Motion Capture System Using Single-Track Gray Code

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ABSTRACT
In this paper, we describe a high speed optical motion capture method that has a simple mechanism. We use a light shielding filter using a pattern of Single-Track Gray Code (STGC) [1] absolute encoder to take location of IR light marker tags instead of high-speed camera or row of binary coded masks. Therefore, this system can convert the position coordinate of tags into the digital signal directly, and it can track faster than the traditional method, with only the combination of inexpensive optical parts.

Categories and Subject Descriptors
I.5.5 [**PATTERN RECOGNITION**]: **Implementation** – *Special architectures*

General Terms
Measurement

Keywords
Single-Track Gray Code, Motion capture, Infrared light

1. INTRODUCTION
Motion capture is a key component in image technology, user interfaces and analysis for injury rehabilitation. There are various motion capture methods. They use, for example, internal sensor, magnetometer, and high speed cameras. But most of them need specific conditions such as commodious rooms and expensive, large devices.

We describe an economical and scalable system uses the simple combination of optical devices made up of a light-emitting diode (LED) as the transmitter, and photosensors with a passive binary mask as the receiver. The main feature of our approach is the use of only one pattern as the mask. The receiver reads position of tag for every lighting-up of the LED inside the tag.

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2. SYSTEM CONFIGURATION
Our system consists of an infrared LED, photosensors, and a light filter printed the pattern of STGC – a kind of Gray Code – encoder. The number of sensors and bit of encoder are decided by necessary resolution. This structure is an idea opposite to the method of Prakash [2].

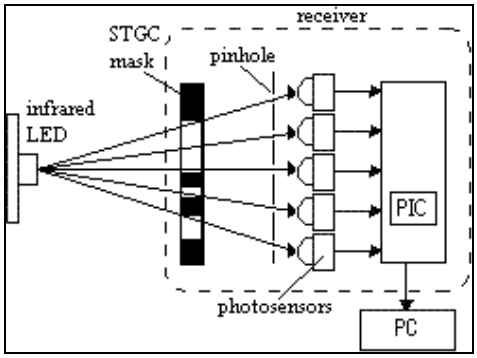

Figure 1. Structure of the system

3. CONCLUSION
In this paper, we have reported a new optical tracking system. Our simple, portable, and low cost method can be easily miniaturized. It can set in wide variety of devices instead of existing motion capture system using camera or expensive sensors.

4. REFERENCES
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