Student Defined Project Proposal

Congratulations! You are considering one of the most difficult yet rewarding approaches available to BlueStamp Engineering Students. The Student Defined Project (SDP) opens up infinite possibilities, but places significantly more work on the student and represents a higher level of risk that things won't be finished as planned. Please be prepared for this extra challenge before deciding to continue.

All projects must be approved by BSE for safety, feasibility, and cost. Doing a remarkable job on this proposal will help you get approval and increase your chances of getting the project done on time. There is an example of a nicely done proposal on the last page.

1. What is your name and BSE city?

Sahas M, Palo Alto

2. Please describe your project in detail:

I wish to make a car that can move from point A to point B using and a precoded map of 'roads' on a 6 ft. by 6 ft. area. I will use arduino to control the robot completely autonomously, using a dead-reckoning position system and algorithmic navigation which will be controlled by the onboard arduino mega. I wish for it to be able to carry a 3 pound payload, deposit it at the site, and return from any preset location in the 6 ft by 6 ft area.

3.Does the project meet the following safety specifications:

A. Will there be any accessible voltages above 48V? - no
B. Are there any high powered or high speed motors used? If so, are they enclosed? - they will be in the car, but they are enclosed by the car's body
C. Are there any chemicals or bodily fluids required to build or test the project? - I may need to construct some plates to hold the electronics safely which will require a band saw + drill/drill press. In addition, I need to custom 3d print the encoder wheel.
D. Are there any other safety issues we should be aware of with this project? - no
E. Which part of the assembly (or parts involved) would you consider to be the greatest safety risk? If the navigation is inaccurate, the car may go off path and hit something.

4. Please list any web link(s) to show others who have completed this project or something similar and published tutorials and/or project documentation for you to base your project on:

http://www.instructables.com/id/Arduino-Powered-Autonomous-Vehicle/
http://people.scs.carleton.ca/~maheshwa/Honor-Project/Fall05-ShortestPaths.pdf
http://www.frc.ri.cmu.edu/~axs/doc/auvsi07.pdf

5. The best projects are planned to be completed in about 4 weeks assuming everything goes to plan (things rarely go to plan). Please create a 'build plan' of 6-12 major milestones and when you expect them to be completed.

Day 1: Receive parts.
Day 3: Find and document the pins that control movement.
Day 5: Solder raspberry pi i/o pins to designated pins on the receiver board.

MILESTONE: Day 7: Write code to control forward/backward and left/right movements.
Day 12: Fit/Test sensors(9dof, encoder, ultrasound, camera)
MILESTONE: Day 18: Implement the Dead Reckoning Navigation and tune.
MILESTONE: Day 24: Create the mapping algorithm and graph the output.
Day 28(if possible): Create a point a to point b algorithm using map.

6. Please create a bill of materials (BOM) (AKA a list of components required, a link to where they are in stock, and their price):
https://docs.google.com/spreadsheets/d/159t1jZHbtNBmNQPYIZjXfTHUamVoBZiwS1KywoD7QEY/edit?usp=sharing
There are some materials not listed that I already have.

7. Please describe the biggest risks to you not finishing this project on time:
My biggest risk is the mega not being able to handle all the calculations. Worst comes to worst, I can borrow a jetson tx1 with ROS installed and use it as an on board computer
In addition, I have never implemented a dead-reckoning system, so I will have to do a lot of research.

8. What time do you have available outside of normal program hours that you are willing to spend working on your project in case things progress slower than expected?
Outside of the program hours, I can spend up to 3 hours extra on the project per day, and twice that on weekends.

Technology Platforms and Sources for Ideas

You are encouraged to come up with your own idea for a SDP, but it can help to have some sites to browse in order to brainstorm. Below is a list of excellent resources to get inspiration flowing:

Websites Where People Post Their Projects:
Like BlueStamp Engineering students, people love posting their projects on the web for others to see. This is a wonderful way to see what is possible, and get ideas for how to approach the problem. Note that the best projects to select are ones that have videos proving that the project works, and has at least some documentation on how it was built.

Hackster.io is a place where people can publish their projects for all to see
Instructables is a place where people can publish their projects for all to see
Hack a Day is a site for makers to publish their inventions and share documentation.
Adafruit is a great place to go for project ideas. They have EL wire kits, arduino kits, wireless kits, and many more!

Sparkfun is another site to go for project ideas, parts, and kits. They also have a very active forum that can help you find motivation, ideas, and guidance.

Parts That Can Be A Basis for an Entire Project:
Platforms, AKA development boards, are devices that are designed for fast prototyping to give the engineer (you) a remarkable starting point for a design. For instance, the Particle Photon is an Arduino that has WiFi built in, allowing you to quickly create a custom Internet of Things (IoT) device of your own!

For a list of suggested platforms, see our BSE Platform Ideas List.