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Feature Recognition for Photogrammetry Calibration of the Super-Kamiokande Detector

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The Super-Kamiokande detector is a 40m tall cylindrical tank with a 40m diameter, filled with ultra-pure water. It makes detailed measurements of solar, atmospheric, and accelerator neutrinos. About 11,000 PMTs (photomultiplier tubes) facing inwards are set up on the detector wall to record neutrino interaction events. The use of the accurate location of photomultiplier tubes (PMTs) on the detector wall will increase the accuracy of the events that the PMTs record. Over 15000 images (57GB) of SuperK were taken in with an underwater drone to reconstruct the locations of the PMTs using photogrammetry. In this study, we used the bolts surrounding each PMT as features. The location of bolts surrounding each PMT is determined using image processing techniques. Further processing was done on bolts to eliminate false bolts. In this talk, I will present the methods used in our study to detect features and various geometrical techniques we used to obtain the final set of bolts.

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Please select: Experiment or Theory

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