

Dice Tester

The project would involve a machine rolling dice and recording the dice rolls. To see the dice, there will need to be cameras able to view the dice and recognize which rolls correspond to which number. The robot will need to be able to understand and read the rolls regardless of the angle that the dice land when rolled. The individual dice must also be recognized and able to be differentiated from the other dice in the vision area. These rolls will be recorded in a database before going on to the next roll.

The machine would also need a way to physically roll and collect the dice. A cup will be designed to hold the dice being rolled, and an arm will be designed to hold the cup and roll it. A method of fair rolling will need to be designed as well. There must be a second arm or some other mechanism in order to collect the dice back into the cup for re-rolling. Additionally, there should be walls so that the dice stay only in a designated spot for the camera to read them.

Additionally, several dice would be 3D printed for the project, with custom designs. This will allow the machine to recognize unique symbols and correlate them to different numbers. The ultimate goal is to make a robot capable of testing any dice for fairness by rolling them several times repeatedly.

Experimental Electroplating Setup and Material Characterization

In this project, students will design a semi-automatic electroplating apparatus for reel-to-reel application in laboratory environment. The setup include a plating bath and mechanism for handling and position control of electrical connector reel to be plated. No electroplating chemical is involved in the project.

To characterize the plated metal layers, microanalysis tools, including scanning electron microscope (SEM) and energy dispersive spectroscopy (EDS) will be used. Grain size, crystal structures of the intermetallic compound (IMC) between the plated layers will be studied.

The project will help student in understanding some electrical components necessary for electrical vehicles. Involved students may have opportunity for internship and job position.