

High School Robotics Course: The #2 Student View  
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### **High School Robotics Course: The #2 Student View**

I have always loved robotics and when I heard that a course was available about robots I jumped for the chance. All through the course I learned new things here and there and helped others become better engineers. My experience with robots lets me help other students with building and programming their own robots when they are stuck or having difficulty. I have learned what many of the students like about the class and what they do not like about the class. Every student in the class had their own way of learning how to do something for the robot.

For most of my life I've loved robots. As far back as I can remember I have always played with legos, which I would make models and robots from. After I got my start in robotics from legos, I tried to join the computer team for my freshman year, but I didn't join in time. My sophomore year I joined the team, and tried to help anyway I could, with design of the robot and I also tried to learn how to program. By the end of botball (which we placed second in the regional's), I had learned the basic of programming. I started the introduction to robotics class as soon as it became available. For the class Aaron Parker and I helped out with teaching the students how to program and how to make good structural designs. I was interested in the class because I love robotics and I thought it would be a good chance to learn some programming before botball rolls around.

Before I really got into programming and building robots I raced remote control cars around my house. When ever something went wrong with one of the cars I would watch my dad fix it, and I was amazed at how simple it looked, but how complicated it really was. Many of my design ideas for the robots I build came from RC car structures. One Christmas my dad got me and my brother some RC cars that were smaller but were built so that you were able to change it and modify it to work better. I replaced many parts in the car with my own ideas like a fan in the roof of the car so that I would draw away the heat and make the motor run better and make the batteries last a little bit longer.

I was motivated to take Introduction to robotics because I love to build robots and I thought that it would be an easy course and that I could help out in the class. When I got in the class I learned that many of the students had never had any experience with robots before and I knew that Mr.Hagin would need some help. My primary excuse for taking the course was that I thought it would be an easy credit since I had already had quite a bit of experience with robots before.

Introduction to robotics is a great way for students to view the engineering process. In the course students were asked again and again about the engineering process and how it applies to the situation there in. Even though some of the students did not understand the engineering process they still were able to put a robot together and talk themselves through a program for it.

During hands on projects Aaron and I would walk around the room checking on the progress of students and making suggestions every now and then on how they might improve something. When a student had a problem Aaron or I would walk over and see what was wrong and try to help the student find the problem for themselves instead of just fixing it for them. Many of the problems that Aaron and I found were very simple mistakes that are easily over

looked such as plugging the motors in backwards or forgetting a semi-colon at the end of a line of code.

Through out the class I found what students liked and didn't like about robotics and how many of them liked to learn. At the beginning of the class most of the student had a very narrow view of what a robot was and how to even begin building one, but towards the end of the year many of the students required very little help with making their robot and programming it. We started off the year with very simple tasks of building the basic bot and then telling them how to make it bounce off walls with touch sensors. I built a simple bot like the classes and added two simple touch sensors each with their own design so the students could get different ideas on how to build their robot. Many of the student preferred hands on building for the robots and programming over being told this is how to do something and having them try to replicate what we wanted them to do. During lectures many of the students would dose off or start to lose focus.

Tests and quizzes for the students were a little bit of a challenge to develop because they needed to be challenging but not so challenging that they wouldn't be able to figure it out. All the tests were half what the robot could do and half a written report or presentation of how they developed the robot and what inspired them to build it the way they did. The first test that the students had was to build a bot and then program it bounce back and forth. This test was pretty simple and many of the students just needed help beginning the program. Each test became more and more difficult, while reusing sensors from previous tests. The final test was to use the camera for the botball game.

While in the class I found that many students used almost all the information they were given to accomplish their tasks for the day. Almost immediately after getting the instructions for a test the students would already be thinking of ways they could accomplish the task and building their robot.

During the course I was surprised by what many of the students were able to accomplish in the semester. Many of the students had never had any programming experience before taking this course but, most of the students caught onto Interactive C (IC) very quickly and were able to program their robot and accomplish the task. I was pretty surprised at how quickly the students caught onto IC. I didn't even catch onto IC as fast as many of the students in the class. In the groups of two that the students were put into, one of the students would work on programming the robot mainly and the other would work on building and fixing the robot.

Aaron had developed a simple-to-use camera library that we gave the students to use. We described how to use it and what it did, before letting them loose with it. Many of the students had a little difficulty with it, but on the first day of the camera project we had a student complete the task of making the robot follow a ball as it moved then move to it and touch it.

For the final exam the students had to complete the same task that our team had for the 2008 botball competition. The goal was set low so that students wouldn't be too pressured to do great on it. Many of the students ran their robot mainly off of timing and hoped it worked right, but they also had to use the color camera on their robot somewhere. One of the groups of students that had already taken basic programming classes and was ahead of most of the students we gave an iRobot Create to try to program and use instead of the legos like the rest of the class.

Although I was not actually taking part in the same tests as the rest of the class, I tried to accomplish the task as efficiently as possible to show the class that the task is possible and if they can beat me at it they are pretty good. The most useful thing I learned while partaking in the tests with other students was how to use the color camera. At the beginning of the course I wanted Aaron to show me how to use the camera better than what I could already do. After a

couple weeks of playing with the camera I was able to make my robot go forwards and touch objects, then I was able to make it pick up items, and finally I was able to make it distinguish items apart by their pixel size. I believe by far that the camera is the most useful sensor that you can put on a robot, because of all the information you are able to collect with it.

Throughout the course the students in it had surprised me with their ability to pick up building and programming a robot so easily. Maybe some of the students that took introduction to robotics will take their experience and join the computer team to further their knowledge of robots and to show others how much they are able to do. With introduction to robotics as a high school course many students are able to view the engineering process first hand, instead of waiting for college where they maybe taken by surprise at its complexity.