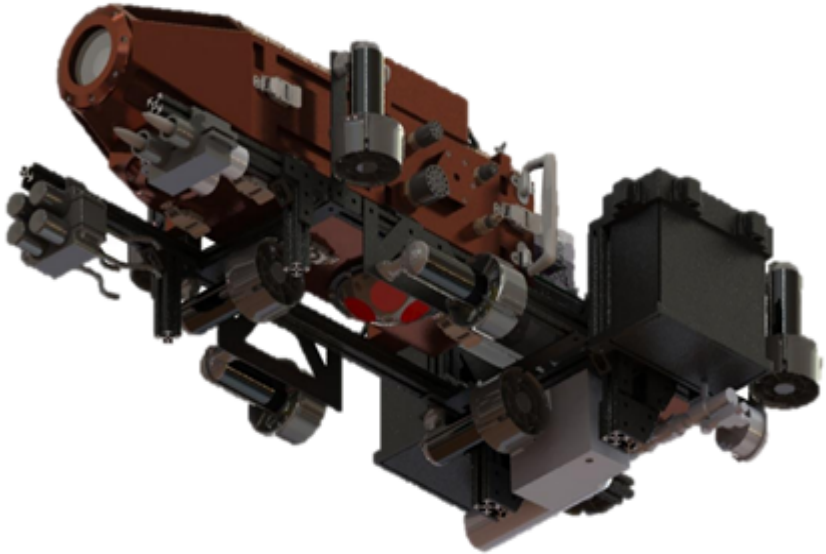
Quality Function Deployment

	PHASE I QFD											
Customer Needs	Customer Weights (1-10)	Material Strength	Thruster Power	Power Source	Sensors Resolution	Camera Resolution	Ballast Volume	Frame Size	Connectors' Young's Mod	Computer Hardware Size	Programming	Casing Volume
Self-Functioning	10				*	*				*	*	
Finish tasks	10		*	*	*	*		*		*	*	
Kill Switch	10							*	*	*	*	
Weight	10	*	*	*	*	*	*	*		*		*
Size	10	*	*	*	*	*	*	*		*		*
Power	10		*	*		*		*	*	*		
Bouyancy	10	*	*	*			*	*		*		*
Recovery	9						*	*			*	
Water proof	10	*	*		*	*	*					*
Cost	8	*	*	*	*	*	*	*	*	*		*
Time to Finish Tasks	7	*	*					*			*	
	Raw Score	6	8	6	6	7	6	9	3	8	5	5
	Unts	Psi	W	W	Hz	MP	ft^3	ft^3	Psi	Bit	Bit	ft^3

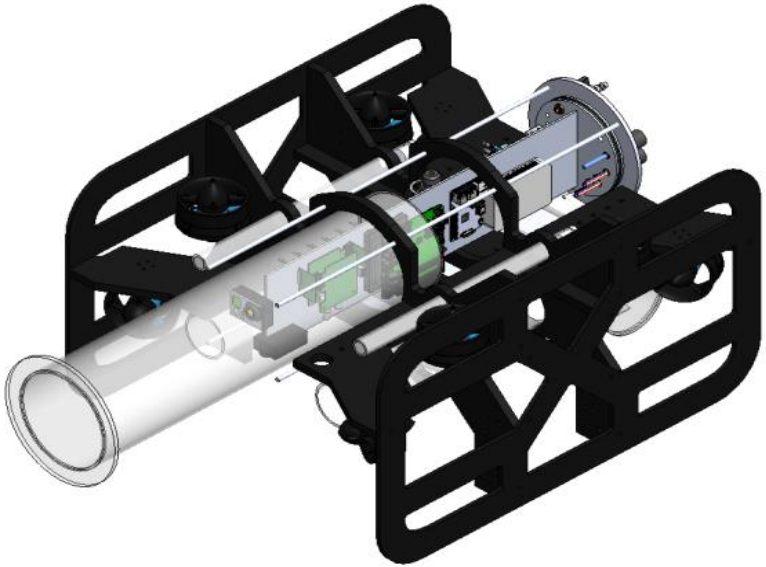
House of Quality



State of the Art

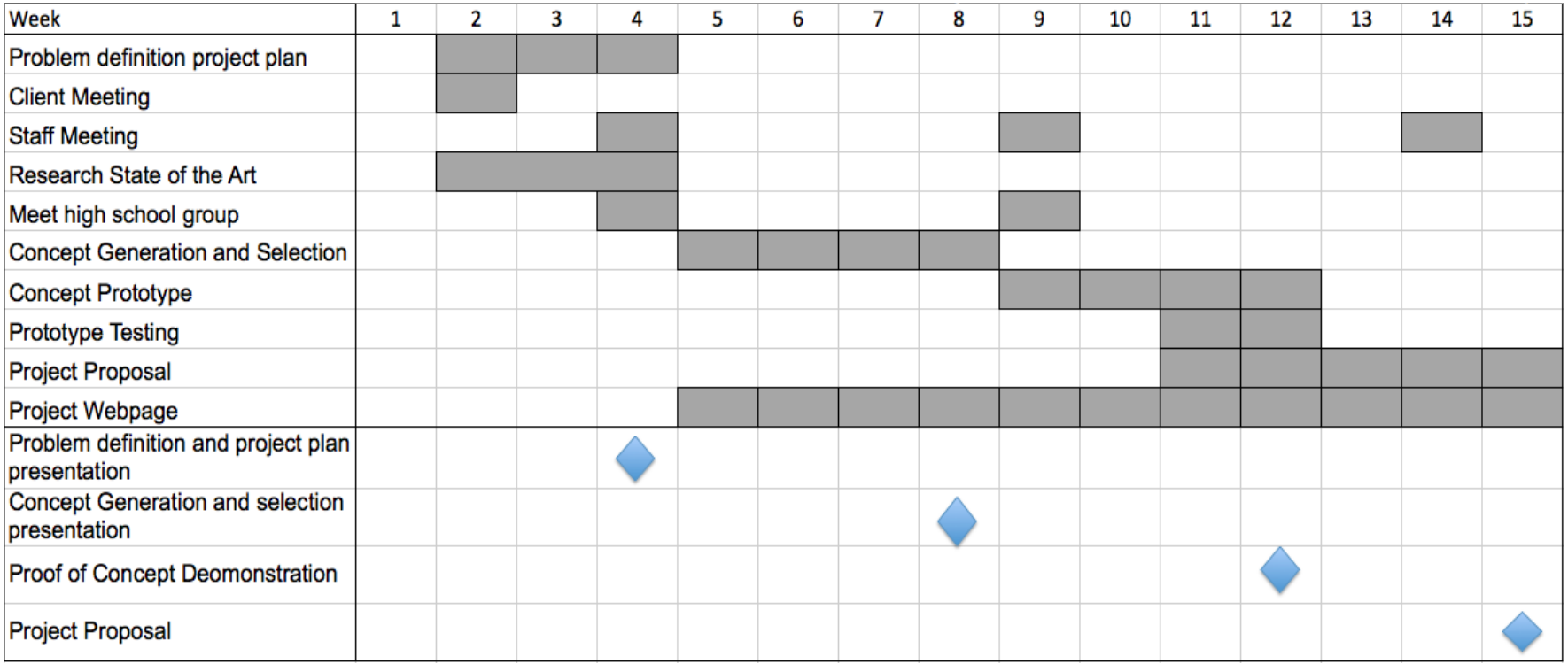


sdsumechatronics.org



auvua.org

Project plan



Conclusions

- AUVSI is an international competition in which the team will compete against many other groups from around the world
- Our objectives are to create an innovative product
- Many constraints must be observed
- utilize the project plan to make a tentative schedule
- Use QFD to prioritize the design concepts
- Use a decision matrix and other evaluating methods in the future to analyze design options

Reference

1. "AUVSI Foundation," Association for Unmanned Vehicle Systems International , [Online]. Available: http://www.auvsifoundation.org/home. [Accessed 24 September 2015].
2. "RoboSub Competition Official Rules and Mission," 26 May 2015. [Online]. Available: http://higherlogicdownload.s3.amazonaws.com/AUVSI/fb9a8da0-2ac8-42d1-a11e-d58c1e158347/UploadedFiles/RoboSub%20Competition%20Official%20Rules%20and%20Mission%20-%202015.pdf. [Accessed 24 September 2015].