

# ***GUN IDENTIFICATION USING IMAGE SYNCHRONIZATION FOR DTI's VIRTUAL SHOOTING RANGE***

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*Abstract*— The DTI's current virtual shooting range detect only one shooting gun. If there are many gun shots upon the same training scenario, the system cannot know what gun shoot belongs to what gun. The goal of this research project is to prove the concept of developing an algorithm to classify gun identification. The gun identification plays an important role in multiple weapon shootings of the virtual shooting simulator. The image synchronization technique was used to interface the shooting to a microcontroller module. A simulated model was experimented to represent a real system for convenience. The result showed that the adopted technique was reliable and at the same time the algorithm yielded correct and acceptable results. The idea can be applied to infrared laser point detection of more than one trainees being trained simultaneously.

*Keywords*— *Gun Identification; Image Synchronization; Virtual Shooting Range, Shooting Simulator*

## I. INTRODUCTION

The virtual shooting range is a combined architecture of hardware and software that shooters can be presented with defined exercises of different terrain backdrops, various environmental conditions and virtual ranges. The 3D visualization software lets trainees to practice firing in realistic, projected terrains like deserts, mountains, jungles and plains. The system helps the trainer to simulate real-world scenarios to enhance the skill level of trainees. The Royal Thai Air Force officers were introduced to the system as shown in Fig. 1.

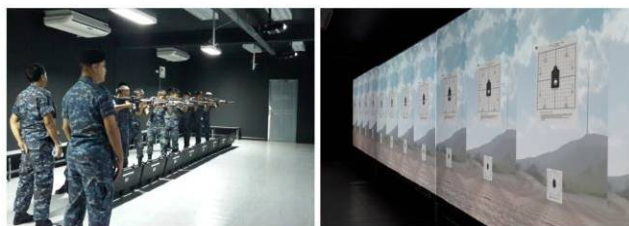


Fig. 1. DTI's virtual shooting range

The officers were often trained with a number of small arms, i.e. M-16 rifles, 9 mm pistols, automatic grenade launchers and .50-caliber machine guns [1]. At the time when many types of gun are being shot at the same scenario, the trainees can hear and obtain a report for realism, and see where their shots land with green for misses and red for hits.

Zen AWeSim® [2] is a state-of-the-art firearms simulator aimed at training recruits to Special Forces and Commandos. The simulator can be adapted to a number of firearms and the versatile simulator imparts basic training, improves weapon handling skills and tests the skill level of trainees in complex and war-like scenarios. Four trainees can be trained simultaneously with the system being able to upgrade up to 8 trainees. The simulator also enables annual range classification to be carried out and the individual firing data stored for records.

This system presented a designed for determine laser pointer on a large tiled displays [3]. The techniques allows many users to interact simultaneously, each user able to utilize a same scenario with computer vision processing. However, it doesn't classify which laser that hit the target. Another project proposes a Genetic algorithm for shape recognition it able to classifies figures that are drawn on a wall with a laser pointer by using optical flow of laser beam [4]. Actually we can modify laser beam to different shape but it is difficult to classified in case of many shape overlap on the same target.

There has been a few works in the field of shooting simulator to address the approach to classify the identification of different weapons because it is a secret and proprietary of the business. Therefore, our system was in-house design in both hardware and software configuration for test and evaluation. How each component was designed and operated will be described in the next section.