



# CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

<b>Name(s)</b> Nikita Lubyanyoy	<b>Project Number</b> <b>J0914</b>
<b>Project Title</b> Best Sensor for Laser Transmissions	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective is to find the best sensor for transmissions by laser and vibrating reflective surfaces, and to learn more about electricity and engineering. I also believe that the more expensive and sensitive sensors will work best in laser transmissions.</p> <p><b>Methods/Materials</b> (1) 9V battery supply (2) Variety of NPN Phototransistors, CDS cells, and/or other photosensors (3) 470uF, 10uF, 0.01uF capacitors (4) 10k and 1k resistor(s) (5) 50k or 100k variable resistor (potentiometer) (6) Wires and cable (7) Headphones (8) Computer (optional) (9) Speaker(s) (10) LM386 IC audio amplifier (11) 3.5mm audio jack connector (12) 9V power switch (optional) (13) 9V batter socket/connection (14) Breadboard or Perforated board (15) IC Base (optional) (16) Soldering iron (17) Solder - lead free and rosin core (recommended) (18) Mirror(s) (19) Helium Neon Laser (recommended)</p> <p>Build receiver (schematic on board); Place sensor into the base/breadboard; Glue a mirror to a speaker; Point the laser towards the mirror; Place the receiver so that reflected laser beam hits the sensor; Play something into the speakers; Either listen to the output or place it into a computer, run it through audio editing software, and then pick the sound with the best quality; Change the sensor; Repeat step 8 and then 9, until all sensors are tested.</p> <p><b>Results</b> (1) NTE3122 T-NPN, Si Phototransistor - no audible sound was heard. (2) NTE3034A Phototransistor Detector Silicon NPN Photo Darlington - no audible sound was heard. (3) NTE3120 T-NPN, Si Phototransistor - no audible sound was heard. (4) CDS Cell #1 - static, but barely audible sound. (5) CDS Cell #2 - audible, but a lot of echo was heard. (6) CDS Cell #3 - audible and less echo was heard than CDS Cell #2.</p> <p><b>Conclusions/Discussion</b> The CDS Cells worked the best, and I believe this is because even though CDS Cells, in general, have worse quality than Phototransistors, they were in the correct wavelength of the laser light, which in this case was a red color with the wavelength of 630nm. Therefore, I decline my hypothesis because based on my data, the CDS Cells were cheaper and less sensitive than the phototransistors, but actual quality of the performance was based on the ability to receive the wavelength of the red laser beam.</p>	
<b>Summary Statement</b> Best sensor for transmissions that are created by sending a laser beam towards a vibrating reflective surface and capturing the beam at the receiving end to recreate the original oscillations of the vibrating surface.	
<b>Help Received</b> Borrowed laser from Joseph Thinn; took breadboard from Andrey Stebikhov.	