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Proposal for the development of PiRover

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https://github.com/chris0707/PiRover

Executive Summary

As students in the Computer Engineering Technology program, we will be integrating the knowledge and skills we have learned from our program. This proposal requests the approval to build the hardware portion, which is the PiRover, that will connect to a mobile device application using Bluetooth connection. The mobile device functionality will allow the user to register and login their information, gain access wirelessly to control the hardware(PiRover), voice commands to control the PiRover's features (lights and code execution).

Background

We believe that the most difficult part of this project is building the script that will handle the voice command functionality that will control the PiRover's pre-implemented features such as; lights and other code executions.

This prototype project that our team has constructed has been inspired by other rovers such as NASA's own rover. By utilizing all of the abilities acquired in our previous Hardware course we have gained further knowledge and become accustomed to the further advancements we are applying into the prototype. The PiRover was designed to be controlled via Bluetooth with an android application from any android device. With this feature working, we plan to implement other features such as; lights, voice activations and maybe further perfect the controller from the android application.

Methodology

This proposal is assigned in the first week of class and is due at the beginning of class in the second week of the winter semester. My coursework will focus on the first two of the 3 phases of this project:

Phase 1 Hardware build.
Phase 2 System integration.
Phase 3 Demonstration to future employers.

Phase 1 Hardware build

The hardware build has been completed in the fall term and will finish it with an enclosed case for protection and stability this winter term. It will fit within the CENG Project maximum dimensions of 12 13/16" x 6" x 2 7/8" (32.5cm x 15.25cm x 7.25cm) which represents the space below the tray in the parts kit. The highest AC voltage that will be used is 16Vrms from a wall adaptor from which +/- 15V or as high as 45 VDC can be obtained. Maximum power consumption will be 20 Watts.

Phase 2 System integration

The system integration will be completed in the winter term.

Phase 3 Demonstration to future employers

This project will showcase the knowledge and skills that I have learned to potential employers.

The brief description below provides rough effort and non-labour estimates respectively for each phase. A Gantt chart will be added by week 3 to provide more project schedule details and a more complete budget will be added by week 4. It is important to start tasks as soon as possible to be able to meet deadlines.

Labour Estimate	**Hrs**	**Notes**
Phase 1		
Writing Proposal	9	Tech Identification Quiz
Creating Project Schedule	9	Proposal Due
Creating Budget (Mock group setup for CENG355/Phase 2)	9	Project Schedule Due
Acquiring Components / Begin to film unboxing	9	Project Budget Due
PCB Fabrication	9	Component received for the project
Mechanincal Assembly / Status Meeting	9	Showing acquisition for the project
Finish off the PCB	9	Mechanical Assembly Due
Writing 30 second Video Script and creating Placard Design	9	PCB Due

Creating 30 second Video with the script created and Demonstration the hardware	9	Video Script and Placard Due
Writing Progress Report	9	30 second Video Due
Creating the Hardware Presentation	9	Progress Report Due
1st round of presentation and Writing build report	9	Presentation Due
2nd round of presentation	9	Build Report Due
Phase 1 Total	**117**	
Phase 2		
Recreate the Proposal	9	Form the group for the project
Meeting with collaborators (SRS)	9	Proposal Due
Status Meeting	9	SRS Due
Meeting with collaborators(Abstract, Introduction and Declaration of Authorship)	9	Family Day Holiday – No Class
Meeting with collaborators (Email Progres Report by Student A)	9	Abstract, Introduction and Declaratiob of Authorship Due
Meeting with collaborators (Merged Build Instruction ported to Technical Report and App, Web and Database Independent Demonstration)	9	Group Status Progress Report Due
Meeting with collaborators(Email Progress Report by Student B)	9	Merged Build Instruction ported to Technical Report and App, Web and Database Independent Demonstration Due

Meeting with collaborators(OACETT basic requirement report checklist)	9	Integration Progress Report Due
Meeting with collaborators(Email Progress Report by Student C)	9	OACETT basic requirement report checklist Due
Prepare for Demonstration	9	Troubleshooting Progress Report Due
Prepare for Presentation	9	Demonstration Due
Writing Technical Report	9	Presentation Due
Extra Day	N/A	Technical Report Due
Phase 2 Total	**108**	
Phase 3		
Interviews	TBD	
Phase 3 Total	**TBD**	
Material Estimate	**Cost with tax**	**Quantity**
Raspberry PI Starter Kit	$112.99	1
Electronic Learning Kit for RaspPi	$19.05	1
100000mAh Portable Power Bank	$23.72	1
Micro Servo Motor FS90R	$21.00	2
Ultrasonic Sensor HC-SR04	$5.00	1
Laserut Chasis from Humber	N/A	1
3D Printed Wheels from Humber	N/A	1
Total	$181.67	

Concluding remarks

This proposal presents a plan for providing an IoT solution for search and rescue situations or even for historical research. This is an opportunity to integrate the knowledge and skills developed in our program to create a collaborative IoT capstone project demonstrating our ability to learn how to support projects such as the initiative described by T. Kubota, Y. Kuroda, Y. Kunii and T. Yoshimitsu, "Path planning for newly developed microrover," *Proceedings 2001 ICRA. IEEE International Conference on Robotics and Automation (Cat. No.01CH37164)*, 2001, pp. 3710-3715 vol.4.
doi: 10.1109/ROBOT.2001.933195
keywords: {computerised navigation;data structures;microrobots;mobile robots;path planning;planetary rovers;probability;data structure;elevation map;mobile robots;navigation;path planning;planetary exploration;planetary microrover;probability;Data structures;Instruments;Mars;Mobile robots;Moon;NASA;Navigation;Path planning;Rain;Space exploration},
URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=933195&isnumber=20185

We request approval of this project.

References

[1] Python Programming Tutorials. (n.d.). Retrieved from https://pythonprogramming.net/robot-remote-control-car-with-the-raspberry-pi/

[2] Institute of Electrical and Electronics Engineers. (2015, August 28). IEEE Xplore Digital Library [Online]. Available: https://ieeexplore.ieee.org/search/advsearch.jsp

[3] T. Kubota, Y. Kuroda, Y. Kunii and T. Yoshimitsu, "Path planning for newly developed microrover," Proceedings 2001 ICRA. IEEE International Conference on Robotics and Automation (Cat. No.01CH37164), 2001, pp. 3710-3715 vol.4.

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