

## Implant Operation Guiding Device For Dental Surgeons

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**Abstract :** Dental implants are one of the top 3 reasons to sue a dentist for malpractice. It involves dental implant complications, usually because of the angle of the implant from the surgery. At present, surgeons usually use a 3D-printed navigator that is customized for the patient's teeth. However, those can't be reused for other patients as they require time. Therefore, I made a guiding device to assist the surgeon in implant operations. The surgeon can input the objective of the operation, and the device constantly checks if the surgery is heading towards the objective within the set range, telling the surgeon by manipulating the LED. We tested the prototypes' consistency and accuracy by checking the graph, average standard deviation, and the average change of the calculated angles. The accuracy of performance was also acquired by running the device and checking the outputs. My first prototype used accelerometer and gyroscope sensors from the Arduino MPU6050 sensor, getting a changeable graph, achieving 0.0295 of standard deviations, 0.25 of average change, and 66.6% accuracy of performance. The second prototype used only the gyroscope, and it got a constant graph, achieved 0.0062 of standard deviation, 0.075 of average change, and 100% accuracy of performance, indicating that the accelerometer sensor aggravated the functionality of the device. Using the gyroscope sensor allowed it to measure the orientations of separate axes without affecting each other and also increased the stability and accuracy of the measurements.

**Keywords :** implant, guide, accelerometer, gyroscope, handpiece

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