



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Amit S. Talreja	Project Number S0916
Project Title Robot Assisted Pattern Recognition and Analysis	
Abstract Objectives/Goals The goal of this project is to design and develop a robot that can teach a child to write basic letters and numbers. The machine can assess the child's writing and give feedback on it's accuracy. The robot should identify characters with a high degree of accuracy. The robot is a platform for children to learn writing at their own pace with minimal human interaction. Though targeted at children with Autism it should be a fun way of learning for all. Methods/Materials The Lego Mindstorms NXT microcontroller and several sensors and gears are used to create a robot that is able to write and scan characters. The software program written in RobotC operates the machine to write the control character and then scan the user input and compare it against the control. The Robot hardware and software was tested and modified to improve accuracy. Results For the project, the accuracy of four characters (E, F, 4 and 7) was tested. The letters E and F had an accuracy of 90 and 80 percent respectively, while the numbers 4 and 7 had an accuracy of seventy percent each. Conclusions/Discussion The project was mostly successful in achieving it's goals. The robot was able to recognize characters with approximately 80% accuracy. The robot struggled with diagonal lines, it is hypothesized that this is due to the scanning method used. Based on testing several improvements were made during the course of the design. For example, the redesign of the writing arm and pen mechanism to get just the right pressure, change of the gear types and ratios to balance torque and tolerance. The software was modified significantly from the start to improve scanning accuracy and resolution.	
Summary Statement The objective of the project is to design a robot that can help children with autism learn to write letters and numbers.	
Help Received Received feedback from occupational therapists working with children with autism on how to improve the robot.	