



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Sasha Jaffarove	Project Number S0909
Project Title Cave Mapper	
Abstract Objectives/Goals The objective of this project is to be able to create a 3D map of a cave or any enclosed space. With the help of electronic devices such as Raspberry Pi and LIDAR and the basic geometry, I believe I can re#create a virtual 3D map of a scanned cave. Methods/Materials In order to create a 3D map, I need to build a device (Cave Mapper), which is made of the following main components: Raspberry Pi(RPi), LIDAR, 2 servos and the servo controlling motorhat. I would also need a 3D mapping software to create a virtual representation of a scanned cave. The Cave Mapper will be placed in the middle of a cave and will rotate the attached LIDAR in 2 dimensions. By using LIDAR ability to measure the distance with its laser to a nearby object, I can collect 2 rotation angles and LIDAR's distance which I can place in 3D space in polar coordinates. The RPi will store collected measurements on SD card which I can then upload to another computer, which has a 3D#mapping software installed and will load and display a 3D map of a cave. Results The result of this project will be a virtual 3D map of a cave or enclosed space. The Cave Mapper will automatically measure the distance to thousands of points around the room so the 3D mapping software can use them to recreate a virtual model of the same room. Once I test the mapper on my room and get close enough 3D map, I will also test Cave Mapper on an actual cave. Conclusions/Discussion As I'm tuning and testing the device, I already see a potential problem # the laser measures distance incorrectly for reflective surfaces such as mirrors, laptop screens, windows, etc. I've read up about it on Wikipedia and I see that this is expected since lasers have the same reflective property as a visible light. This will definitely mess up the final 3D version of my map. I probably need to find a dry cave without any wet surfaces to interfere with the scan.	
Summary Statement My CaveMapper scans a cave and creates a virtual 3D map of that cave.	
Help Received I would like to thank Keshav and Gregory from TechLab who taught me how to use Raspberry Pi and Python coding.	