

# Plane Extraction on Surfaces

Connie Wu

Department of Electrical Engineering, Stanford University



## Motivation

- Track a section of a plane so that a user can place a 3D object on the surface
- Useful for augmented reality applications

## Background

- Track features (corners) and minimize the number of features dropped between frames
- Minimize the translational error
- Marker less- can track in any scene that has texture
- Tracks all features in the frame for more stability

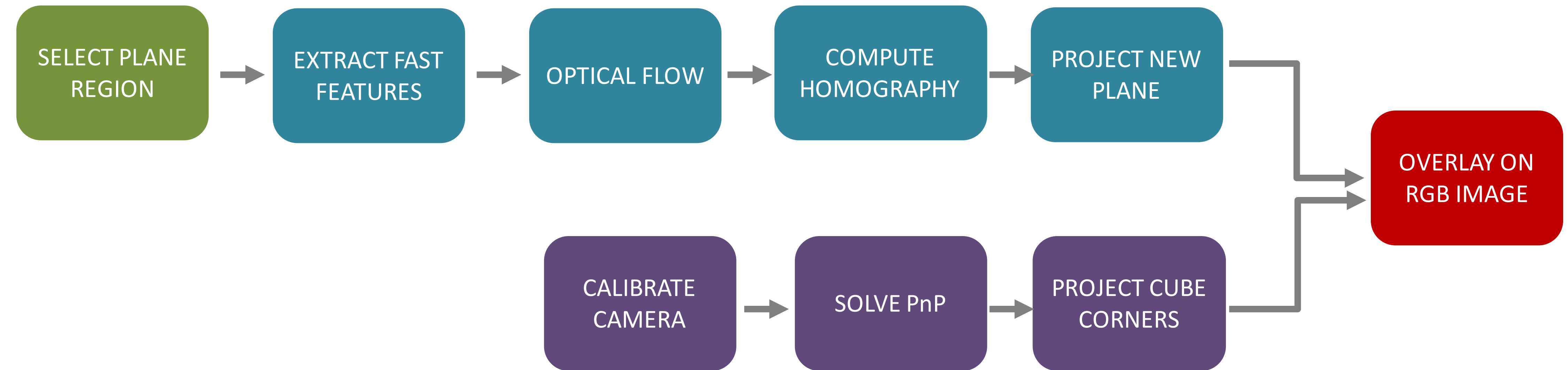
## Metrics

Method	Pixel Error	Retention Rate	# of Features
ORB	27.679	0.275	40
Optflow FAST	0.548	0.991	1462
Optflow Shi-Tomasi	0.071	0.995	205

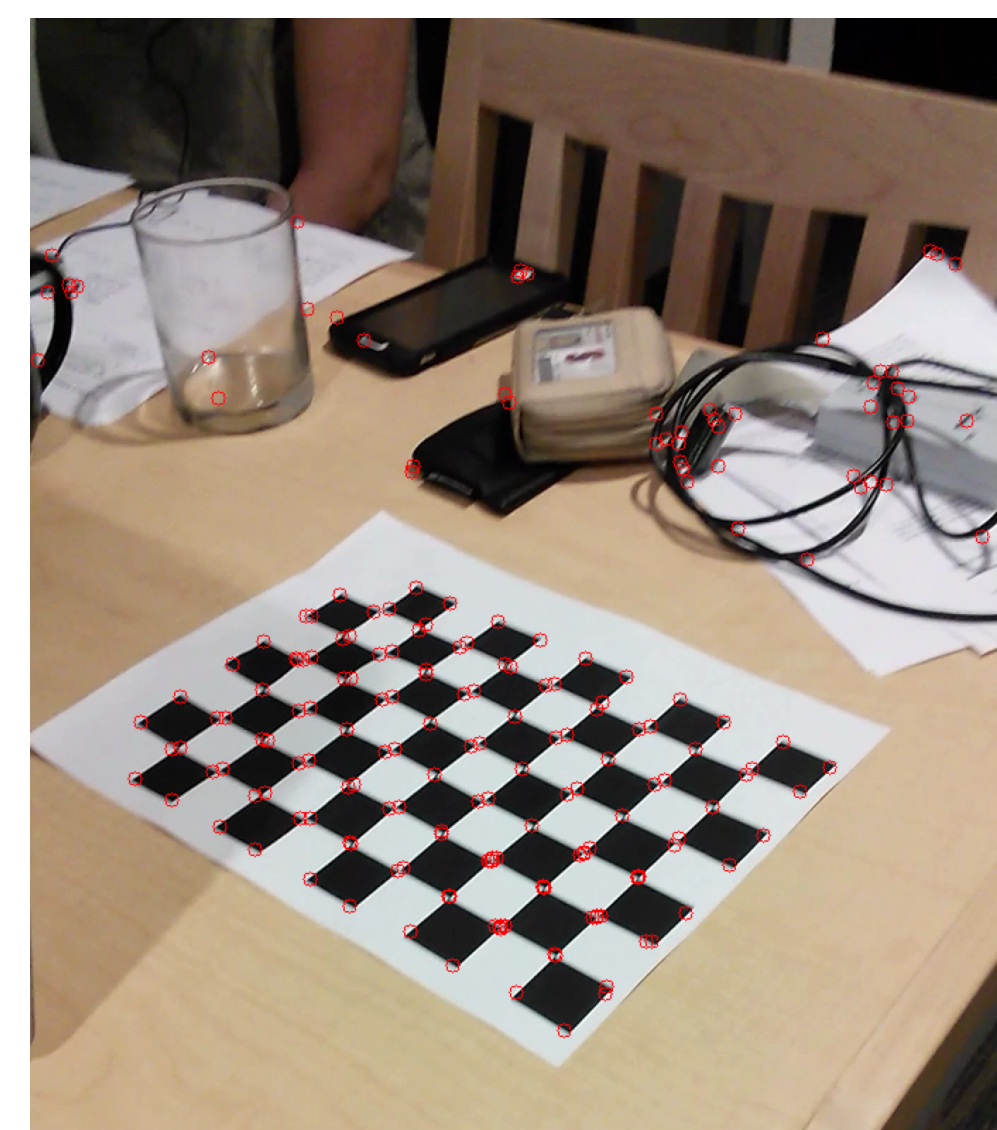
## Future Work

- Speed up computation with GPU
- Can use SLAM-based methods to create a 3D map
- Loop-closure
- Direct methods to increase speed

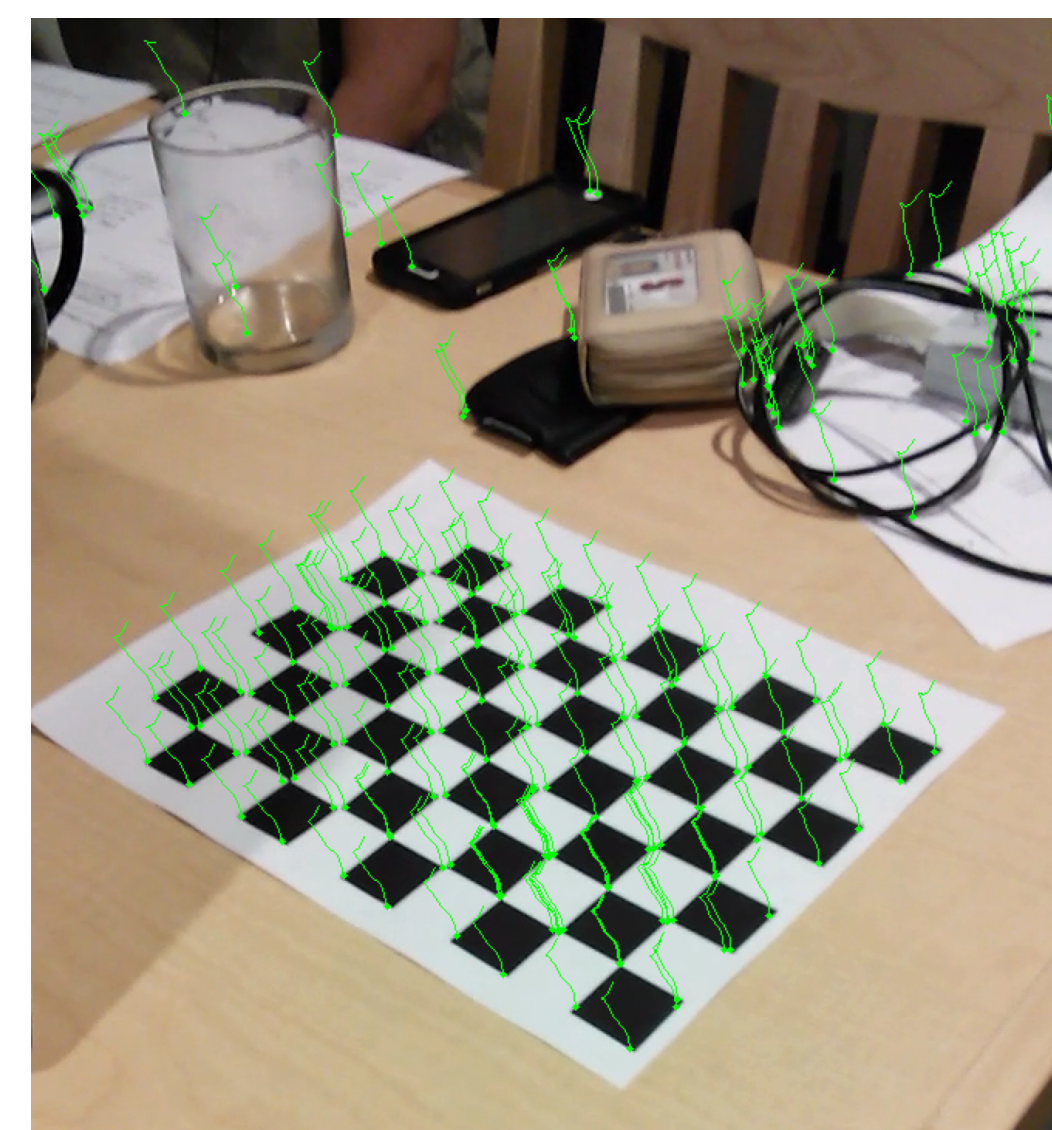
## Method/Pipeline



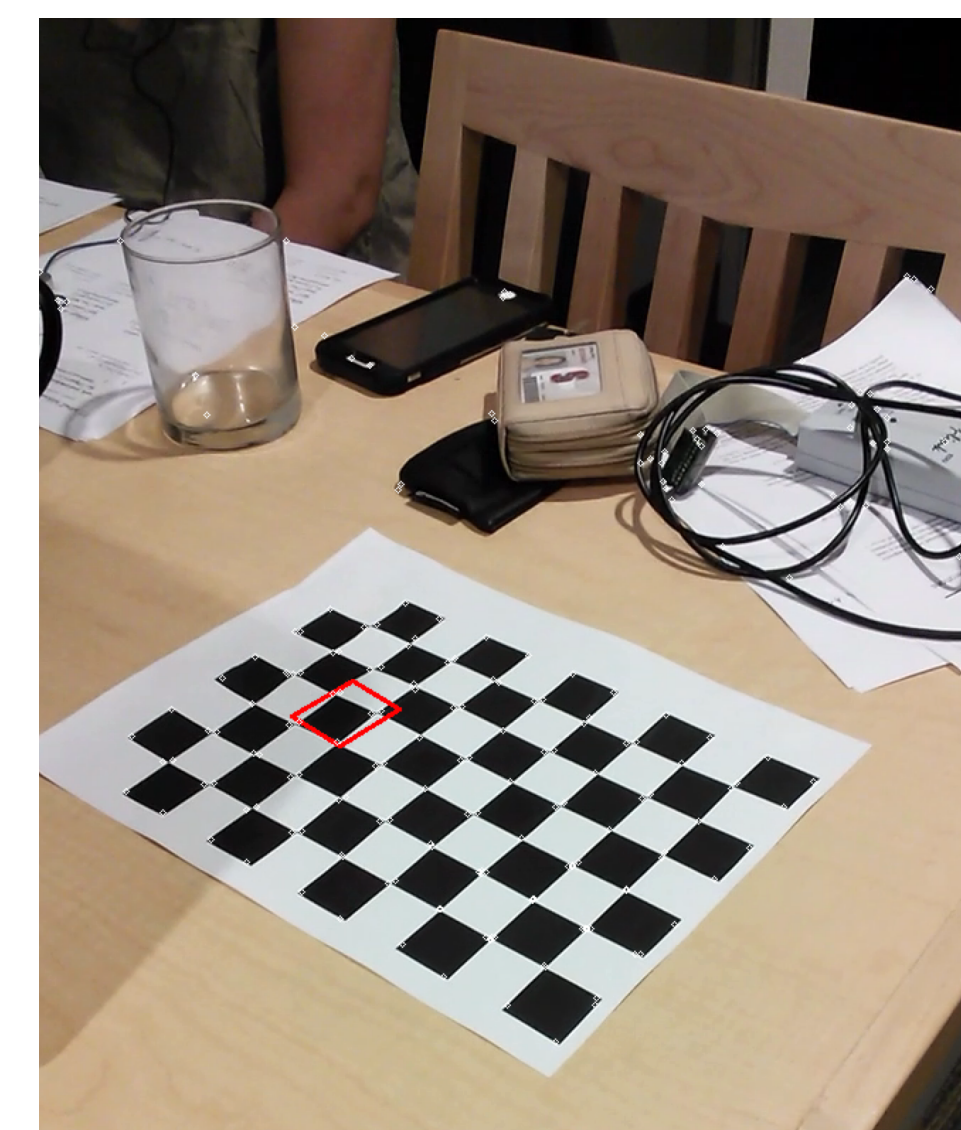
## Experimental Results



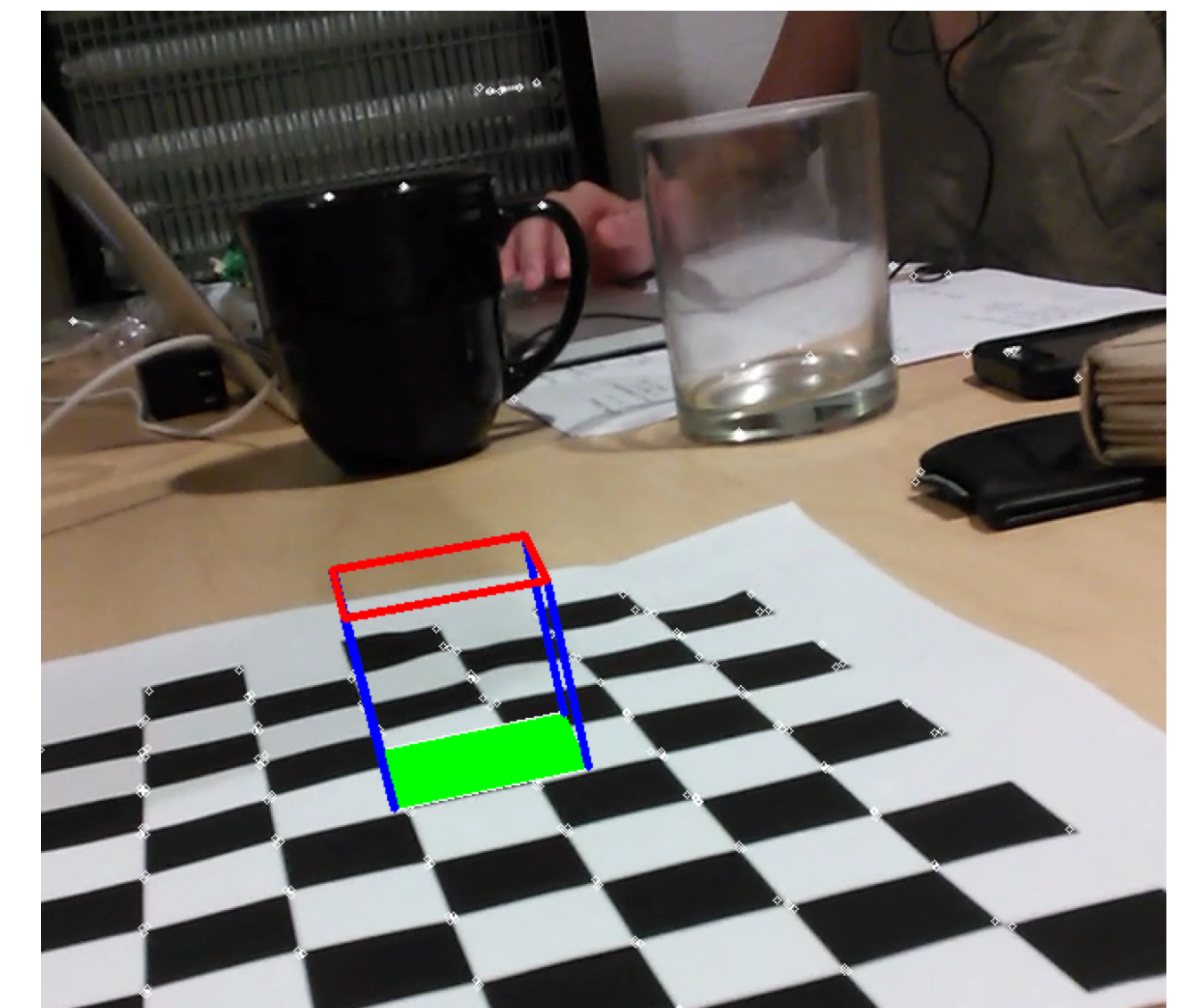
Extract Features



Optical Flow Trajectory



Plane Placement



Cube Projection

Tuning parameters led to varying performance as well. More features and smaller pixel error had better tracking.