Real-time 3D Face Tracking and Modeling From a Webcam
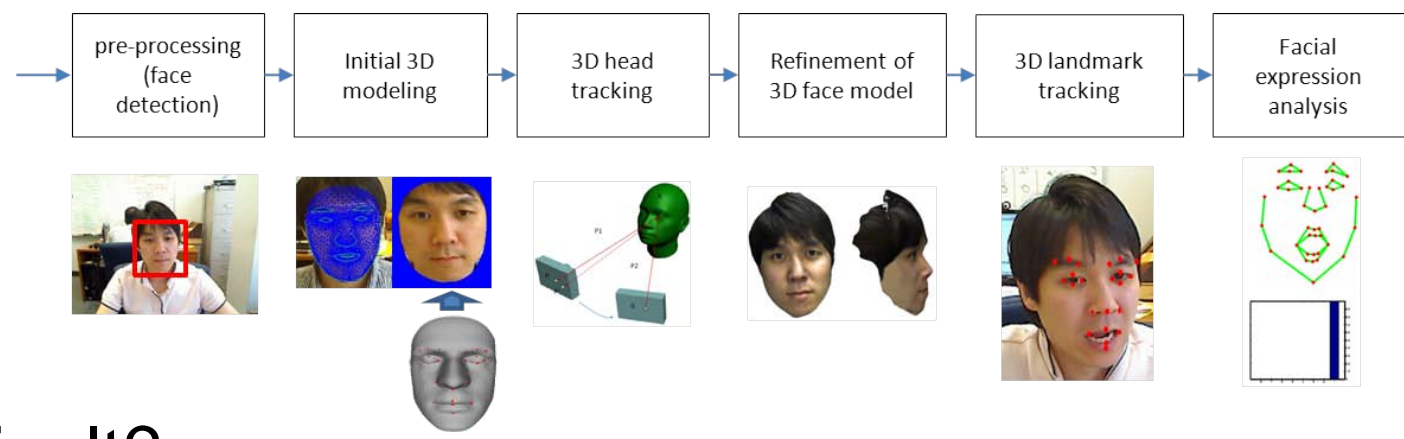
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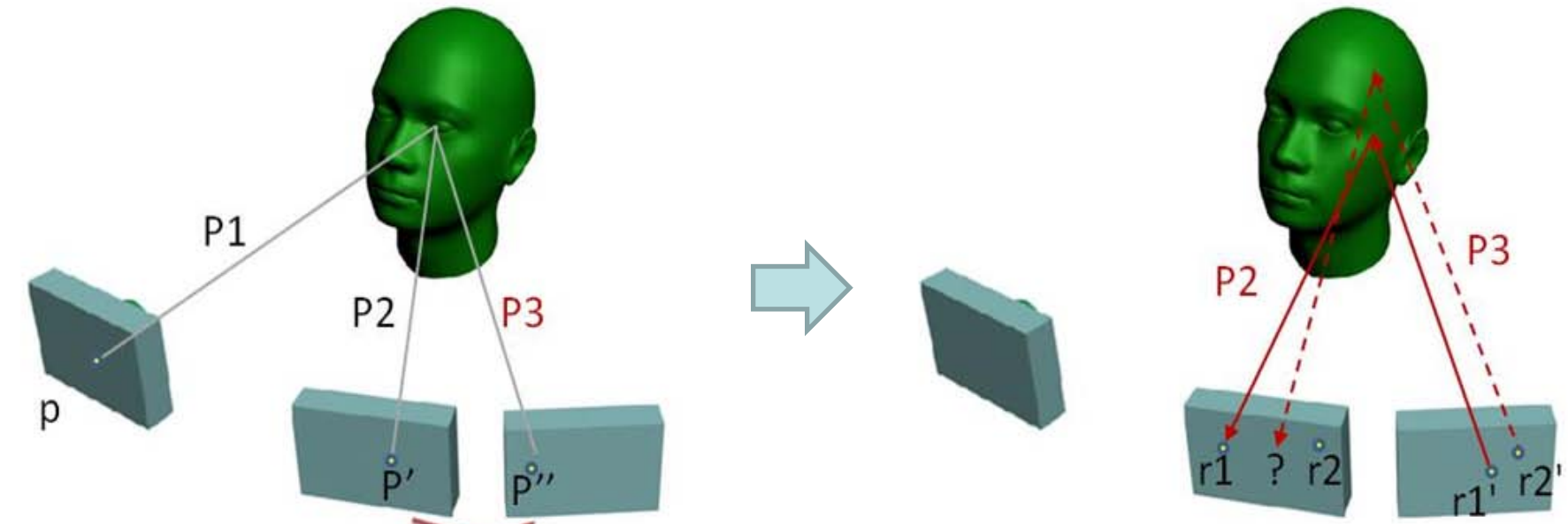
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Introduction

- Input: video from webcam
- Output: 3D (6dof) pose of face

- Why difficult?
  - (self-)occlusion, outliers, expressions, …
- Key idea
  - Build 3D face model and use it for tracking

Proposed Method

Initial 3D modeling

- ASM fit to 2D facial landmarks
- Warp 3D generic face model
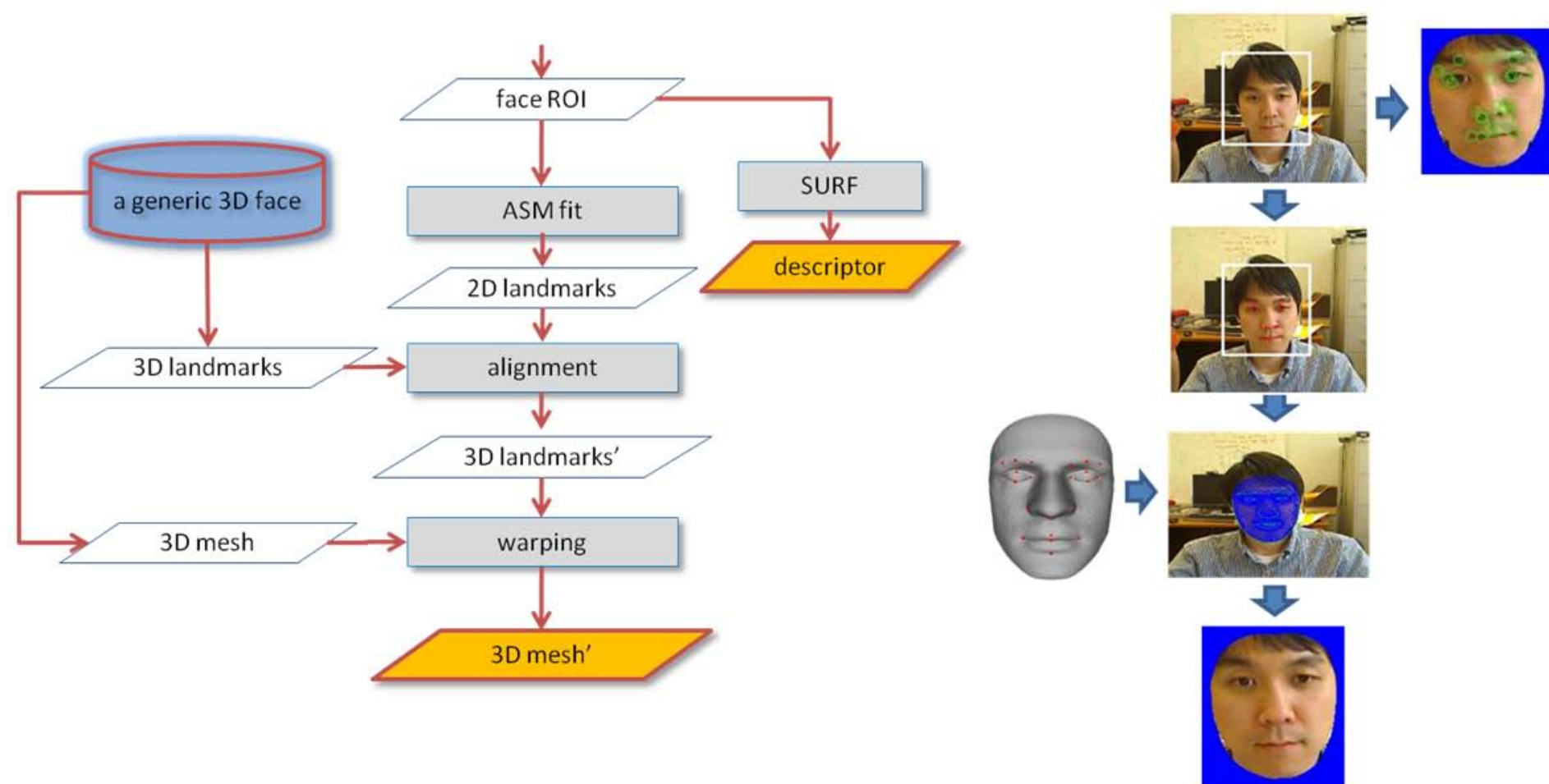
3D pose from tracked keypoints

- Initialization

$P1 = K [R0, t0]$

R = identity matrix

3D pose using RANSAC + PnP method

- 2D tracking followed by 3D computation (RANSAC + PnP)

Adding new keypoints

- To handle wide pose angles

Re-acquisition

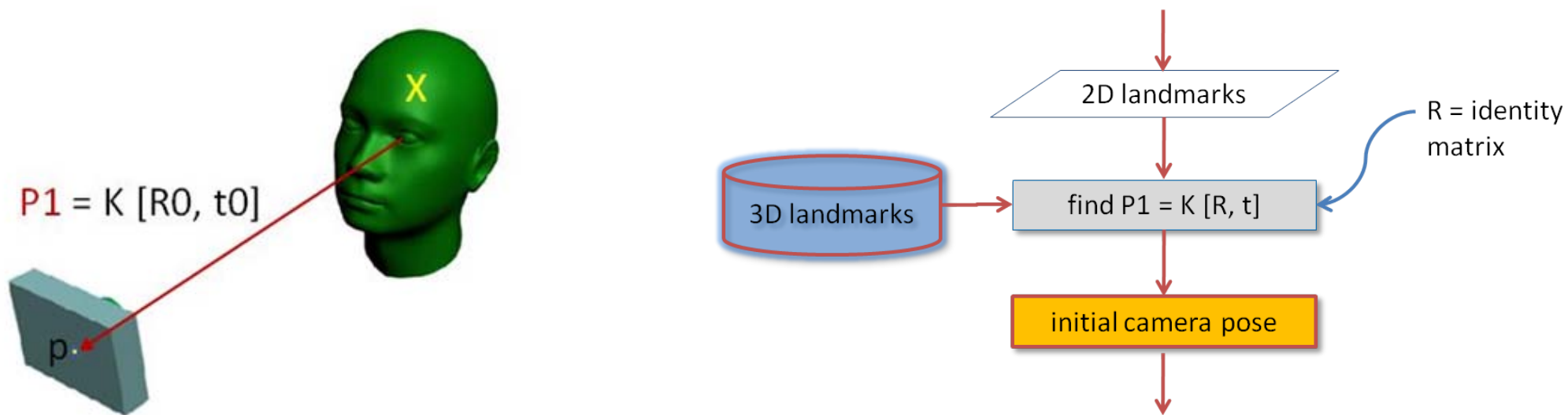- Reacquisition after tracking loss
- Using stored descriptors (SURF)
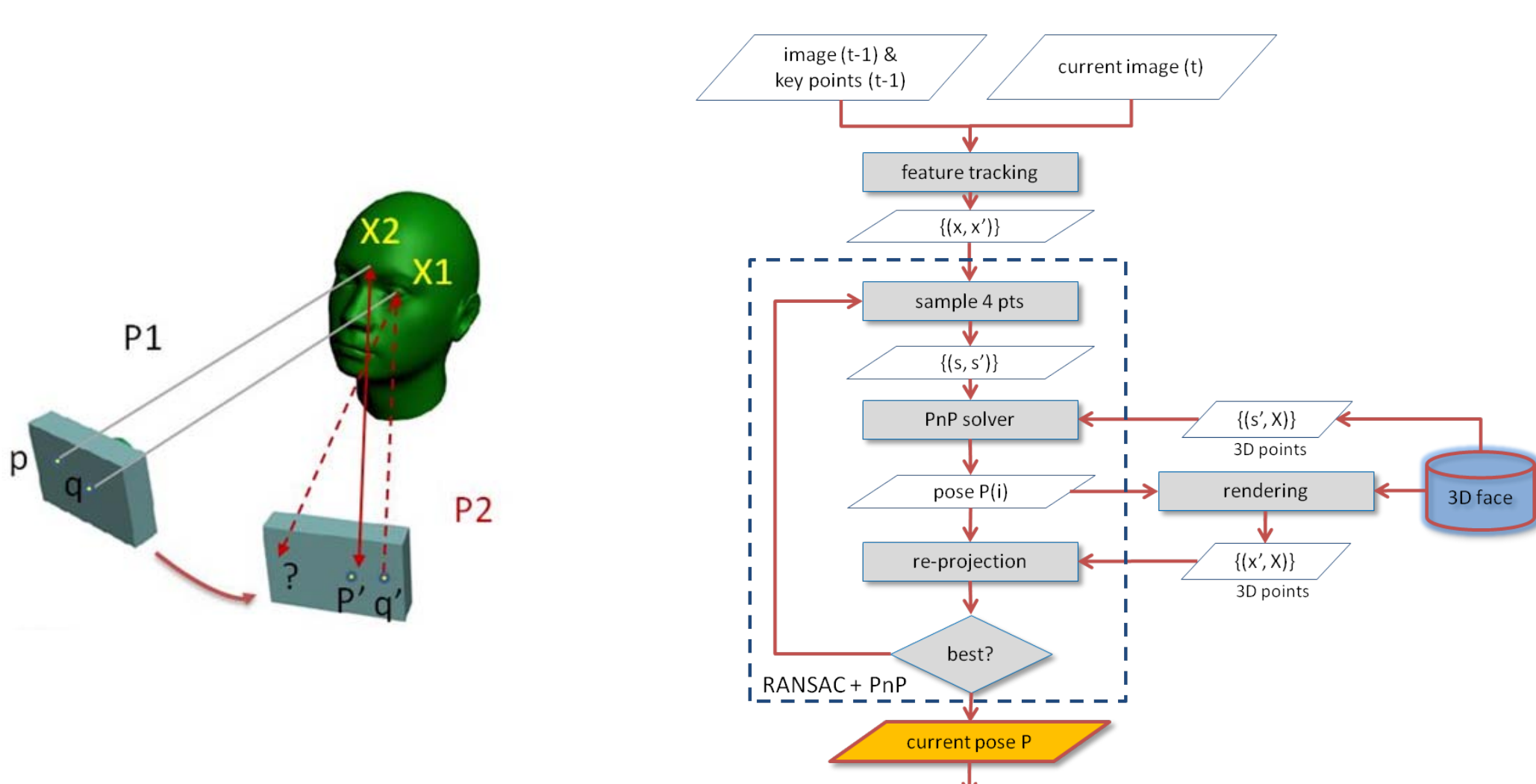
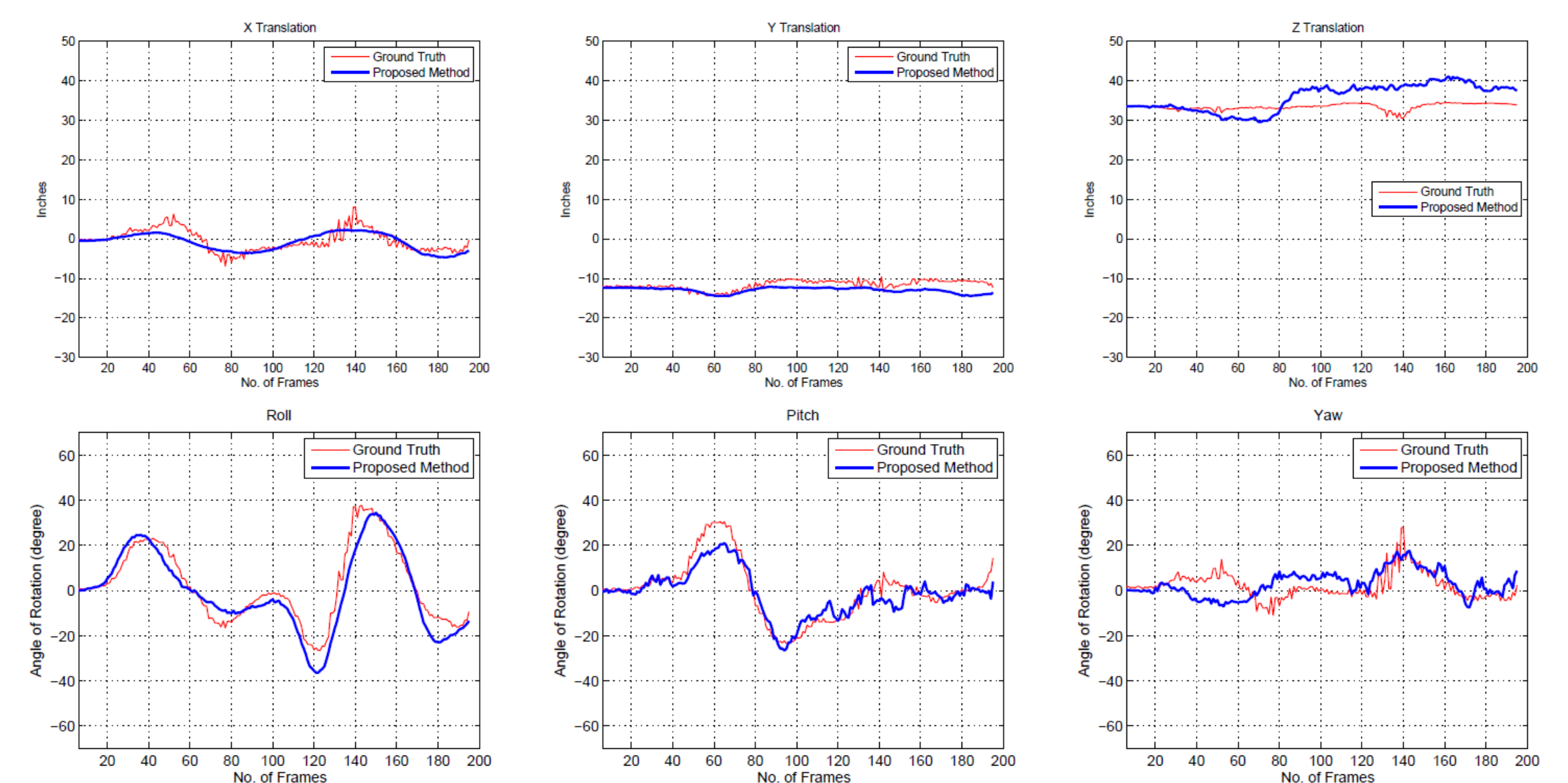## Experiments

- From videos and live input

fast motion

rotation (pitch)

- From videos and live input

Conclusion and Future Work

- Real-time, accurate, robust 3D face tracking
- Pros and cons

  (+)

  Robust and fast, real-time (>15Hz)

  Range (X: ±70°, Y: ±90°, Z: 360°)

  Distance (~1.8m, 30 pixels between eyes)

  Robust to facial expression changes

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  Computation (GPU-SURF, rendering, …)

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