DISTRIBUTED CAMERA SURVEILLANCE NETWORK FOR MULTI-OBJECT TRACKING

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BACKGROUND

- Existing technology involves storing and analyzing video streams at a central location
- Current setup introduces latency and is not conducive to real time surveillance
- Manual handling of individual data streams is tedious and time consuming
- Our solution aims to provide greater flexibility for the end user in analyzing captured data streams
- This is a great opportunity to assess the commercialization of our project in the field of security and surveillance

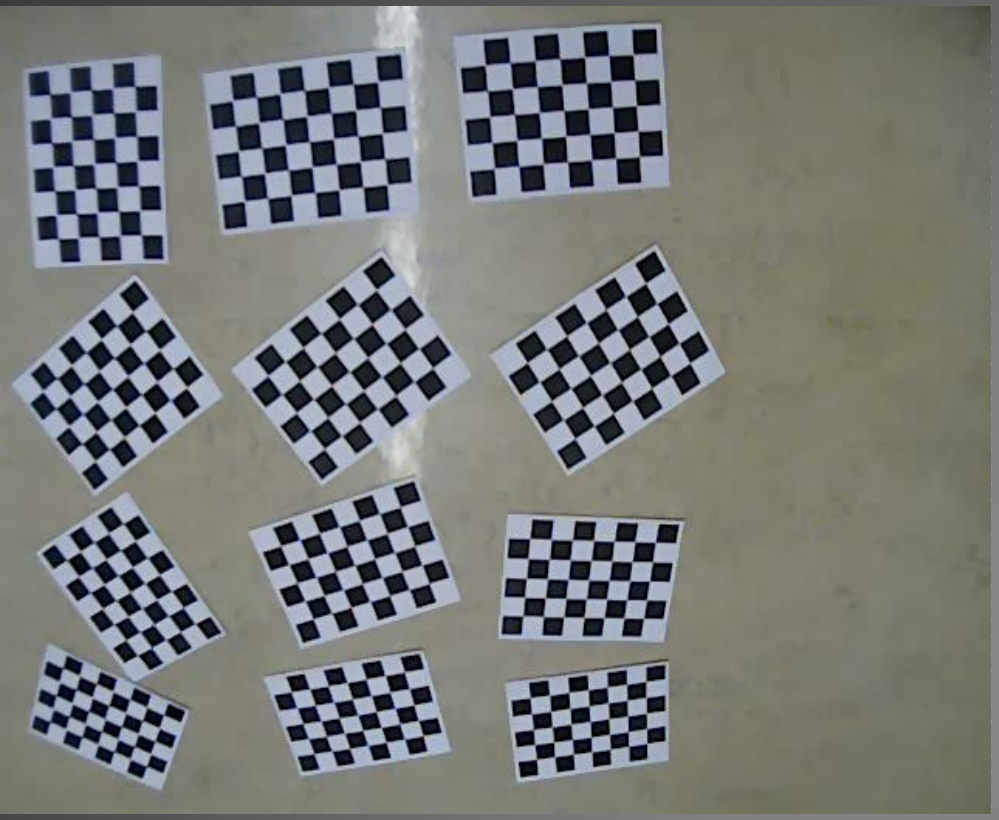
Source: http://www.ianvisits.co.uk/blog/2008/06/27/too-many-security-cameras-or-too-much-hype

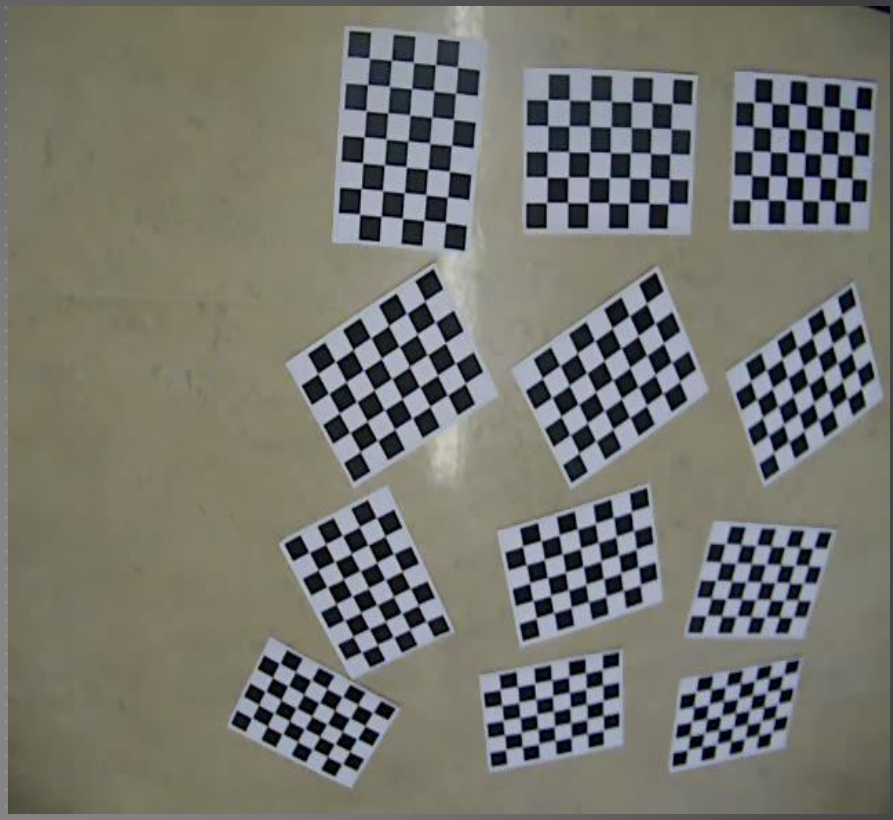
PROGRESS SUMMARY

- Creating a controlled environment.
- Using video feeds from two cameras.
- Tracking a moving object
- Producing a single-point video centre

CREATING A CONTROLLED ENVIRONMENT

- A control environment was created as shown in the next slide.
- Points on this environment are mapped to a global reference plane using homograpghy
- This environment allows us to determine a reference plane (discuss later-on). It includes the following
  - --Two video feeds from two cameras are used to generate this controlled environment. Each video is processed individually.
  - --They are named left and right video clips.
  - -- A moving object (pop can)





BLOB ANALISYS

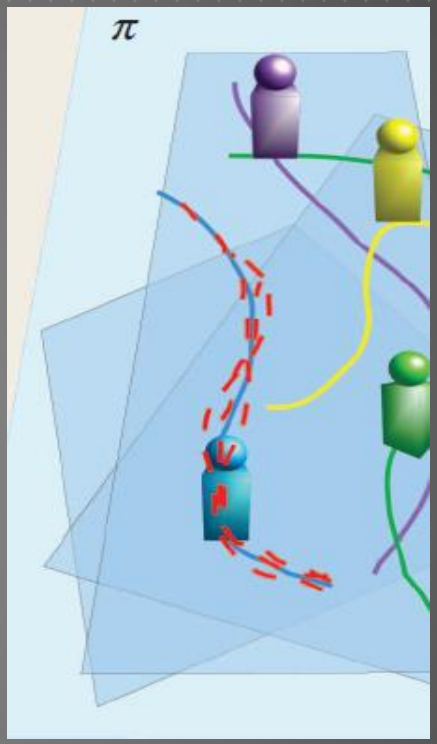
- Blob analysis or blob detection is a technique to detect group of connected pixels (blobs) which are likely to correspond to a moving object.
- The whole view is divided into two sections – Background and Foreground. Foreground refers to the moving object (a can in our case).
- With Blob analysis, Foreground remains bright, keeping the background dark. This process is called Background subtraction.
- In blob analysis, characteristics such as area, centroid and the bounding box are computed.
- Centroids are more reasonable parameters for future calculation as they act as center of mass of an object

KALMAN FILTER

- After detecting moving object, tracking is performed using Kalman Filter.
- Kalman filter is an algorithm that produces an estimation of navigation of moving object. For our project, it helps to create track of the moving can.
- Kalman filter predicts the location of track in each frame. Its role becomes more crucial for multi object tracking as it has capability of determining likelihood of each detection being assigned to each track.

TRACKS

- Associate moving objects with a path
- Calculate co-ordinates of the centroid from Blob Analysis
- Depict individual points to form a track for each camera node
- Represent the tracks from each node to obtain the entire track for the global scene



Source: Multi-view multi-object detection and tracking, in Computer Vision: Detection, Recognition and Reconstruction, R. Cipolla,S. Battiato, and G. M.Farinella, Eds. New York: Springer-Verlag, 2010, ch.8, pp.263–280

GLOBAL REFERENCE FRAME

- Combine the views from different camera into one global view
- It allows us to display the track of any moving object as seen from different cameras as one single track.

NEXT STEPS

- Increase the number of cameras
- Decrease the amount of overlapping among cameras
- Introduce a person as the moving object

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THANKS