System Requirements Review

Robotics Project

Team D
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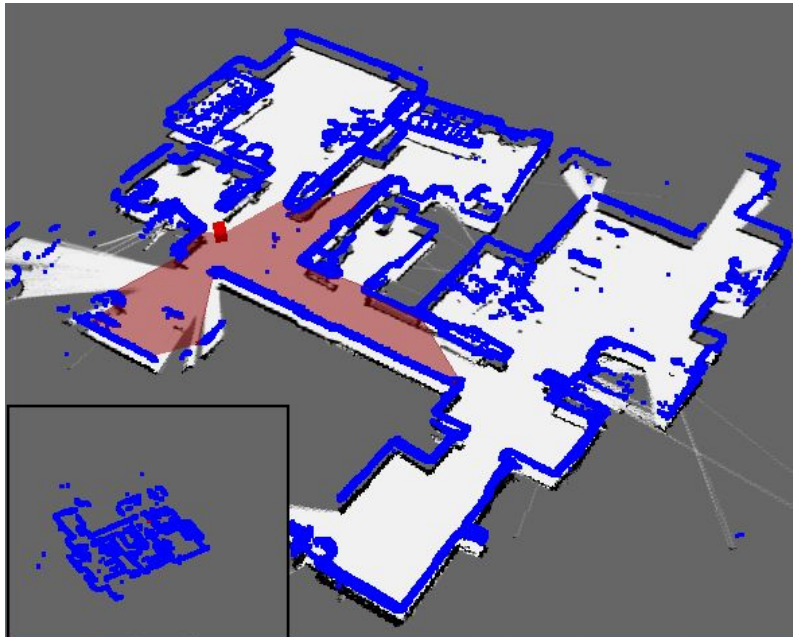
Problem definition

Simultaneous Localization And Mapping (SLAM)



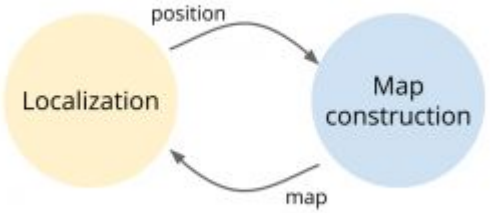


Image retrieved from: http://mapir.isa.uma.es/jotaraul/Resources/Robot@Home-dataset/geometric_maps/buildingMap-fullhouse.png

Proposed solution

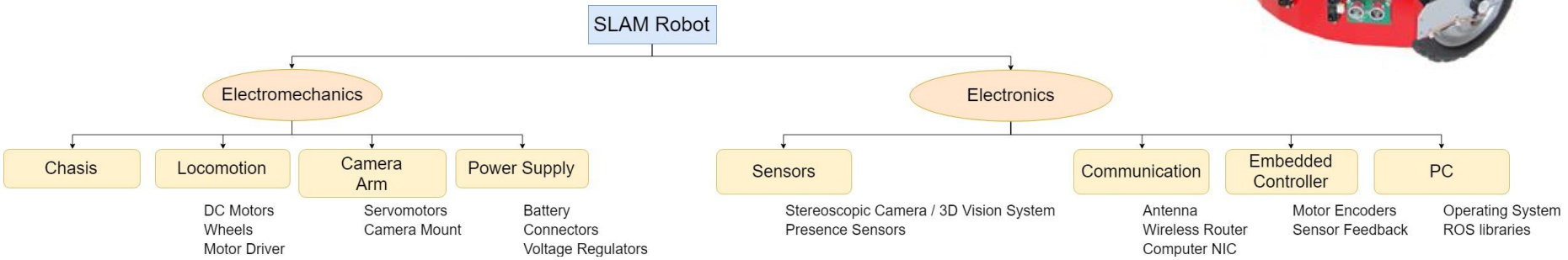


Image retrieved from: [2]

Requirements overview

Functional requirements

Electromechanics:

- The robot shall be able to move freely on a plain surface.
- The robot shall be contained in a chassis robust enough to carry all its components around.
- The robot shall be powered by a portable power supply.

Electronics:

- The robot shall operate autonomously and wirelessly.
- The robot shall have the ability of scanning its surroundings without directly interacting with the obstacles. It shall, in fact, avoid them.
- The robot shall compute its trajectories and take decisions based on the information gathered from its surroundings.
- The actions of the robot shall be coherent with and faithful to the instructions it computes.

Design, implementation and testing plan

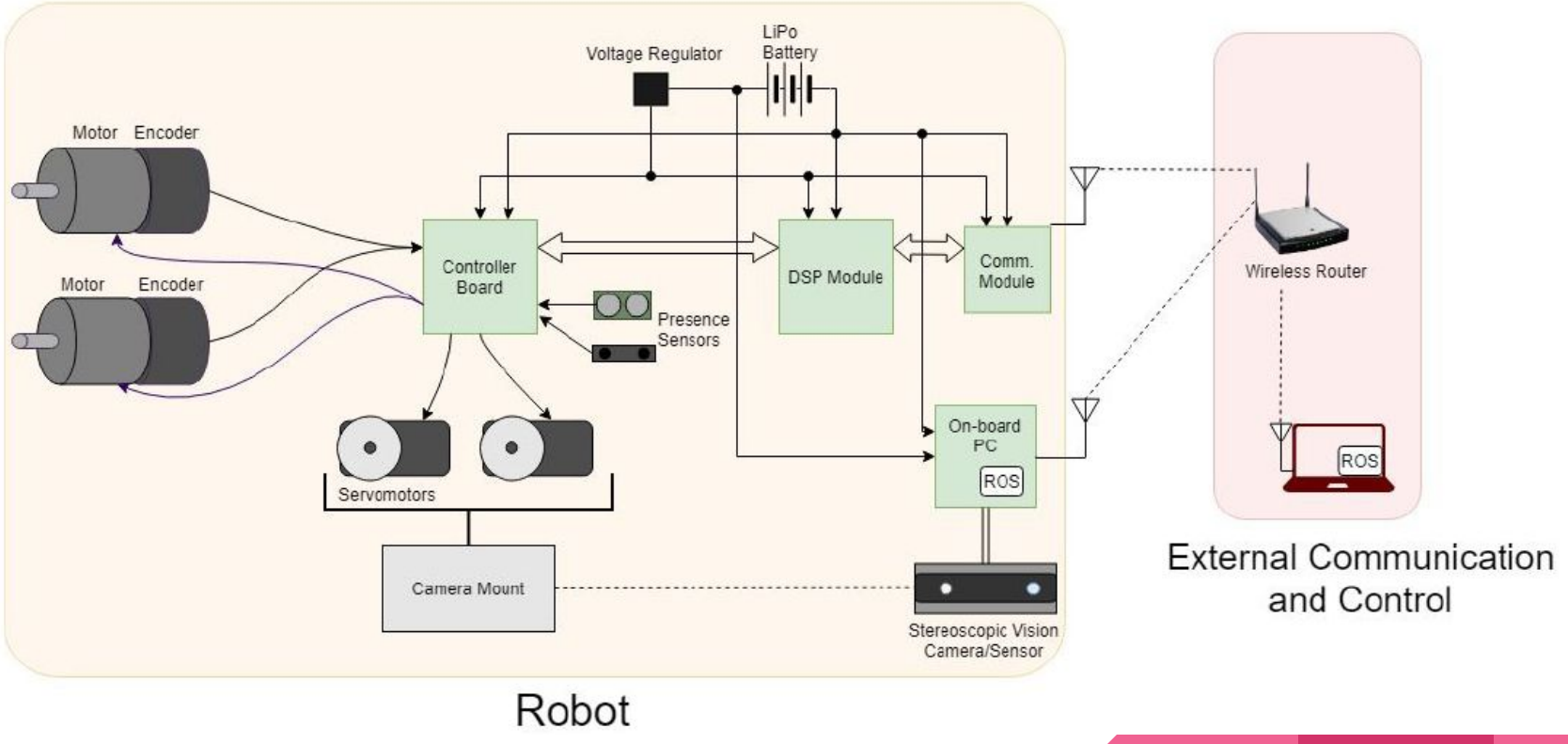
Milestone	Assigned To	Start Date	Number of Days	Week	Sep 9-13	Sep 16-20	Sep 23-27	Sep30-Oct4	Oct 7-11	Oct 14-18	Oct 21-25	Oct29-Nov1	Nov 4-8	Nov 11-15	Nov 18-22	Nov 25-29
					SSR				CDR			Semana		SIR		Demo
					(Sep 9)				(Oct 7)			i		(Nov 11)		(Nov 25)
Robot Connection and Startup	Everyone	10-Sep-2019	4													
Wireless Control Test	Emmanuel	17-Sep-2019	3													
On-board PC Supply Design	Uriel	17-Sep-2019	1													
On-board PC Supply Implementation	Uriel	18-Sep-2019	2													
On-board PC Configuration	Everyone	23-Sep-2019	5													
Use of PC as a ROS node	Marcos	30-Sep-2019	3													
ROS Remote Interfacing to the Robot	Emmanuel	30-Sep-2019	3													
Camera Mount Design	Marcos	16-Sep-2019	3													
Camera Mount Manufacturing	Marcos	19-Sep-2019	1													
Integration of Camera into Robot	Marcos	20-Sep-2019	1													
Remote Access to Camera through ROS	Uriel	3-Oct-2019	2													
Coordinate Frames Tracking and Transform Publication	Everyone	7-Oct-2019	10													
Map Building and Visualization with Manual Control	Everyone	21-Oct-2019	10													
Full Simultaneous Localization and Mapping (SLAM) Implementation	Everyone	11-Nov-2019	10													

Budget

Element	Cost	Importance
X80 Robot [2]	52762.86 MXN	High
Stereoscopic camera	3600.00 MXN	High
On-board computer	7000.00 MXN	High
3D impression for camera base	200.00 MXN	Medium
14.1V LiPo battery	700.00 MXN	High
Power converter	300.00 MXN	Medium

The total estimated cost of the project is 63,862 MXN.

Internal and external interfaces



Risk assessment

Probability	Negligible	Minor	Moderate	Significant	Severe
Very High	Low Risk (I)	Medium Risk (II)	High Risk (III)	High Risk (III)	High Risk (III)
High	Low Risk (I)	Medium Risk (II)	Medium Risk (II)	High Risk (III)	High Risk (III)
Medium	Low Risk (I)	Low Risk (I)	Medium Risk (II)	High Risk (III)	High Risk (III)
Low	Low Risk (I)	Low Risk (I)	Medium Risk (II)	Medium Risk (II)	High Risk (III)
Very Low	Low Risk (I)	Low Risk (I)	Low Risk (I)	Low Risk (I)	High Risk (III)
	Impact				

Image retrieved from: [3]

References

[1] Riisgaard, S. & Rufus, M. (2005). A Tutorial Approach to Simultaneous Localization and Mapping . September 3rd 2019, Massachusetts Institute of Technology. Retrieved from: https://dspace.mit.edu/bitstream/handle/1721.1/119149/16-412j-spring-2005/contents/projects/1aslam_blas_repo.pdf

[2] Dr Robot, Inc. (2019). X80: WiFi Mobile Robot Development Platform with extreme mobility and Video/Audio Capability . Retrieved from: http://www.drrobot.com/products_item.asp?itemNumber=x80

[3] PMI. (2008). A guide to the project management body of knowledge (PMBOK guide) . Newton Square, Pa: Project Management Institute, p. 292.