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Independent Projects  
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*Compelling, Connected, Real, Rigorous, Research Based, Documented*

## **Project Proposal**

### **Compelling and Real**

For my freshman project, I would like to build a robot that could collect data using sensors and move around on its own or be remote controlled. I want to make this robot using Arduino, a very popular, inexpensive microcontroller and the free, open source Arduino software that you can download from the website. My main target audiences for this project are kids and schools. Hopefully, my project could get more kids interested in robotics and, in turn, encourage more schools to start robotics programs. This project interests me because it combines my interests of science, programming, engineering, robots, and math (which is actually very important). I have wanted to build a robot by myself for a while and initially planned to just use it as a side project. I initially planned on building a computer program for my freshman project but my mom encouraged me to do something more exciting that I would enjoy more.

### **Connected**

I will present my project to my class and publish it online to hopefully encourage more kids to be interested in robotics. I am hoping this maybe could eventually lead to more robotics programs in schools. When you publish something online, almost anybody can see it and learn from it. I'm hoping that I could at least contribute one more robot design for some kid in the world to try and learn from. Then, in turn, they may teach somebody else.

### **Rigorous**

I will learn more about building, designing, and programming robots. I will also expand my knowledge of basic electronics to build more complicated circuits controlled by arduino. I will learn more about programming using the arduino software and I will learn how to do many things that I haven't done before. One of the challenges I will face is definitely time and efficiency. With such a big project, I will have to manage my time very well. I will be using a lot of time and effort to build and design the robot. Another obstacle I face is that I will have to use a lot of tools that I am unfamiliar with to build the actual robot. My dad said that he would supervise so that I won't lose a finger however I will still have to practice with power tools so that I don't mess anything up. I will also have to do extensive research about how to build the robot and which sensors I should use.

### **List five questions that must be answered to finish your project.**

1. What types of data do I wish to collect (temperature, humidity, etc.)?
2. What are the best sensors to use on the robot to collect different types of data (since multiple sensors can do similar things)?
3. What practical uses can such a robot have in schools, medicine, or science?
4. How are robots used right now in the world of science and data collection?
5. How can scientists and engineers collaborate on technology that could be used to discover new things or solve new problems? What about doctors as well?

### **Which of the 21st Century Skills will you develop with this project, and how?**

I will develop my Thinking and Problem Solving skills and my Information Skills during this project. A large part of building a robot is to use the scientific method and engineering design process to guide me through every part of the project. I also know that, when building something, anything could go wrong or stray from the original plan. A large part of this is being able to solve possible problems that could pop up. That is why Thinking and Problem Solving Skills are very important. Information skills are also vital because I will have to do a lot of research throughout this project. I need to be able to judge good sources of information and to focus on only the important information. Furthermore, this project is partly about collecting data, therefore, information skills are crucial.

### **Research-based**

Can a 13 year old build a working robot that collects data and what kind of data could it collect? Also, could this encourage more people to get interested in robotics.

### **Documented**

*List at least five possible ways you can plan to document and show off your hard work to the world. This should include ongoing steps, as well as your final product or event.*

1. Use pictures and videos to document the process (maybe in a video).
2. Bring the robot to class for my presentation.
3. Make a website with information about the robot and how it was built. Also add clear instructions and materials to build the robot so that other students will be able to build their own.
4. Include the 3D models, electrical schematics, and original sketches of the robot from the design phase.
5. Make a powerpoint presentation about the robot and the process of building it.

### **How will you know if your project is a success?**

I will have completed a robot that can collect data and move around. I will also have all my assignments turned in and a successful presentation that details the process of how I built the robot. Also, maybe it could encourage more kids to get interested in robotics.