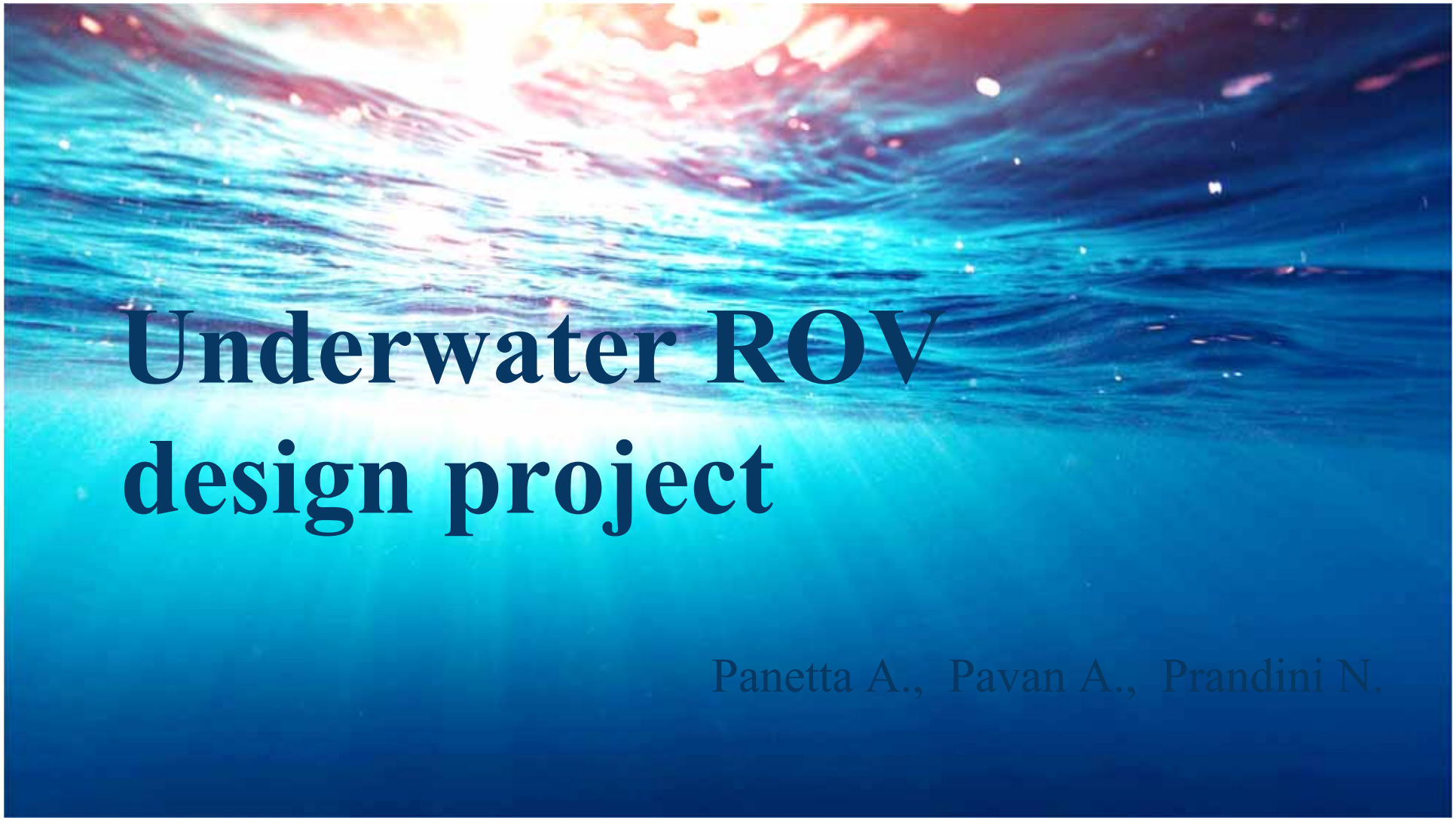


Underwater ROV design project

Panetta A., Pavan A., Prandini N.

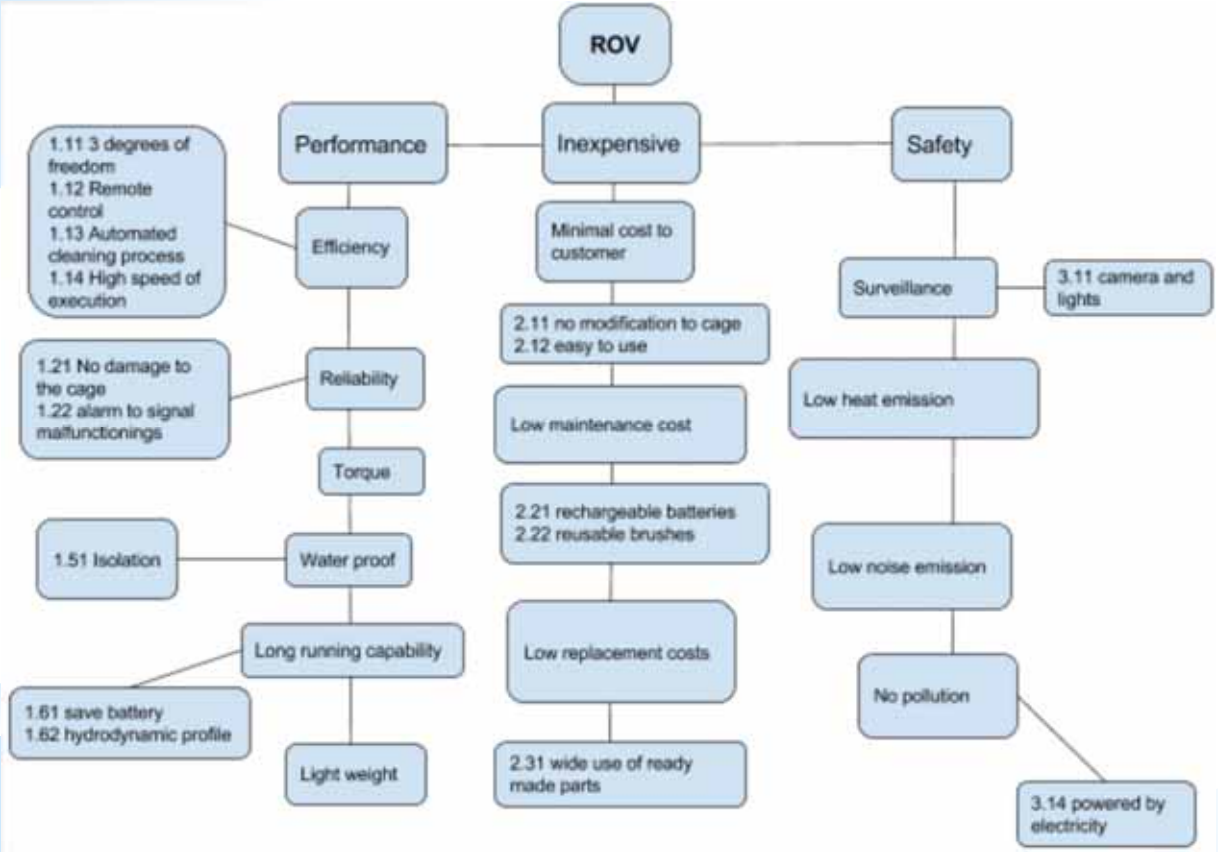
Index

Initial problem statement

Target: fish farming industry

ROV better than those currently on the market

Customers needs assessment



Objective tree diagram

Customers needs assessment

Pairwise comparison chart weighting Main Objective categories:

I. Performance
II. Inexpensive
III. Safety

	Performance	Inexpensive	Safety	Total	Weighing
Performance	1	2	2	5	47,62%
Inexpensive	0,5	1	0,5	2	19,05%
Safety	0,5	2	1	3,5	33,33%
				10,5	100,00%

Customers needs assessment

Weighted Hierarchical customer main needs list

I.	Surveillance; Non polluting	11,11%
II.	Minimal cost to customers	10,88%
III.	High efficiency; High reliability; Water proof	10,58%
IV.	Little heat produced; Low noise	5,56%
V.	Low maintenance cost	5,44%
VI.	High torque transmission; Long running capacity; Light weight	5,29%
VII.	Low cost part replacements	2,72%

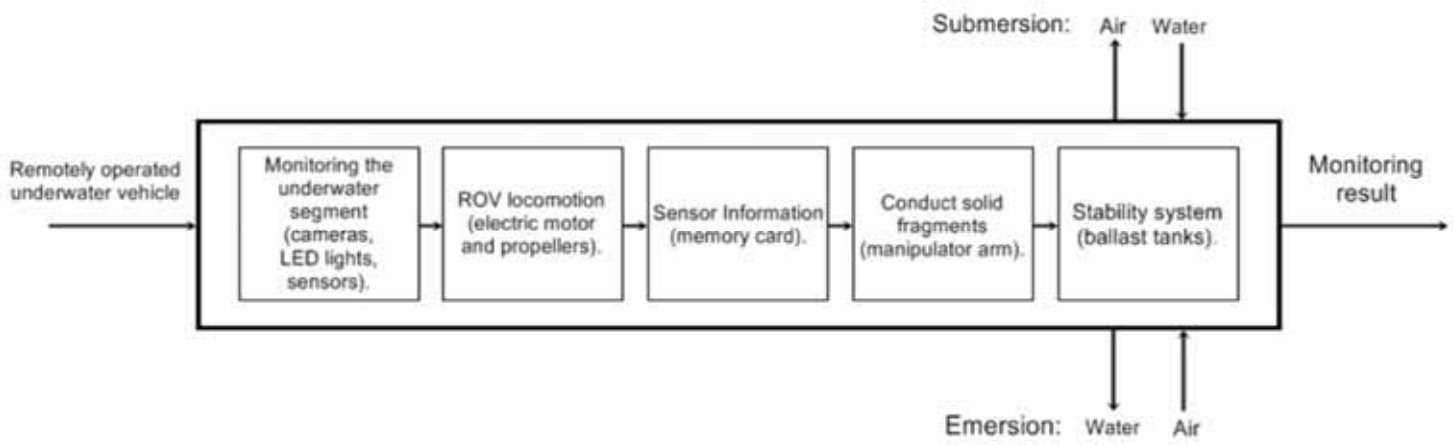
Functional structure

The five essential Subfunctions

I. Monitoring	Visual system, lighting, sensors
II. Locomotion	Propulsion, electric engine
III. Data storage	Memory card
IV. Conduct solid fragments	Manipulator arm
V. Stability system	Submergence by ballast tanks

Functional structure

Function Analysis of ROV



Revised problem statement

Target: Farm fishing industry market

Objectives:

Safety

Low cost

High efficiency, Waterproof

Remote control

Low maintenance cost

Easy to use

Concept generation and selection

Decision Matrix due to External Search

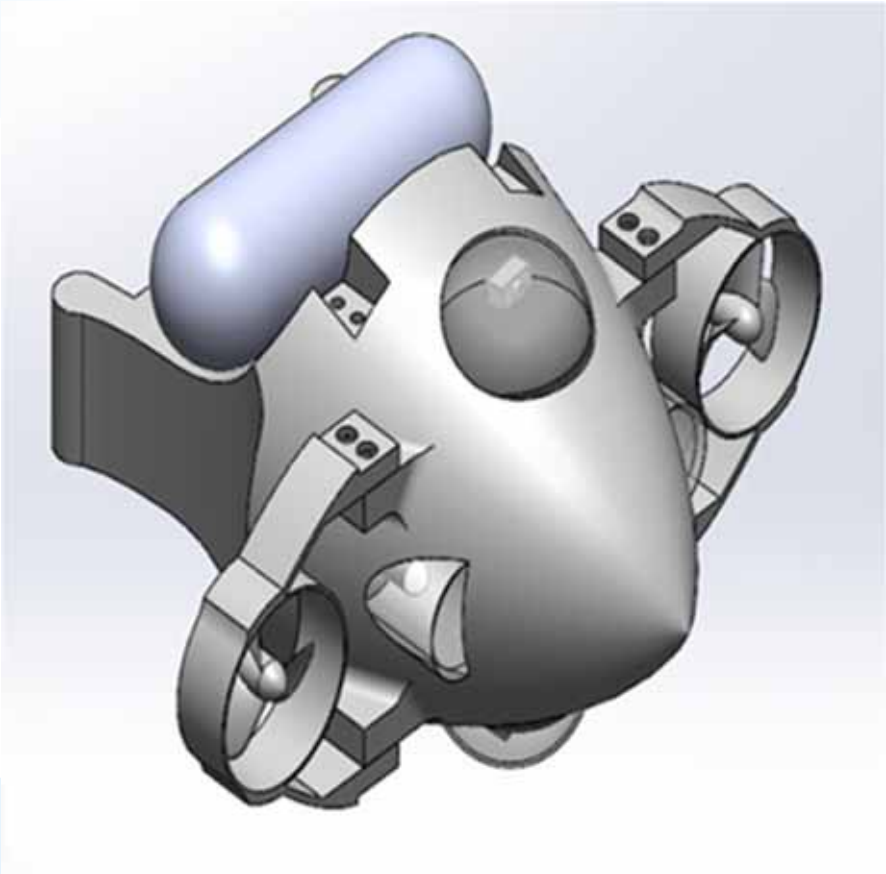
	Solutions			
ROV Components	Deep Trekker DTX2	Aquabotix Endura	Shark Marine Barracuda	IVER 3
Thrusters				
	6 Blade Thruster	3 Blade Thruster	3 Blade Thruster	3 Blade Thruster
Body				
Material:	Anodized Cast Aluminum	Aluminum Cast	High-tech plastics, Aluminum	Aluminum Cast
Cameras				
	270° rotation camera	Camera Pan 160° / 120° Tilt	Digital Still Camera	Go-Pro Based

Concept generation and selection

Weighted score Matrix for each Patent

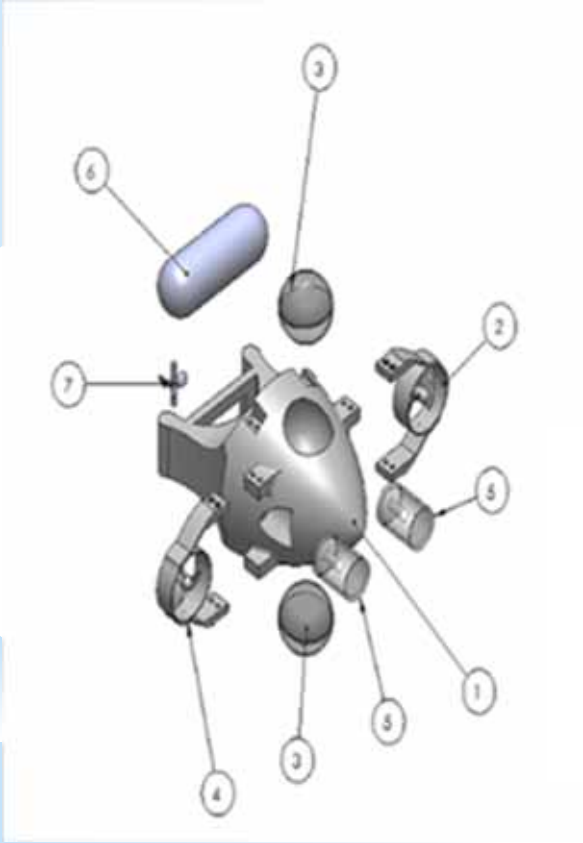
Selection Criteria	Weight	Concept							
		Deep Trekker DTX2		Aquabotix Endura		Shark Marine Barracuda		IVER 3	
		Rate	Weighted Score	Rate	Weighted Score	Rate	Weighted Score	Rate	Weighted Score
High efficiency	22	5	55	5	44	5	54	5	45
High reliability	22	3	65	4	40	4	57	4	62
Lightweight	11	4	40	3	30	4	24	4	57
Waterproof	22	4	50	5	50	5	63	5	55
High torque transmission	11	5	25	5	40	3	40	3	30
Water proof	22	4	75	4	65	5	34	4	60
Long running capacity	11	4	35	4	40	5	45	5	30
Total Scoring	121	345		309		317		339	
Rate		4		1		2		3	

Final design



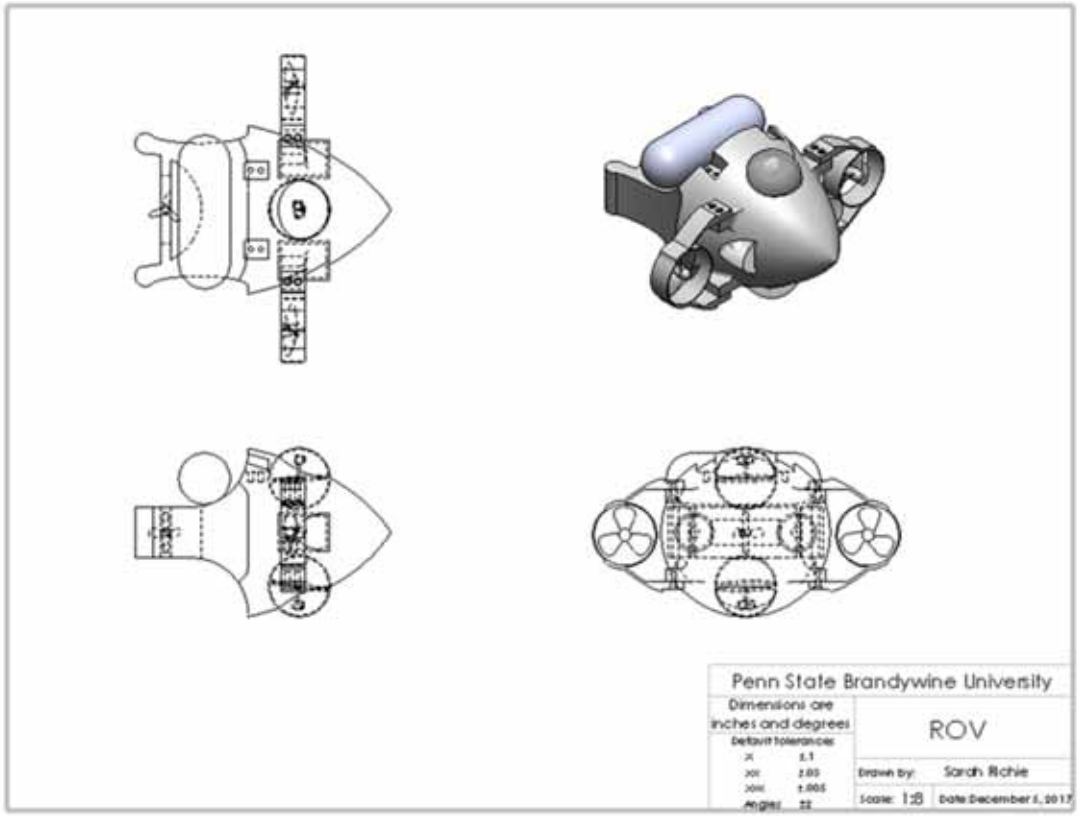
Solidworks Model of ROV

Final design description



ITEM NO.	DESCRIPTION	QTY
1	Body	1
2	Propeller L	1
3	Camera	2
4	Propeller R	1
5	Led Light	2
6	Ballast Tank	1
7	Back Propeller	1

Final design



Conclusions

The designed ROV satisfies:

Customer needs satisfaction

(Such as easiness of use, cheapness, battery endurance...)

Versatility of use in underwater environment

Appeal to a wide range of market

References

Muriru, P.K. and Daewoo, R., “Prediction of the Heat Transfer Characteristics of a Multi-Flame Injector'”, Combustion and Flame, vol. 100, no. 2, pp. 123-135, 2002.

“What is an ROV.” Remotely Operated Vehicle Committee of the Marine Technology Society, http://www.rov.org/rov_overview.cfm, Accessed October 26 2017.

US Department of Commerce, National Oceanic and Atmospheric Administration. “What Is an ROV?” NOAA Ocean Explorer Podcast RSS, 27 Feb. 2014, oceanexplorer.noaa.gov/facts/rov.html.

European feasibility research p. 14-16, 23 www.va.minambiente.it/File/Documento/91416