

A Technique of Error Position Reduction on Beam Steering System by using Computer Vision for Optical Wireless Power Transfer

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1. Introduction

As an alternative technology to develop Wireless Power Transmission (WPT), laser has a special characteristic to transmit the power for long distance. It provides a coherent and non-divergent beam with high energy density in a small size of beam diameter, the beam steering is required to direct the laser beam to the appropriate object spot.

A corner cube is placed in the center of solar panel and the reflected light from the corner cube on the solar panel is detected by a 4-element diode through a lens to track a small air plane [1]. The high-speed tracking system can be developed by computer vision using color filtering method and the Galvano mirror [2].

2. Experiment Setup

In Fig. 1 shows the Galvano mirror is used to direct the visible laser beam and controlled by color filtering method using CMOS camera and OpenCV to track the object movement in real time. In this experiment, we have added the tracking method using prediction calculation based on

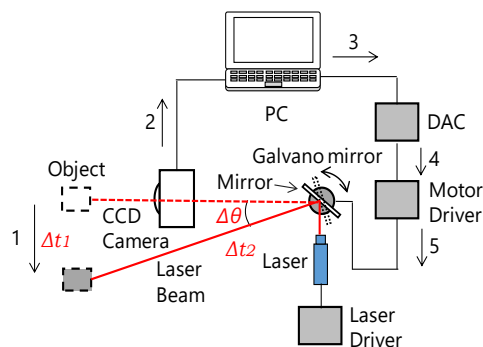


Fig. 1 Experiment Setup



a) Without Prediction b) Using Prediction

Fig. 2 Object Recognition View

accelerated uniform motion theory.

3. Result and Discussion

In Fig. 2 shows the object recognition view of without and using prediction method. The red line is a color filtering boundary and the green line is the prediction. In Fig. 3 shows the object speed dependency of without and using prediction method. The result shows that the error angle can be reduced by prediction methods up to 98%. at at 27.35°/s object speed.

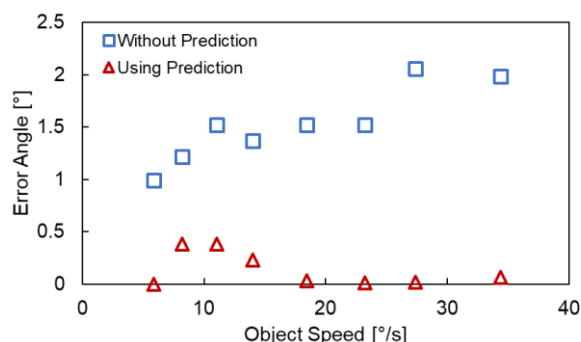


Fig. 3 Object Speed Dependency of Error Angle
Without and Using Prediction Method

References

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