

Sel-CAM

Auto follow camera with smartphone application

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Background



Work flow

Extract a center point of tracking target on Smartphone



Pass the point which sent from Smartphone
to Arduino using Bluetooth



Convert a point to an angle



Track Target

OpenTLD

- Introduced as a thesis named "P-N Learning: Bootstrapping Binary Classifiers by Structural Constraints" at CVPR-institution
- Detector find already-known object in input data
- Tracker find a object with the similarity such as time, space and morphology
- OpenTLD run both tracker and detector

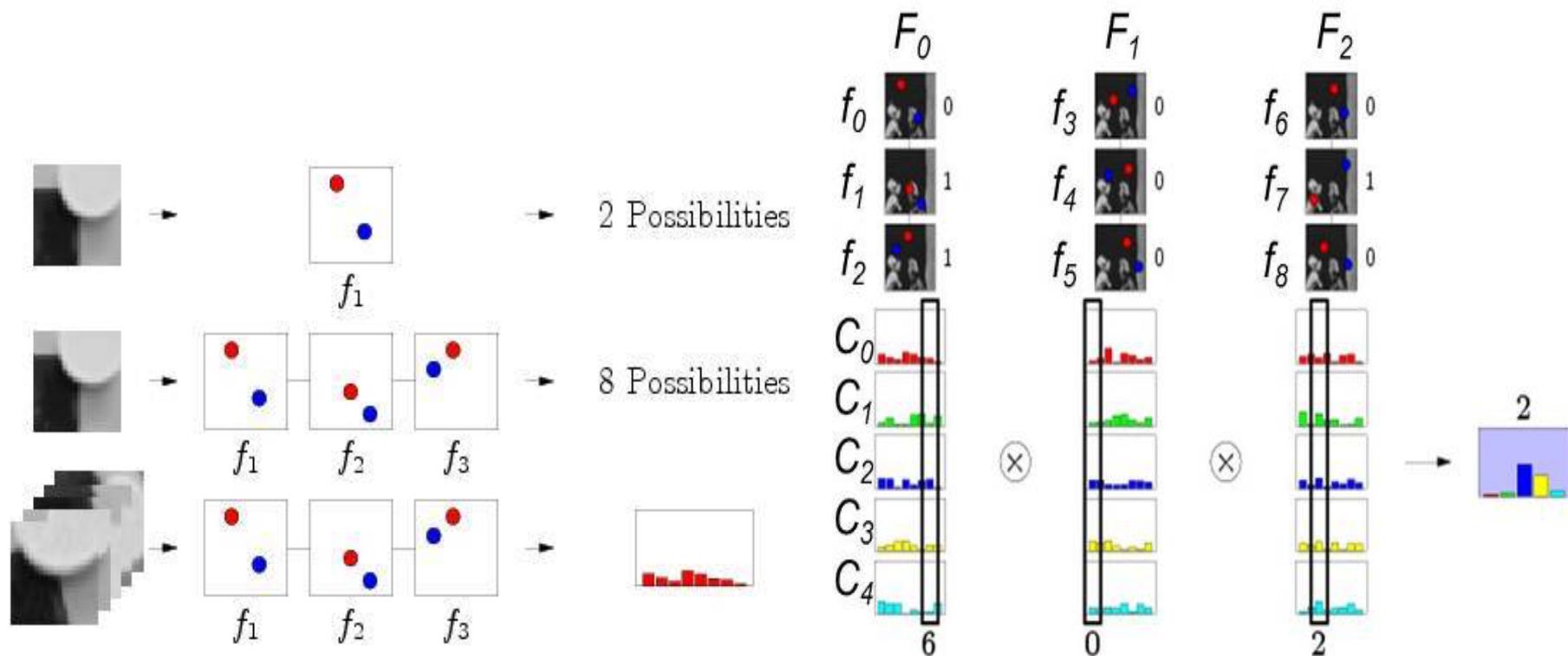
OpenTLD

Optical Flow Tracker

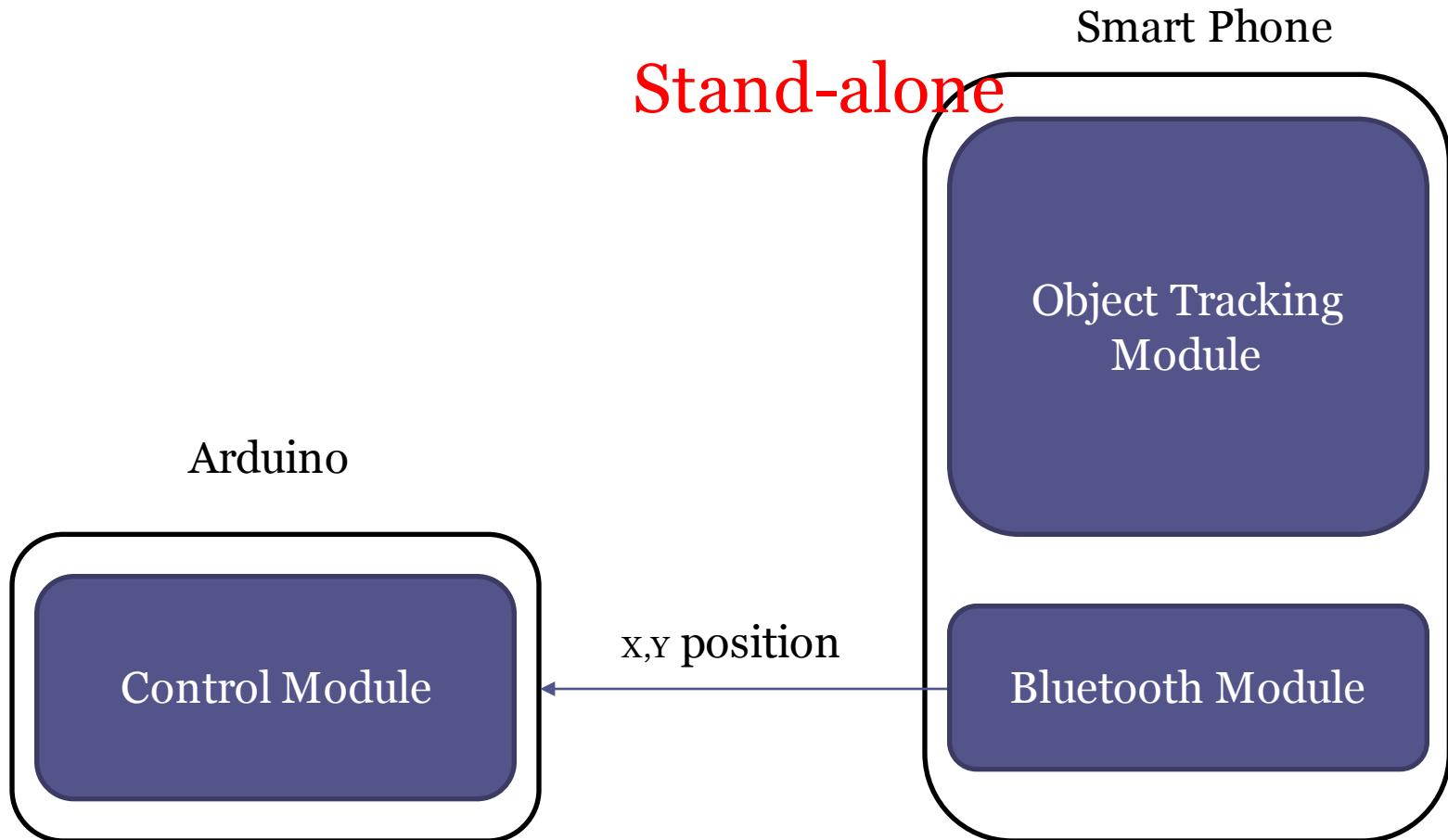


OpenTLD

Ferns



Architecture



Software Design

We cannot expect a network latency

- Read 1 MB sequentially from memory 250,000 ns
- Read 1 MB sequentially from network 10,000,000 ns

Network is not stable

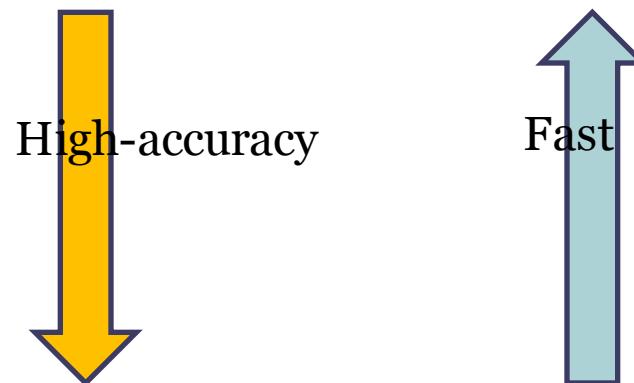
So we port library for Android platform

Software Design

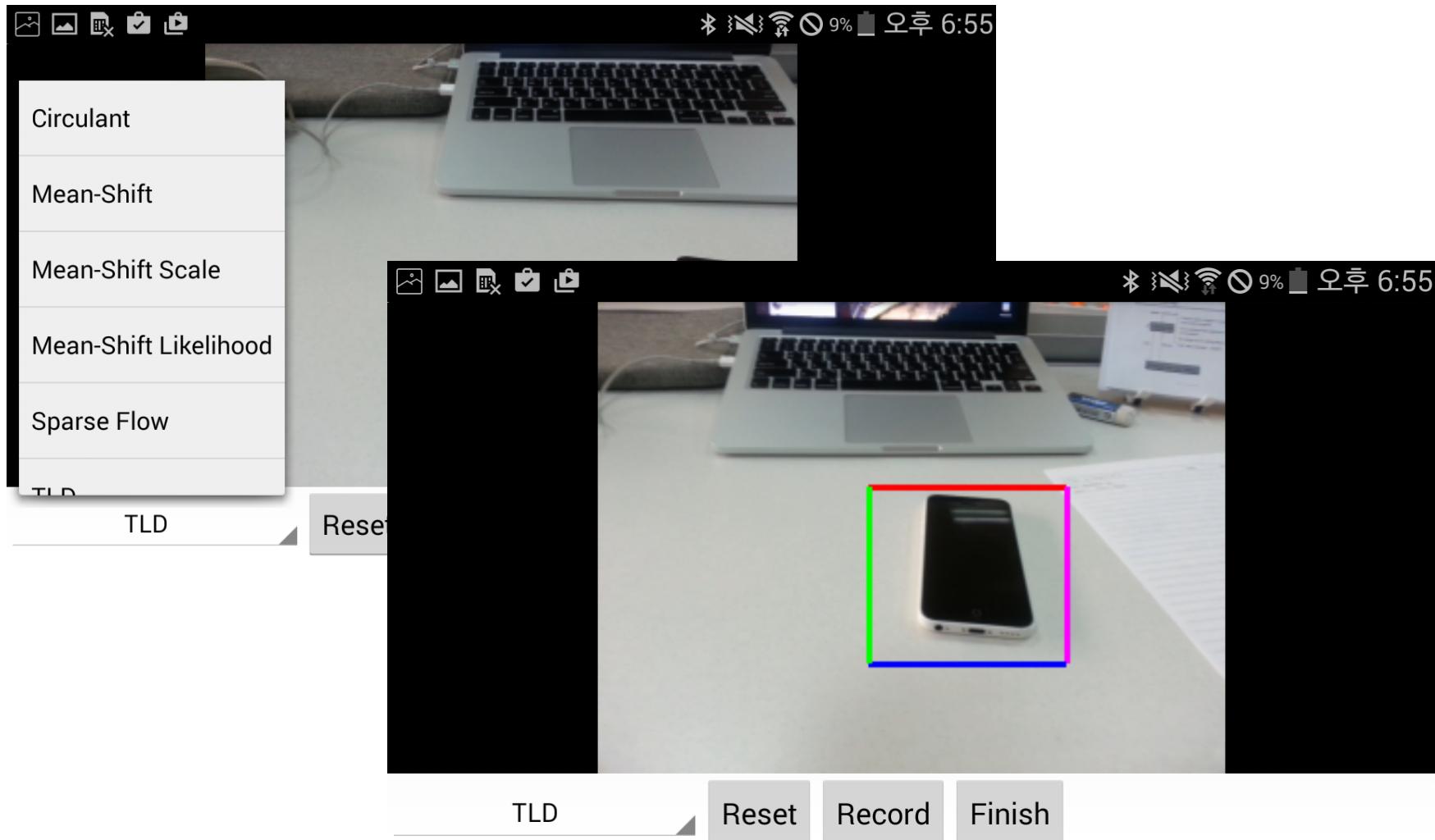
But smart-phone have LOW computational power

Trade-Off

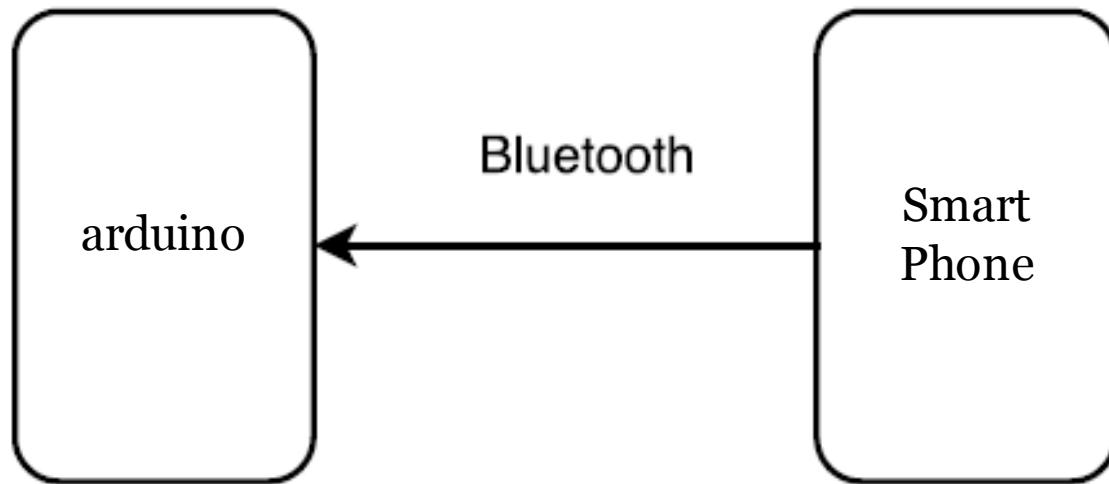
- Circulant
- Mean-Shift
- Mean-Shift Scale
- Mean-Shift Likelihood
- Sparse Flow
- TLD



Application



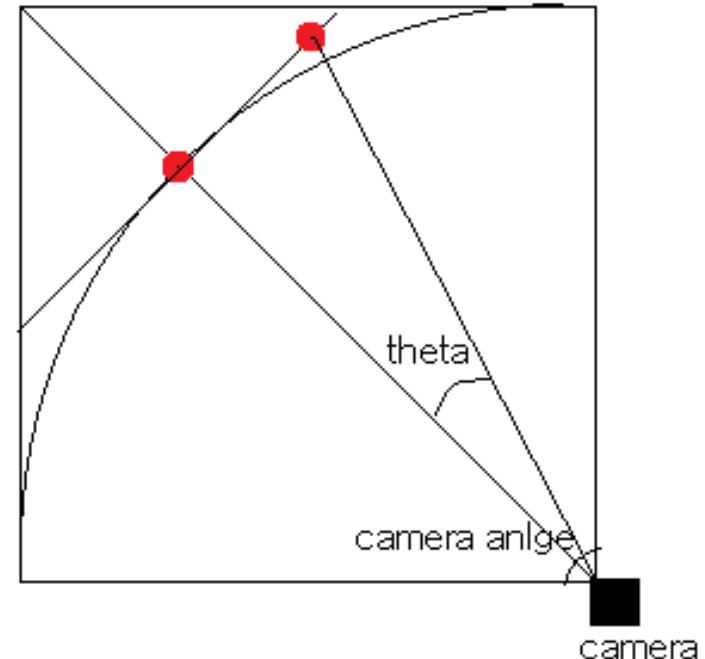
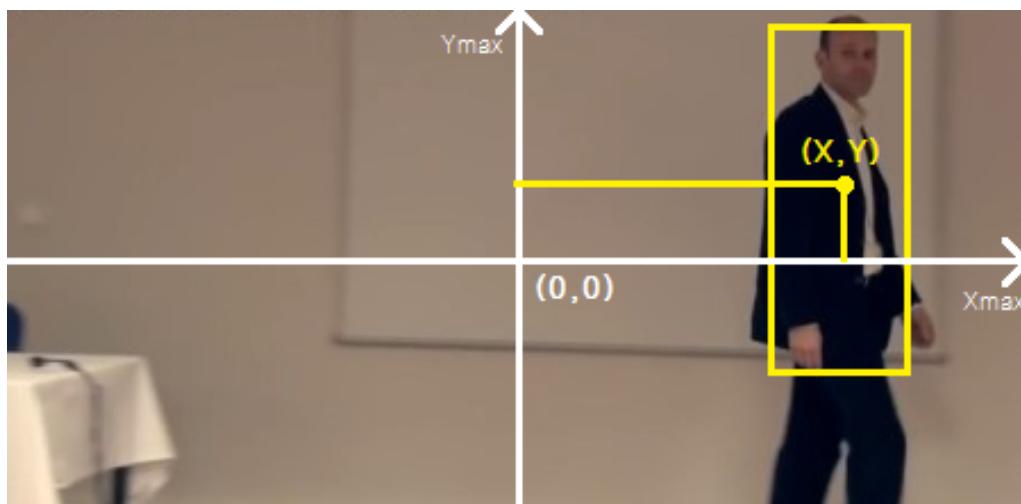
Arduino implementation



Interface

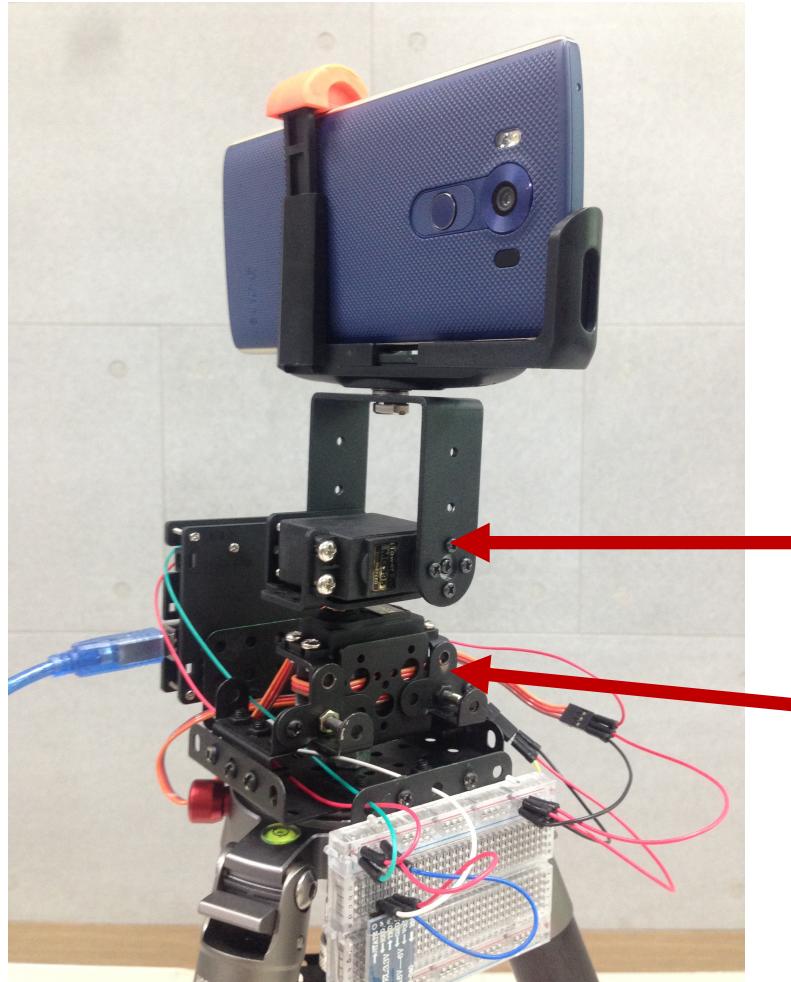
- Arduino receives the target's x, y position through the Bluetooth from smartphone app periodically(300ms).

Arduino implementation



- Set $(X, Y) \rightarrow (0,0)$
- Assume that variation of position is linear to the variation of Theta

Servo Motor action



- Motor needs delay to rotate received input theta.
- We found minimum delay for fast response experimentally
- First, motor rotates horizontally. And then, vertically.

For vertical movement

For horizontal movement

Structure



Structure



Simulation



Operating Test

Thank you!