



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

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| <b>Name(s)</b><br><b>Michael L. Monaghan</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Project Number</b><br><b>J1314</b> |
| <b>Project Title</b><br><b>Robots: Are They Better than Us?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                       |
| <b>Abstract</b><br><b>Objectives/Goals</b><br>To discover if a human is better than a program for controlling a robot. My hypothesis is that a program would be better than a human for controlling Roomba, a robotic vacuum cleaner I reprogrammed. The Roomba is not intended to be reprogrammed, but can be.<br><b>Methods/Materials</b><br>A cable for a similar but entirely different robot, the iRobot Create, was obtained to modify the negative polarity and 15 volt electrical outputs from the Roomba to suit a communications port on a computer. A maze like path was constructed to compare two humans controlling Roomba through a joystick control program that I wrote and a different program I wrote directly making decisions for Roomba. I recorded the results of the two programs controlling Roomba 10 times in the maze ending at the finish line. Programming was done through Microsoft robotic studio's visual programming language. I had no experience in the Microsoft's visual programming language and robotics, with a few clues, I figured out how to reprogram Roomba on my own. The "wall hugging" algorithm is less complex than the joystick control program because there was less algebra involved. My joystick is used so a human could give input to the joystick to Roomba conversion program. A joystick program for converting a joystick axis to be recognizable by Roomba has many calculations for transforming values from a joystick to values recognizable by Roomba. For example, the straight value for Roomba = 32768.<br><b>Results</b><br>A program is best for a robot as observed in my experiment. A human given only an array of sensors could not beat the best time of a program not intended for navigating through a maze but to effectively clean it. The human could beat the program when it could use an addition of its own senses mainly sight. The human given only an array of sensors was the slowest and eventually exceeded 10 minutes or became overly confused. If the human became confused, the time until confusion was recorded. The human with the sensors and its own senses had the shortest finish time.<br><b>Conclusions/Discussion</b><br>A human can do things that a robot cannot do but the opposite can occur on occasion. My experiment shows the importance of programs and shows how programs can be better than their creators. Robots can replace us in good ways, but they will not take over completely. A human still needs to maintain robots and program them. |                                       |
| <b>Summary Statement</b><br>I reprogrammed an iRobot robotic vacuum cleaner and created a maze to see if a human is better than a program for controlling a robot.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                       |
| <b>Help Received</b><br>Father helped with scientific method, Mother helped with maze construction and glueing papers on display board.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |