Hardware Requirements Specification

BE Projects 2011-12

<Autonomous Security Guard Robot>

<Group 15>

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Hardware Specification

Parts	Type	Quantity
Firebird Robot	Delivered	1
Microphone	-	2
Buzzer	Delivered	1
Smoke Detecting Sensor	TGS308	2
	-	-
8051 development board/kit	-	1
Camera (2MP)	Interfaceable with firebird specs	1
GSM Module	-	1

Our Project Approach & how we will proceed

Phase 1– Chassis

 Task: To begin the process of building the prototype.
 Approach: We first considered many option of possible materials which will improve the interfacing needs of the robot. Finally we concluded that no need for chassis remodelling was required.
 Expected Deliverable: SparkV Robot is working and is in fine condition.

Phase 2 – Batteries

 Task: To determine the type of battery/batteries and their operating voltage, power, capacity and all other specification required for our prototype in order to make it operational.
 Approach: We researched and determined how much power and stored capacity were required for our project and determined the best possible solution which was taken into account our budget as well.
 Expected Results: After we chose the proper battery/batteries, which were a 7.2 NiCad and 9v alkaline batteries, we made sure it works properly and efficiently. We made sure that the robot is able to move at a speed of at least 5 mph and leave enough space for the other components to be mounted on the robot.
 Expected Deliverable: Already existing in the SparkV which has an efficient powering systemt.

Phase 3 –Microcontroller

 Task: We needed to determine what type of controller to use, whether it, is a microcontroller, PLC's, or any other kind.
 Approach: We researched and determined which one was better to be used to implement the functions that we wanted, and which one was easier to work with, as well as its price.
 Expected Results: We found the right controller and it is the P89V51RD2 already present in the SparkV robot.
 Expected Deliverable: prototype with microcontroller mounted with functionalities we wanted in our design

Phase 4 –Peripherals

 Task: To determine and buy the needed peripherals needed.
 Approach: We did researches on cameras, sensors, microcontrollers, speakers, microphones and computer interface.
 Expected Results: We found the right peripherals and make them work properly.
 Expected Deliverable: a prototype with peripherals mounted and working.

Phase 5 –Steering

 Task: To design and implement a system to steer the robot.
 Approach: Researched different methods of steering the robot including, but not limited to, servos and multiple motors.
 Expected Results: We designed our steering system that can aid in the robots navigation inside a building.
 Expected Deliverable: a prototype that can turn in any direction when needed to avoid obstacles or to arrive at its desired destination

Phase 6–Propulsion

 Task: To give the robot a means of movement capable of velocities greater than 5 miles per hour while still being stable enough to avoid obstacles easily.
 Approach: We researched several motors to find which ones were able to power our robot, and which ones can interface easily with a motor controller.
 Expected Results: We designed a robot that can move around its surrounding easily, avoiding obstacles when needed.
 Expected Deliverable: A propulsion system fully capable of handling the loads required of it.

Phase 7- Integration

 Task: Here's where it all comes together, we needed to integrate all of the above described phases.
 Approach: By making sure we followed step by step integration of the parts, and making sure that everything worked fine we made sure that nothing was left out. We needed to consider that all the peripherals, logic, and hardware were in sync and everything worked well together, by testing and testing again and again.
 Expected Results: We finished designing the robot and it is working properly. We didn't want any surprises and we made sure of that.
 Expected Deliverable: a complete hardware containing all the peripherals and logic implemented.

Phase 8 –Testing

 Task: To test and verify the working of all hardware and software.
 Approach: By testing each component individually, modify the code if necessary, and demonstrate a fake break through to check if the robot was working or not.
 Expected Results: a working security guard robot that functions as a security guard during night time or day time.
 Expected Deliverable: a complete piece of hardware representing our project as well as documentations.