

TJHSST Computer Systems Lab Senior  
Research Project  
Tracking in Persistent Surveillance  
2009-2010

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October 27, 2009

**Abstract**

Use this abstract section as your problem statement. This is an introduction to the purpose of your research project. What is the subject of the project, what are your goals, what is the project about? Also consider why is the project worth doing, and why is it a good topic for the Computer Systems Lab? Think of who will might be interested in your expected results and how might the results be applied? (prospective results at this point - you may not currently have any actual results determined)

**Keywords:** genetic algorithms, algorithmic composition - List any special vocabulary words that will apply to this research area.

## 1 Introduction

### 1.1 Scope of Study

The goal of this project is to create a tracker that can follow a certain object, whether it be a human, a vehicle, or some other moving target, and trace its path through a series of images. The extent of this project is quite variable, due to that there is no apparent limit to how detailed it can become. By adding more and more noise, the problem will become harder and harder.

## **1.2 Expected results**

Ideally, the result of this project will be a tracker that can successfully track a target or multiple targets through a simulated terrain and through actually aerial imagery taken of an urban area.

## **1.3 Type of research**

My project is a project of pure applied research. I am not seeking new fundamental understanding of the material, but rather implementing various methodologies such as pixel subtraction. Rather than instituting a brand new theory, I am working to use an established theory and to utilize it, and possibly improve on current models and programs.

## **2 Background and review of current literature and research**

My mentor told me about the step in her project of Persistent Surveillance that involves tracking targets through the area of interest. In the office, some of our colleagues are working on posture recognition, and this is partially related to my project. The similarity is that both attempt to analyze images and provide useful information, all by looking at the pixels and edges of the image. In one paper I read, the tracker is being used on thousands of different images, taken from the 4 orthogonal directions. The new tracker generates simulated humans in different postures, and matches the real image to the closest simulated posture. The generated posture is then compared to the edges of the image, by using an edge detection program on the real image.

## **3 Procedures and Methodology**

I will be working mostly in Python, because it has sufficient image processing capabilities for my project. I will be able to evaluate the efficacy of my program in a qualitative manner; the line tracing the object's movement can be evaluated simply by watching it and seeing if it follows the same path.

## 4 Expected Results

The final result should be able to follow a target or multiple targets through both simulated terrain images as well as real world aerial imagery. I will provide the results most likely in a series of images showing my tracker tracing the path of target(s). I could run the program multiple times, and check if the tracker follows the target throughout its entire path, and graph the percent accuracies depending on the complexity of the image. This project has no apparent end, as the algorithm for tracing and the complexity of the image can always be increased.