

# Fully Automatic Timing on Personal Devices

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## Motivation

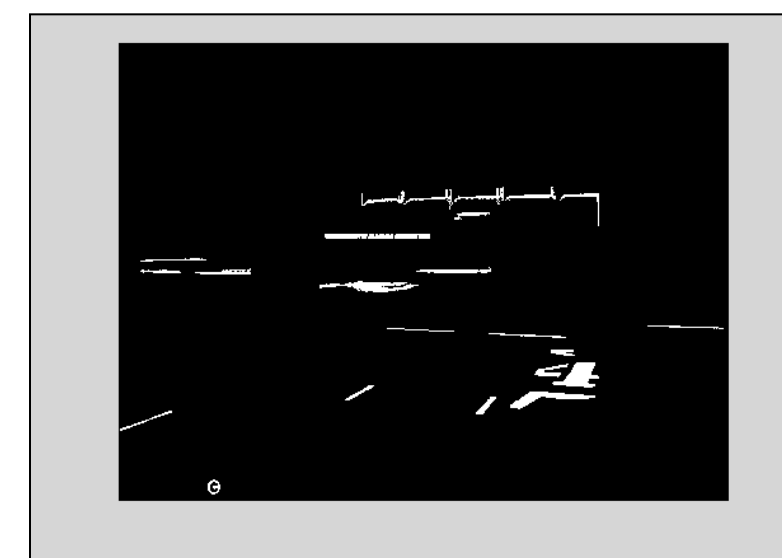
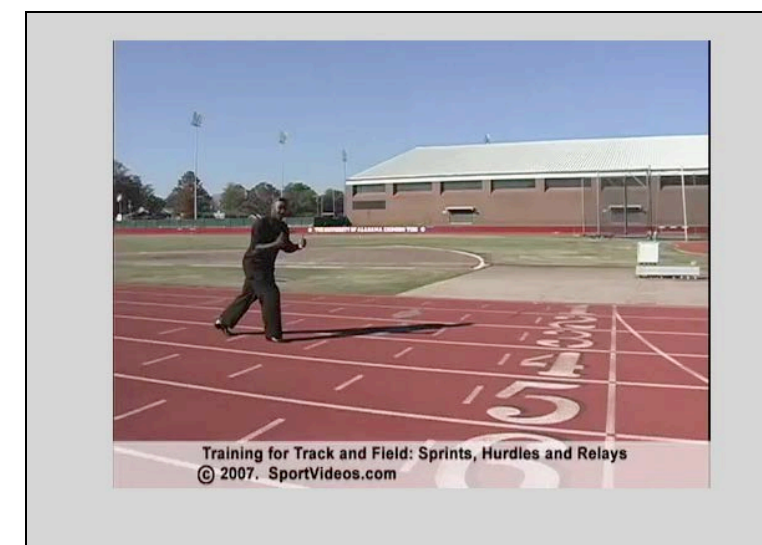
- Manual timing is often inaccurate and can lead to a lot of variance
- Fully Automatic Timing (FAT) allows incredible precision professional events and competitions, but the cost is prohibitive for training purposes



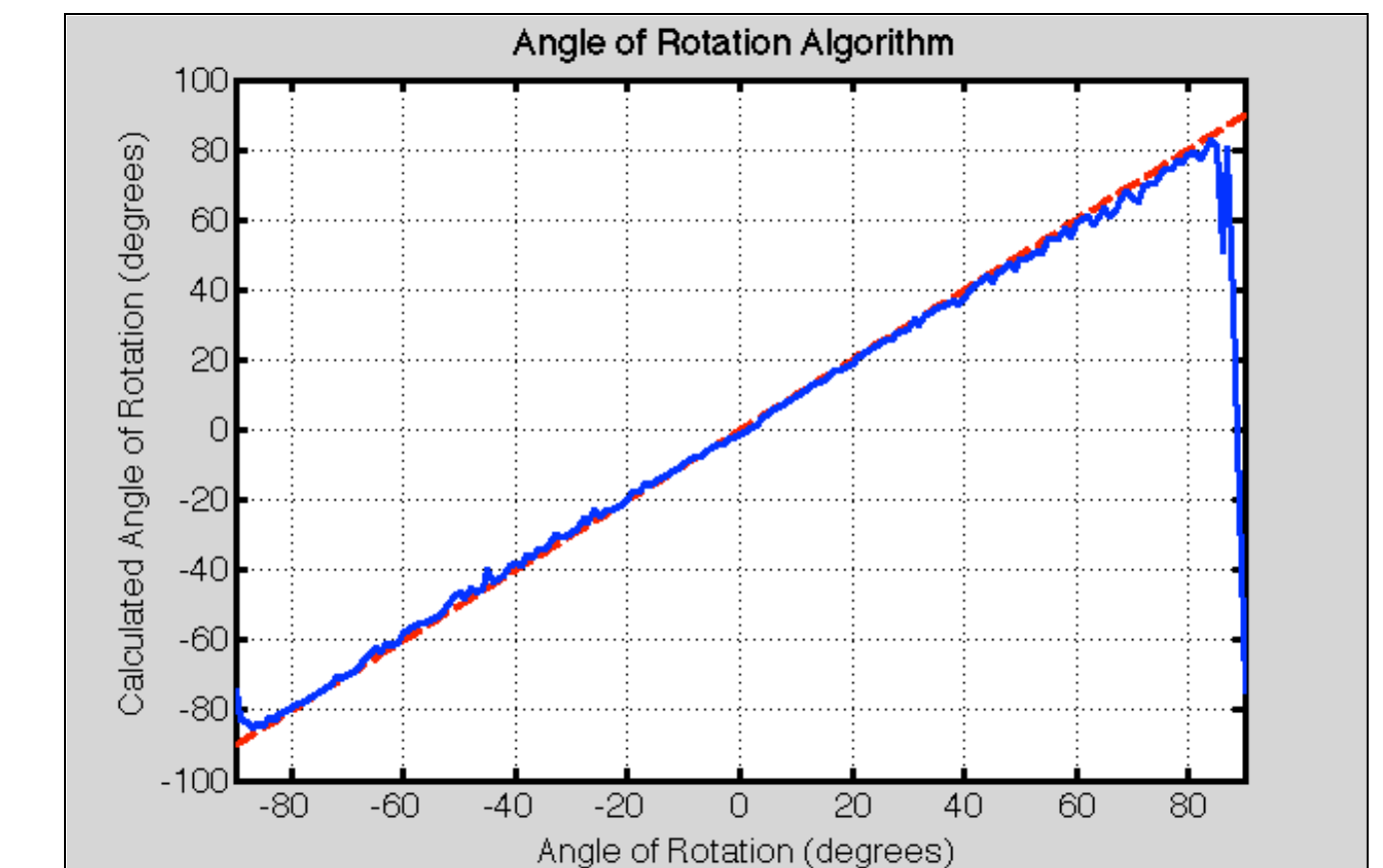
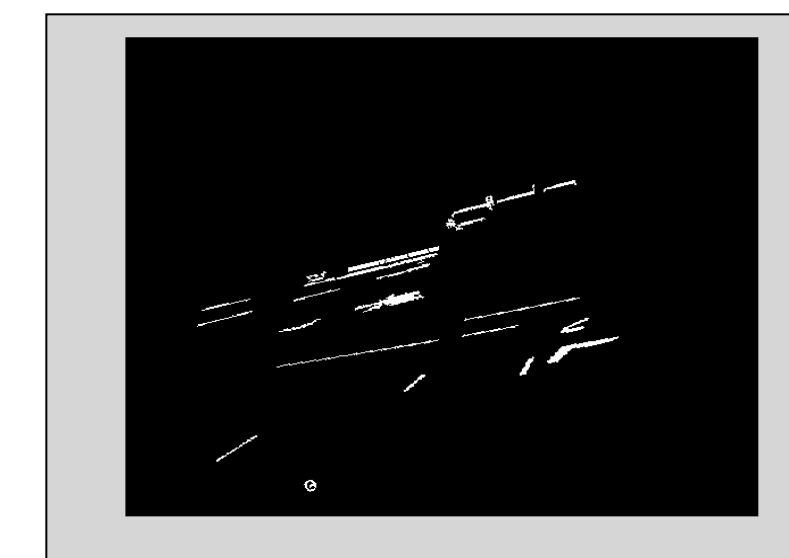
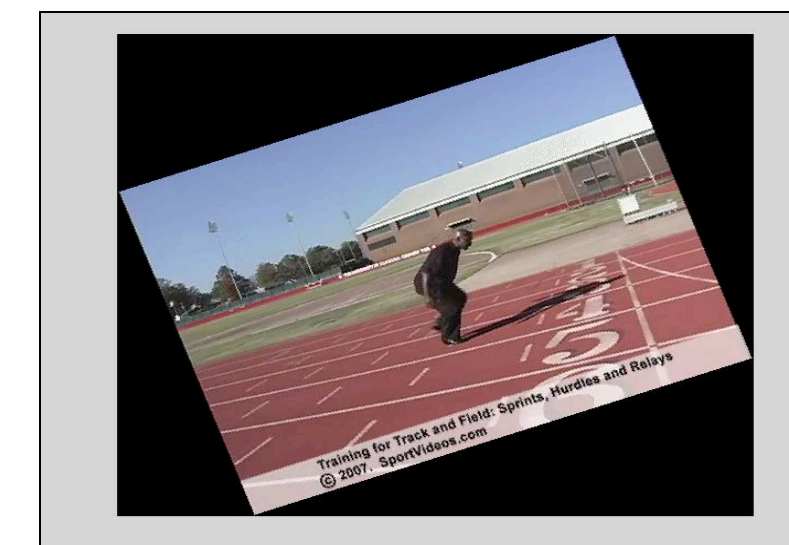
- Beneficial to have a similar system available on personal electronic devices.

## Rapid Rotation Angle Detection

Start



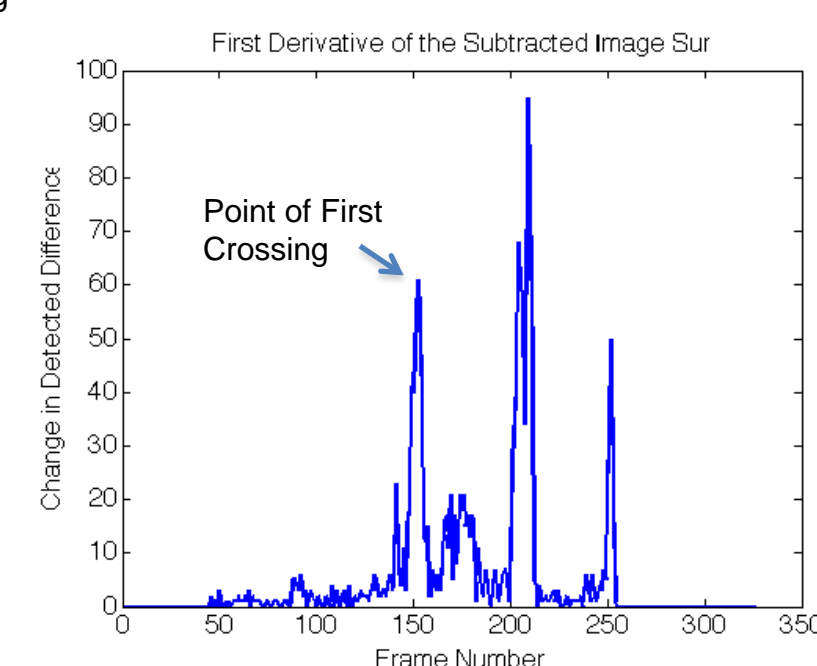
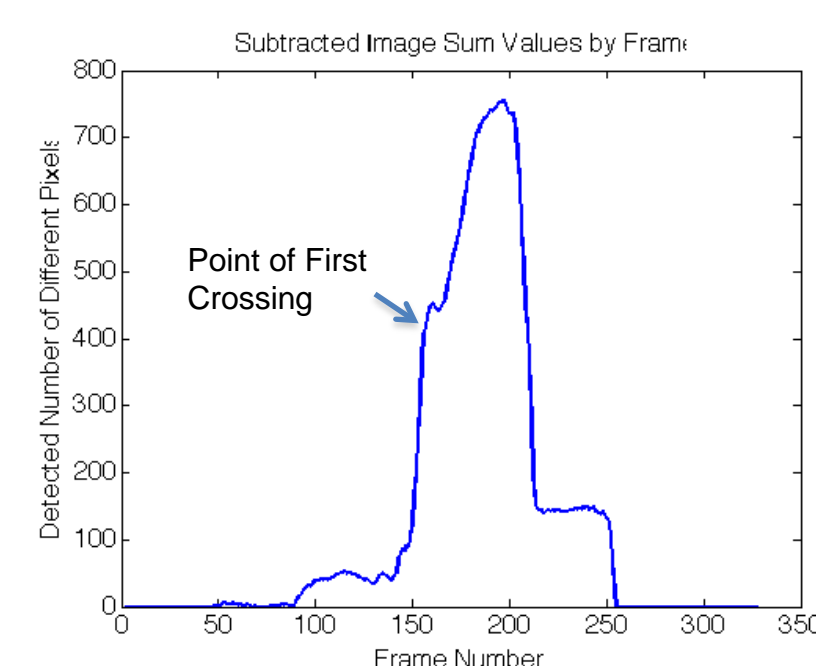
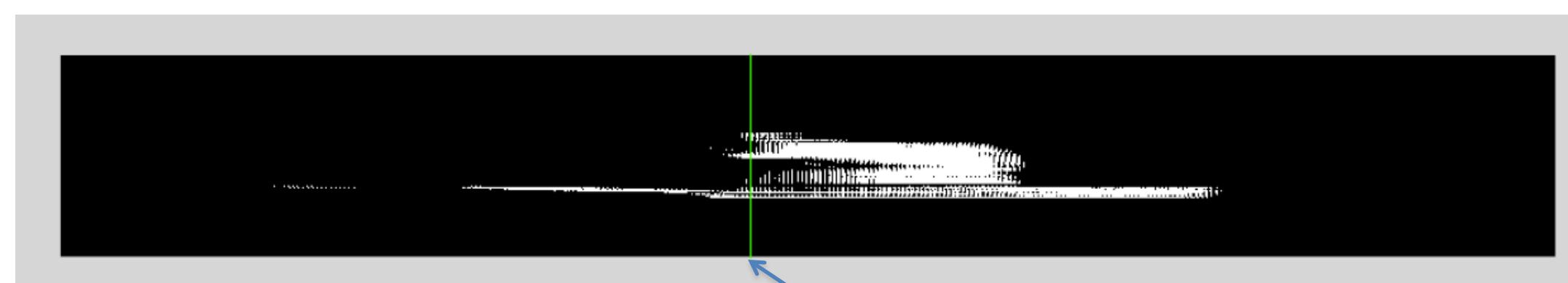
Finish



- Use region orientation to detect variations in angle rotation
- However, unable to take into account camera translation

## Background Subtraction

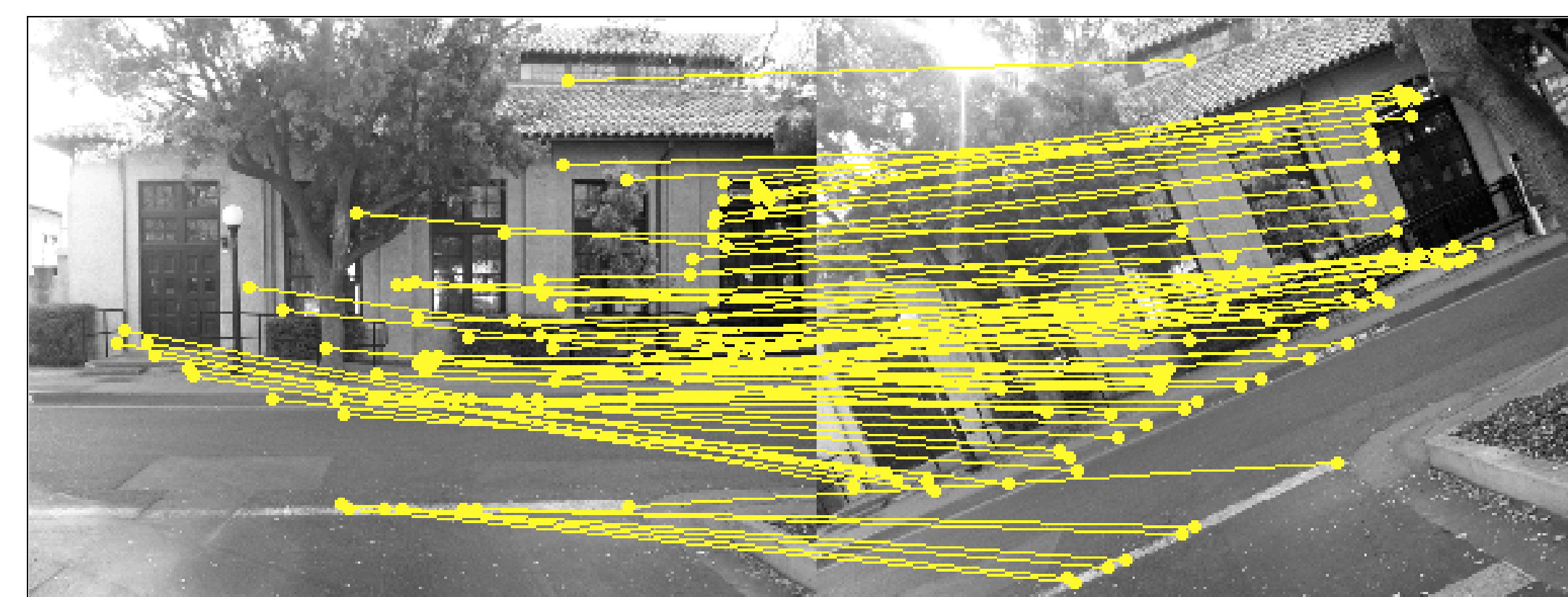
Combined Differences Through Finish Line



- Subtractive Image Processing used to detect an object moving across the finish line

## SIFT and RANSAC

Original



Rotated and Translated

Corrected Image



- Use Feature Detection to translate and rotate a virtual finish line between frames