CAPTURING GUITAR FINGERING BY PHOTO-REFLECTOR TECHNIQUE

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ABSTRACT

In optical motion capture, video camera images are generally employed as initial input data. Since complicated fingering forms of playing guitar may potentially cause occlusion problems in such optical motion capture, obtaining video camera images is not necessarily appropriate to capturing guitar fingering unless the layout of the cameras is carefully taken into consideration. This study has newly developed a motion capture system for guitar fingering. The proposed system obtains guitar fingering based on an optical motion capture technique that employs photo-reflectors embedded in the guitar fingerboard.

1. INTRODUCTION

One of the conventional techniques for capturing guitar fingering is employing a mechanical motion capture that uses data glove [1]. However, this technique may potentially restrict the performance of guitarists by wearing the grove. Thus, there may be room for considering another technique for capturing more natural performance.

This study has newly developed a motion capture system for guitar fingering by using photo-reflectors that are embedded in the guitar fingerboard [2]. By means of these photo-reflectors, guitar fingering is optically captured in the proposed system.

2. FINGERING CAPTURE SYSTEM

Figure 1 and 2 show the fingering capture system developed in this study. Figure 3 shows the block diagram of the proposed system.

Figure 1. *Photo-reflector based fingering capture system.*

Figure 2. *Photo-reflector based fingering capture system.*

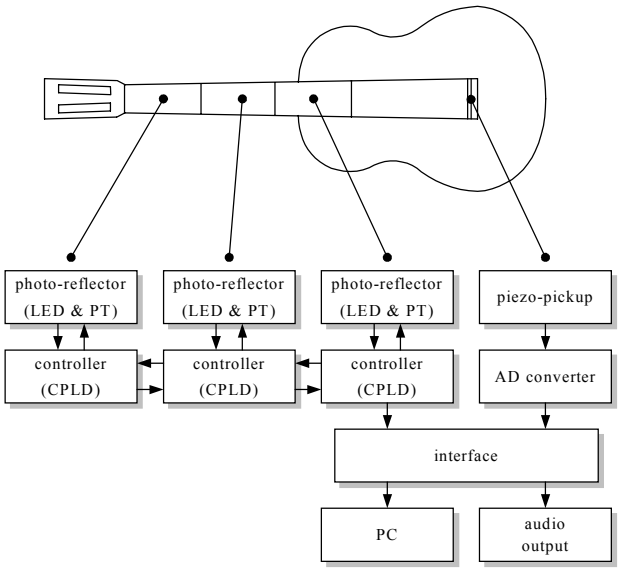

Figure 3. *Block diagram of the proposed system.*

The photo-reflectors employed in the proposed system consist of full-color LED's and phototransistors. The positions of the fingers are detected by the phototransistors measuring the amount of light that is emitted by LED's and reflected by fingers. Figure 4 shows the layout of photo-reflectors in the guitar fingerboard. In the proposed system, the resolution of the captured image is 576 (column and row is 12 and 48, respectively) per the guitar fingerboard. Figure 5 shows the photo-reflectors embedded in the guitar fingerboard.

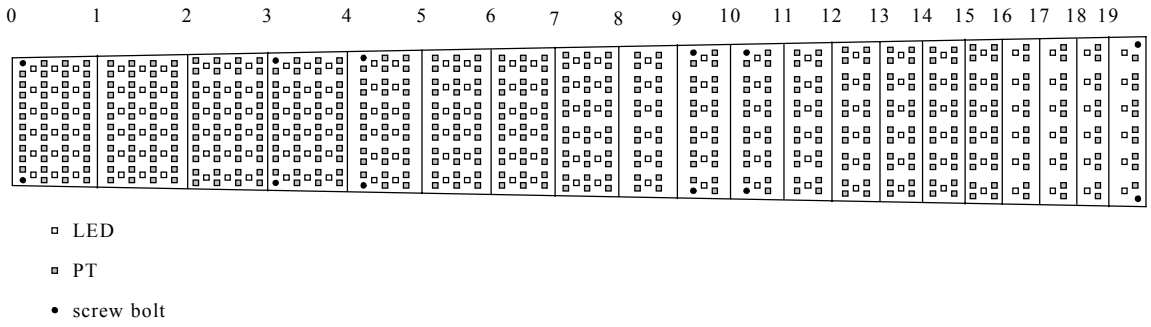

Figure 4. *Layout of photo-reflectors in the guitar fingerboard.*

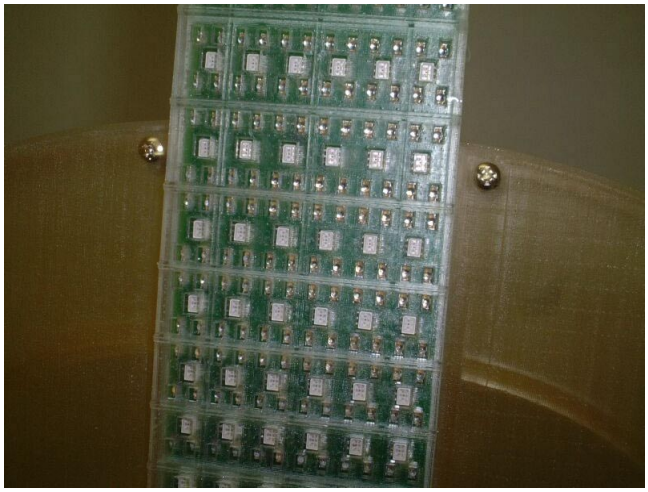

Figure 5. *photo-reflectors embedded in the guitar fingerboard.*

One of the problems of the photo-reflector technique is that it cannot distinguish background noise caused by other light sources. In order to cancel such background noise, the proposed system measures the deference between the amount of light when the LED's are switched on and off, as shown in Fig. 6.

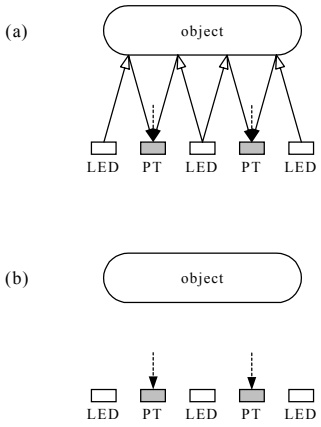

Figure 6. *Background noise cancellation in photo-reflector: (a) LED's are switched on and (b) off.*

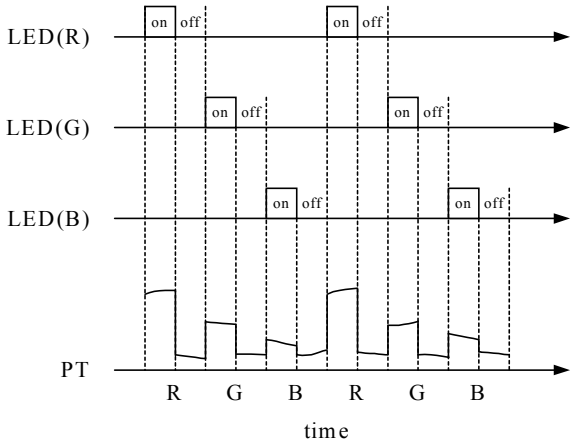

Figure 7. *Acquisition of the three primary colors information by means of time division scheme.*

In the proposed system, the three primary colors information, namely R, G, and B, is obtained by means of time-division scheme, as shown in Fig. 7. In order to identify which fingers are used for fingering, each of the fingers is differently colored.

In addition, piezo-type pickups are also employed in the proposed system for detecting the vibration of strings. Such information is taken into consideration as side information for capturing guitar fingering.

3. SUMMARY

This article briefly describes a fingering capture system by means of photo-reflector technique. Since this system can capture guitar fingering itself unlike the conventional MIDI guitar, it may measure how guitarists play the instruments in detail. This system may be potentially useful for making automatically guitar scores, namely tablatures, which are manually transcribed in general.

4. ACKNOWLEDGEMENT

This study was partially supported by a grant “Sapporo IT Carrozzeria” in 2004 from Ministry of Education, Culture, Sports, Science and Technology of Japan. We wish to express our appreciation to this grant.

5. REFERENCES

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