

Track #1 - Published Abstract

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Real-time photogrammetric tree detection and measurement

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Abstract:

A low-cost camera system purpose-built for forest harvesting machines is being developed. We present the design of the camera and computer vision algorithms for detecting and measuring trees. The imaging system consists of two cameras mounted on a rugged stereo rig and an embedded computer capable of acquiring and processing images in real-time. The algorithms developed in this work can estimate angle, distance, diameter at breast height and stem taper for trees within close proximity (60 feet) of the camera rig. Preliminary results show that diameters and distances can be estimated with a root mean squared error of 0.6 inches and 5.6 inches, respectively. This information is coupled with a silvicultural prescription to provide equipment operators with cut/leave decision aids for partial harvests. The decision aids are presented to the operator on a display mounted inside the cab of the harvesting equipment. The use of this technology is expected to reduce costs and increase productivity in mark-less prescriptions where operators are required to designate cut and leave trees during operation. We intend to extend the use of this system for autonomous boom control, teleoperated forestry machines and real-time stem mapping of removed and residual trees for post-treatment monitoring and treatment compliance.