MULTIPLE DEGREE OF FREEDOM STEREO CAMERA PLATFORM FOR ACTIVE VISION

Design of: in Instruction set Architecture and a Processor Architecture for Related Calculations

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Abstract

Vision or visual perception is the most, prominent moans of observation in human beings and primates. The potential of visual perception has caused a substantial research effort to be put in to machine vision. But still, harnessing the full power of vision is only a fiction than reality. The main reason for this is the over whelming amount of information and complexity that has to be handled. In this context the concept of active vision has attracted t he interest of researchers. An active vision system can be defined as a system capable of manipulating its visual parameters in order to extract useful information about the scene .

The main contribution of the this work is the creation of 7 degrees of freedom binocular camera platform with its own optimized FPGA based controller. The objective is to use the created platform to further the knowledge-base in active vision. It consists of two eye modules and a neck module where the two eyes are mounted. The system is able to look at. a particular point in space at a given time and to trace a given trajectory.

The camera platform has three degrees of freedom in its neck and two degrees of freedom in its each eye. Stepper motors are used to drive all the degrees of freedom. Stepper motors are used in a closed loop control system with sequential optical encoders to provided feedback information 011 position. Custom built gearwheels are used to increase the torque provided by the motors.

since a large number of inputs and outputs have to be handled in parallel and the architecture can be optimized for the types of mathematical calculations required, a FPGA based microprocessor was developed to control the Stereo Camera Platform .it interprets the instructions given by the user and calculates, the angle of rotation for individual degrees of freedom, and the required acceleration. The generation of pulses to drive the stepper motors is

also done by the controller. Optical encoder feed back was used by the controller t o correct any error resulting from, step missing of stepper motors or backslash of gear trains.

Results show that the velocity profiles, of individual degrees of freedom quite closely follow the expected velocity profiles. The deviations may be due to mechanical deficiencies like uneven friction, and eccentric ness of gear wheels and shafts.