

A PROTOTYPE LABORATORY INSTRUMENT FOR VIDEO MOTION ANALYSIS

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ABSTRACT

Motion analysis is the systematic and usually quantitative study of movement that is recorded on movie film or video tape. Our presentation will describe a prototype of a laboratory instrument for the motion analysis of video tape records. The heart of the system is an experimental display processor which generates a computer-animated representation of the phenomenon being analyzed, and superimposes it on the actual video record being streamed from a video disk.

RÉSUMÉ

L'analyse du mouvement est l'étude systématique et souvent quantitative du mouvement tel qu'enregistré sur film ou ruban vidéo. Notre exposé décrira un instrument de laboratoire pour l'analyse du mouvement enregistré sur vidéo. Au coeur du système est un processeur d'affichage qui produit, animé par ordinateur, une représentation du phénomène analysé, et le superpose sur l'enregistrement extrait simultanément d'un disque vidéo.

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Motion analysis is the systematic and usually quantitative study of the movements of humans, animals, organisms, cells, or other entities as recorded on movie film or video tape. Motion analysis is a central tool in numerous fields including anatomy, behavioral psychology, cardiology, cell biology, meteorology, physical and health education, radiology, and transportation planning and traffic engineering. Yet the role of motion analysis has been limited by the costly and time-consuming procedures required for frame by frame measurement and computation.

In recent years, Futrelle and Potel have revolutionized the process of motion analysis with an innovative application of the technology of interactive computer graphics. However, their experimental apparatus is applicable only to film and not to video tape records, and consists of equipment which cannot easily be engineered into a reliable and mass-producible laboratory instrument.

We shall describe a prototype of a suitable laboratory instrument for the motion analysis of video tape records. An experimental display processor called SPIWRIT generates a computer-animated representation of the phenomenon being analyzed, and superimposes it on the actual video record being streamed from a video disk. The SPIWRIT display processor employs bit-slice technology as part of a microcoded display processor, which decodes segmented display file images into alternate halves of a double frame buffer.

An experimental system encompassing a host PDP 11/45, the SPIWRIT display, and a microprocessor-controlled video disk will be described. A new quantitative representation of complex dynamic shape that is well suited for motion analysis will be briefly summarized. We shall conclude with a discussion of the application of the system and the representation to the analysis of video tape records of images of the motion of the wall of the left ventricle of the heart.

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