

# AR Shooter: An Augmented Reality Shooting Game System

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## ABSTRACT

### Introduction

This paper presents the features and functionalities of AR Shooter, an augmented reality shooting game system which is based on infrared marker tracking. The proposed system consists of two parts: a gun with video cameras and infrared markers composed of LED. When the gun aims on the infrared markers, some monsters will appear on the LCD equipped on the gun. Then, the user can open fire and shoot at the monsters. Figure 1 shows the diagram of the proposed system.

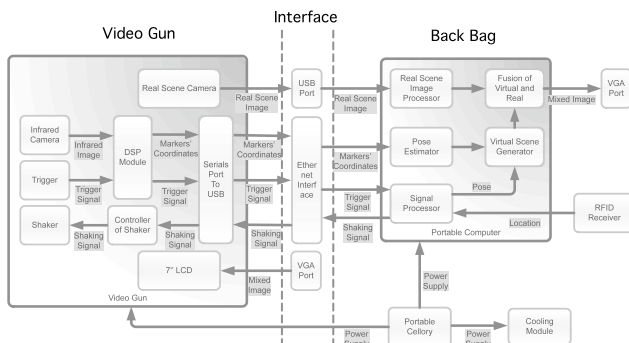


Figure 1. Diagram of the proposed system.

### Equipments and Methods

Two cameras are installed on the gun as shown in Figure 2. One is used to track the infrared markers. The other is used to capture the real scene. Infrared markers are used for the tracking of the pose of the camera, so as to avoid the influence of the visible light on the vision based tracking system and ensure the robustness of the tracking system. Furthermore, the markers will not affect the game because they are totally invisible for eyes.



Figure 2. The shooting gun.

The infrared images captured by the tracking camera are processed by an embedded DSP module, which outputs the coordinates of the markers and then the pose of the camera is estimated by a portable computer with the information of the markers. The system can process at up to 30 fps, which fully

meets the requirement of real-time processing, because the most expensive part of the whole computation is efficiently done by the DSP module. After that, the virtual objects are overlaid into the real scene to generate a fused image of the virtual and real, as shown in Figure 3. Since the location relationship between the user and the virtual objects has been estimated, the users can accurately shoot at the virtual enemies with the gun. This makes it possible for the users to interact with the virtual world naturally. The game of AR Shooter has a fantasy background and a large number of characters. Its user can have an unimaginable experience when they immerse in the mixed reality world and complete every task of the game.



Figure 3. The fused image.

### Results

Our system is specially designed with augmented reality technologies and has significant commercial potential. It will be installed in a theme park in the next year.

### Discussion

In actual experiments, it is found that the LED markers are difficult to install and maintain. As a result, we are now trying to make improvements. Currently, we are experimenting with a novel approach, which projects infrared patterns as markers with lasers or infrared projectors. This work may last several months, and hopefully we will bring to the conference an improved version if it can be finished.

We hope that the attendees of the conference will be interested in AR Shooter!

### KEYWORDS

Augmented Reality, Infrared Marker, Shooting Game

### REFERENCES

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