Motion Capture for Everyone

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1 Introduction

During the last years, motion capture systems have revolutionized computer animation and have become powerful tools for many other areas (virtual reality, animation, wearable computing, etc.). Even so and despite of new developments, nowadays motion capture technology remains as a very expensive resource for the common user. For that reason, this work proposes a low-budget novel technology which allows users to keep track and record of the movements of any joint of the body.

2 Overview of the System

The working principle is simple; by means of a set of wires, the movements of each joint of the body are transmitted mechanically to the view field of a camera. In this way, the body's movements can be measured indirectly analyzing the captured image (Fig. 1).
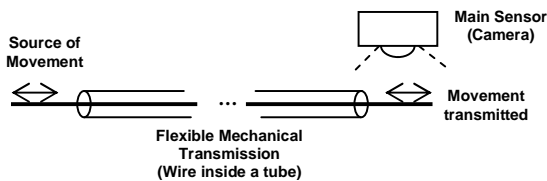

Fig.1 *Overview of the method.*

3 Implementation

Following this simple idea, a prototype of the system was built using a webcam mounted on the top of a box (visualization chamber) were the end of each flexible mechanical transmission (wire) can be detected (Fig. 2).
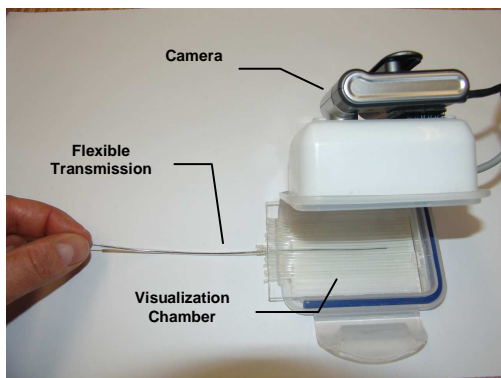

Fig.2 *Prototype of the system.*

This prototype can be assembled by one person in less than 2 hours and non-electronic knowledge or special tool is needed.

The communication between different applications and the prototype is reached by means of a simple driver program. In order to test the prototype, two applications were develop. The former is a simple Java program, which takes the captured data from the driver and sends it to the screen (a "hello world" app); the latter is a Maya application displaying a real time animation of a character according to the captured data (Fig. 3).

4 Samples of Use

Once the webcam is capturing the images from the whole set of wires, the user is free to attach them to the joints of the body. Fig 4 shows different ways of attaching the wires to the joints of the body (e.g. just using adhesive tape, a sophisticated glove or elastic bands).
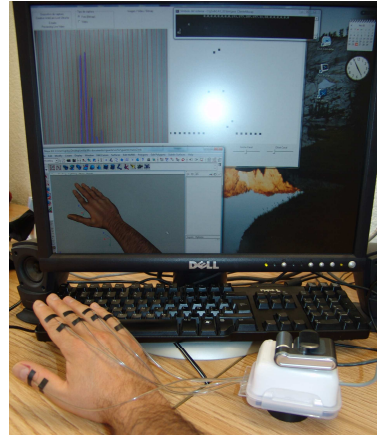

Fig.3 *Examples of applications, using Java and Maya.*

Fig.4 *Examples of use.*

5 Results

This prototype can manage up to 64 capture channels (wires) at 30 samples per second each. All of these channels allow to measure up to 480 steps each. The total cost of the hardware was about $100 USD plus 10 cents per wire.

6 Conclusions

Even though this system was designed for applications that doesn't require high precision, like animation, we believe that it can be used as a computer generic interface in many others ways, such as control for robots, virtual reality, video games, or rehabilitation.

We consider that this development can help more people to exploit the benefits of motion capture technology, and anyone would be able to construct or to acquire their own Motion Capture System at a very low cost.

A full description of the system and some videos about recent experiments is available on: http://sigma.iimas.unam.mx/mocap2.