

Optical Flow Based Detection

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Movement in a marker-less world



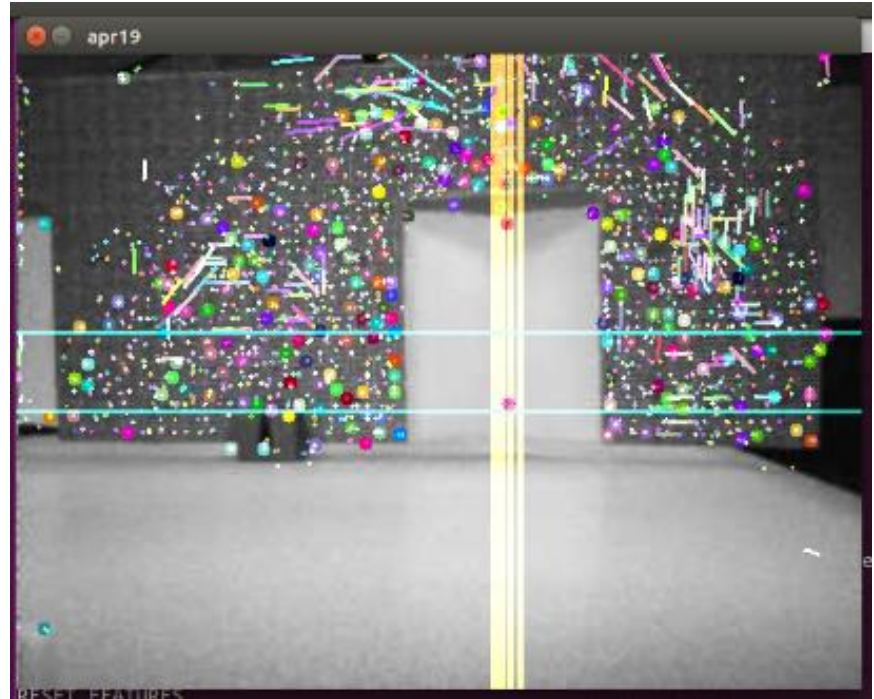
- Navigating surfaces without the help of ArUco markers using optical flow
- Keeps track of a set of “good” features, and tracks the distances those points move over multiple frames
- Finds and traverses through doorways by looking for gaps in feature clusters
- Dodges (sufficiently-textured) obstacles

Challenges

- (1) Maintaining perfect alignment in the absence of marker data
- (2) Differentiating between close-range and faraway objects in an accurate manner without too many false positives

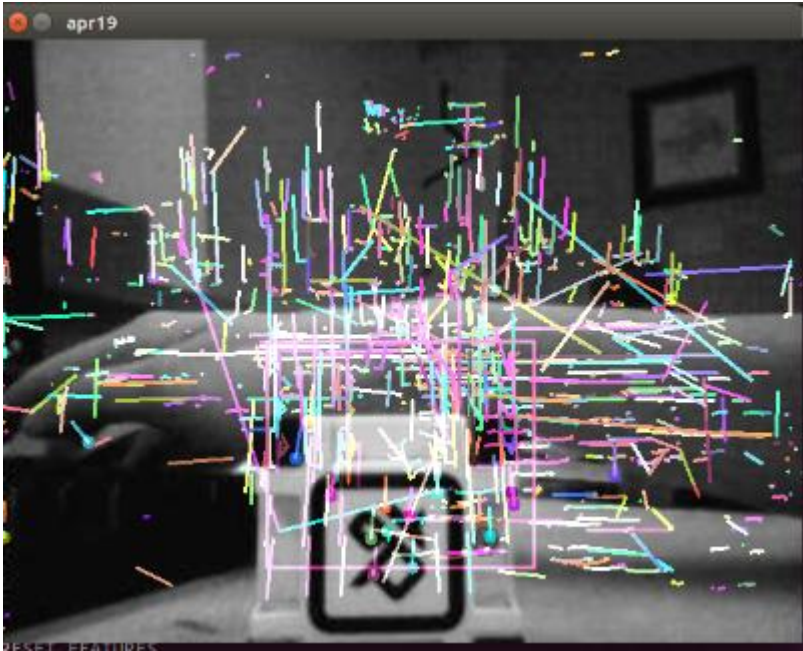
Solutions:

- 1) Gradually turning until proportion of points and large gap is detected in centre
- 2) Blocking the doorway with sheets of blank paper & carefully adjusting distance threshold parameters



Cozmo's view: calibrating for the centre of a doorway given a set of detected points

Future Work



Optical flow returns distance between similar points in adjacent frames. Obstacle detection occurs in a small region in front of the robot

- Better detect close-range objects versus those in the distance to reduce reliance on covered doorways
- Integrate the path planner with obstacle detection for real-time feedback
- Testing in more varied environments
- Fully integrate behaviors and animations with current source code