Senior Design Project

Group 9

Descriptive Title:

Extremely Durable Military/Law Enforcement Robot

Group Members:

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Sponsors or Contributors:

None

Narrative Description:

The motivation for this project came in our robotics class where we saw this robot and it looked interesting to rebuild for a more affordable price. The goals for this project are to create an extremely durable, user controlled, and low cost robot for military and law enforcement applications.

This robot will be controlled via wireless communication (motors), such as iPhone Application or Computer. The robot will also stream audio/video wirelessly to the user. We also plan on having a GPS module to locate the robot in case of communication failure.

The robot will have multiple power sources to control motors, board, cameras, and all other electronic components. These power sources will be rechargeable and will be easy to access. The locomotion will be controlled using high powered dc motors with gearboxes connected to shafts. We will have four all terrain wheels on the robot.

The software portion of this robot will be controlled primarily by user interface computer application and in addition the iPhone will connect to the application and become the primary controller for the robot.

The boards in the robot will contain a receiver, transmitter, MCU, Motor Controller (H-Bridge). We are still researching these boards.

The control station will consist of either a laptop or desktop computer that will be running Windows XP or Linux. It will be able to control our robot and be able to allow the iPhone to connect and take over control. The iPhone application will be able to move the robot and view the video feed.

The body of the robot will construct out of a high impact polymer that is highly resistant to the elements. It will be covered in different coat of resistant materials. We hope to make durable enough to sustain high elevation falls.

Specifications:

-Body

-Length – 1.5-2.5 feet
- Width – 0.5 – 1.5 feet
- Height – 0.5 feet
- Weight - <10lbs
-Body – Fiber glass, Carbon Fiber, Truck Bed Liner, Aluminum

-Power

-Radio Frequency- Undetermined
-Peak Video Frame Rate – 30fps

-Battery Voltage – 9 to 15 V

-Battery life – 30 Minutes(Drive Time) and 2-4 Hours(Stationary)

-Locomotion

- Peak Speed – 25mph

- Wheel Size (diameter) – 10inch

-Wireless

-Wireless Range – 100ft

-Camera – Composite Video

-Microphone – Directional

Requirements:

-Be able to move on both sides

-Sustain impact from 2 story drops

-Drive on multiple terrains (grass, concrete, dirt,)

- Feedback on range of loss of signal

-Send video signal back to control station

-Battery life of minimum 30 minutes

-Controlled via iPhone and Computer application

-Minimum loss of packets

-Will cost less than $600

-Minimum Speed will be 15mph

-Minimum Range of Wireless will be 100ft

-Find location of unit via GPS

Block Diagrams:

iPhone UI:
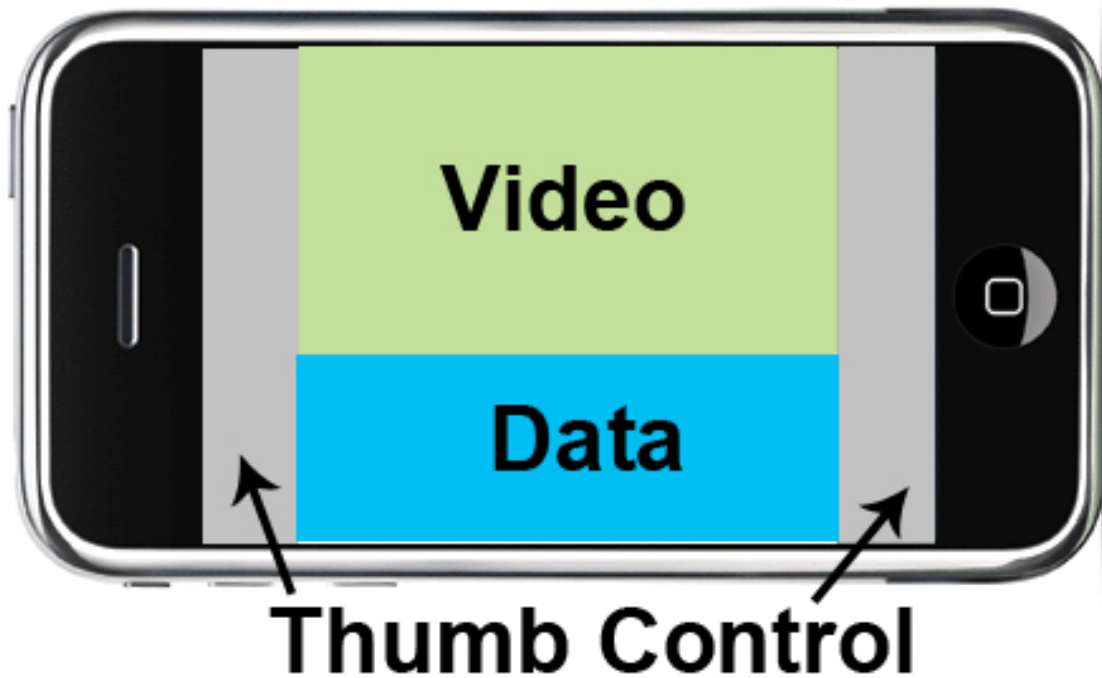
Software Block Diagram:
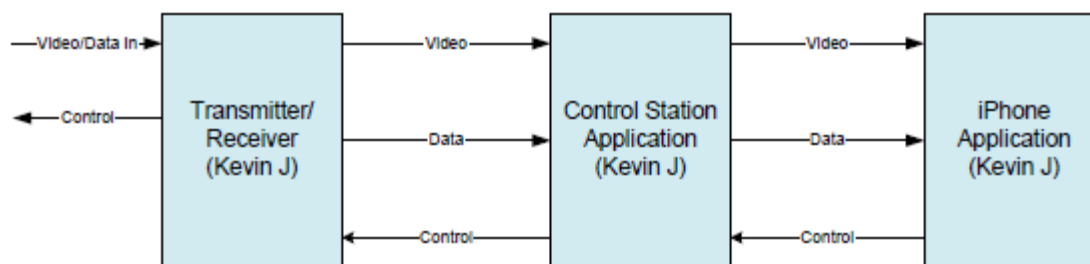
Hardware Block Diagram:

Prototype Design:

Frontal View

Rear View

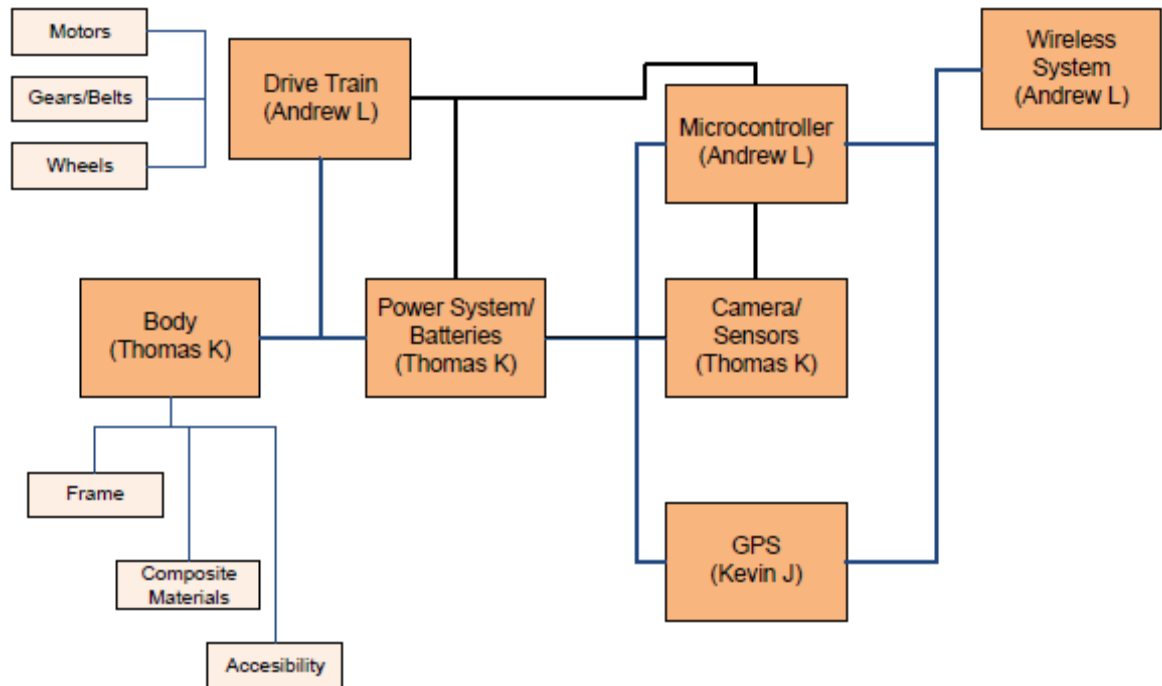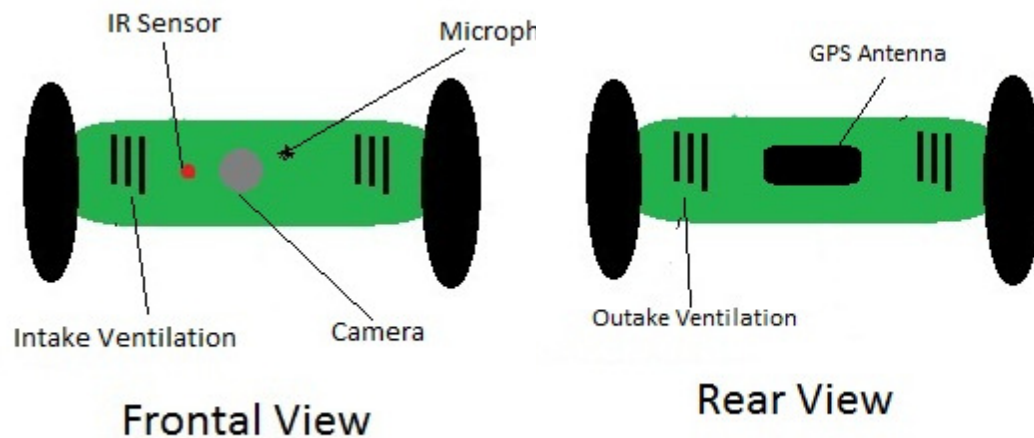| ID	Task Name	Start	Finish	Duration
1	Research and Development	9/1/2009	11/16/2009	55d
2	Boards	9/1/2009	10/26/2009	40d
3	Microcontroller	9/1/2009	9/21/2009	15d
4	Wireless Module	9/22/2009	10/5/2009	10d
5	Motor Controller	10/6/2009	10/26/2009	15d
6	DriveTrain	9/22/2009	10/26/2009	25d
7	Motors	9/22/2009	10/5/2009	10d
8	Shafts	10/6/2009	10/14/2009	7d
9	Gears/Gear Boxes	10/15/2009	10/21/2009	5d
10	Wheels	10/22/2009	10/26/2009	3d
11	Power	10/15/2009	11/3/2009	14d
12	Battery	10/15/2009	10/23/2009	7d
13	Fan/Heat Sinks	10/26/2009	10/30/2009	5d
14	Power Management	11/2/2009	11/3/2009	2d
15	Misc	10/15/2009	10/19/2009	3d
16	Camera/Microphone	10/15/2009	10/19/2009	3d
17	GPS	10/15/2009	10/19/2009	3d
18	Body	9/30/2009	11/16/2009	34d
19	Frame	9/30/2009	10/20/2009	15d
20	Inside Body Materials	10/27/2009	11/9/2009	10d
21	Outer Cover	11/10/2009	11/16/2009	5d
22	Part Selection and Purchase	11/17/2009	11/23/2009	5d
23	Hardware Assembly/Testing	11/24/2009	1/4/2010	30d
24	Programming (Hardware and UI)	1/5/2010	2/1/2010	20d
25	Testing and Troubleshooting	2/2/2010	3/1/2010	20d
26	Hardware/Software Cleanup	3/2/2010	3/22/2010	15d
27	Final Testing	3/23/2010	4/19/2010	20d
28	Preparation for Presentation	4/20/2010	4/28/2010	7d
29	Documentation	9/1/2009	12/1/2009	66d

Budget:

Item	Amount	Cost	Total
Battery	2	$20.00	$40.00
Wheels	4	$10.00	$40.00
Cameras	3	$15.00	$45.00
Motors	2	$5.00	$10.00
Construction Materials	1	$50.00	$50.00
GPS	1	$70.00	$70.00
Board	2	$50.00	$100.00
Drive-train	1	$20.00	$20.00
iPhone SDK	1	$100.00	$100.00
Receiver/Transmitter	1	$75.00	$75.00
Miscellaneous	1	$50.00	$50.00
		TOTAL:	$600.00

Financing:

All financing will be coming out of pocket from teammates equally. We are currently speaking to our employers to see if they will sponsor our project.

Additional Notes:

This robot (Dragon Runner) has already been created and we are trying to reengineer using what we have learned in classes. Major focus is being able to reproduce robot for less than 1% of their cost. The link to their website is: http://www.automatika.com/products-dragonrunner-overview.htm