1. Positional measurement of an agricultural vehicle at different speeds using omnidirectional vision

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Abstract: Vehicle localization systems are useful in various agricultural operations. Although RTK-GPS is commercially available for field localization and navigation systems, the cost is too high for agricultural use. The authors propose a simple and inexpensive localization system using omnidirectional vision and artificial landmarks. In the system, four landmarks are set at the corners of a rectangular field and a 360° image is obtained using an omnidirectional camera installed on a vehicle. The vehicle position and direction in the field are determined from the images of the landmarks. This article reports the results of vehicle localization while driving in an agricultural field. The experiments were conducted in a 50-×50-m square field. The vehicle position could be determined from 468 images (81% of the total 578 images) with a root mean square error of about 30 cm for a driving speed of 1.0 m/s. The error was larger at higher speeds of 1.5 and 2.0 m/s. However, the difference in errors was not significant. © 2013 American Society of Agricultural and Biological Engineers ISSN 0883-8542. (0 refs)
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