



Flash Talk: Autonomous Drone Landing

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Overview

- ▶ Drone flight – largely automated



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... except for landing
- ▶ Landing – hard and risky



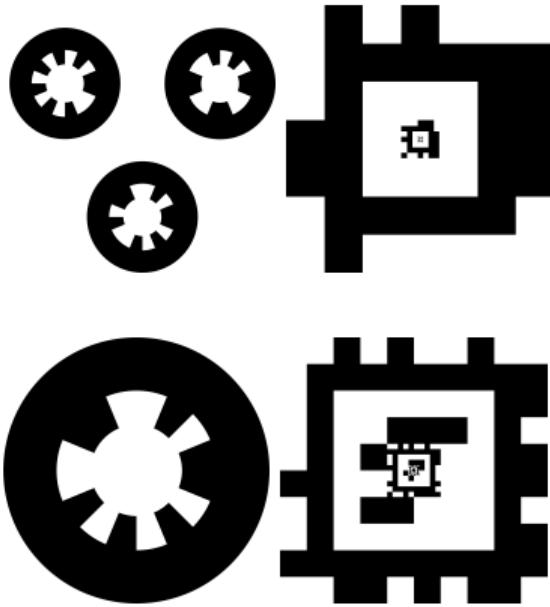
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... except for landing
- ▶ Landing – hard and risky
GPS is not precise enough
Beacons require extra infrastructure



- ▶ Drone flight – largely automated
 - ... except for landing
- ▶ Landing – hard and risky
 - GPS is not precise enough
 - Beacons require extra infrastructure
- ▶ Focus: efficient processing, passive ground infrastructure



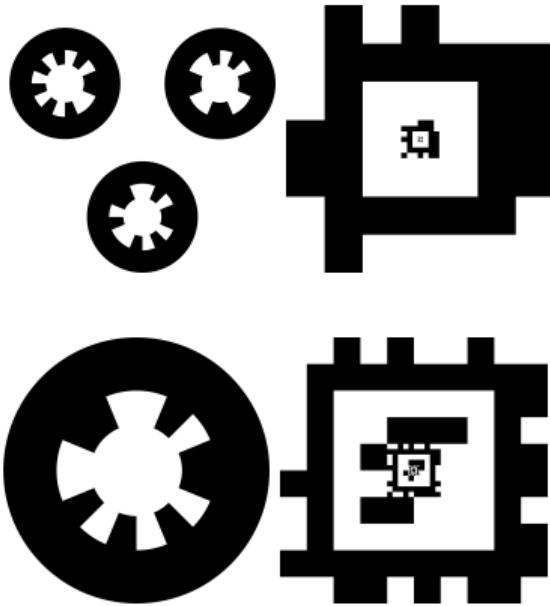
Part 1: Fiducial Markers



- ▶ Passive
- ▶ *Theoretically* only need a monocular camera



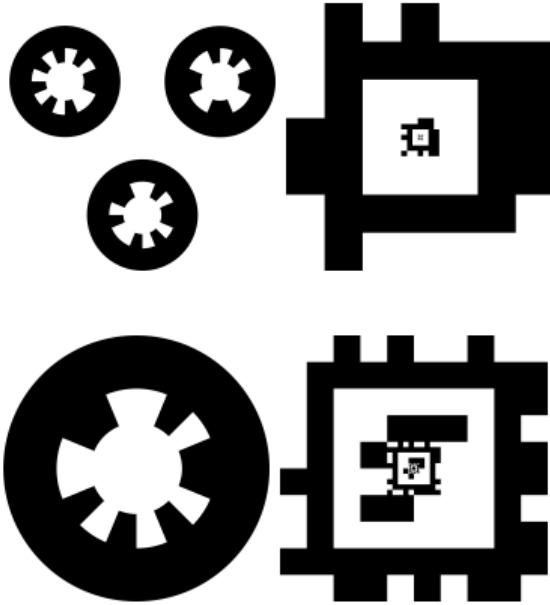
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Orientation ambiguity problem



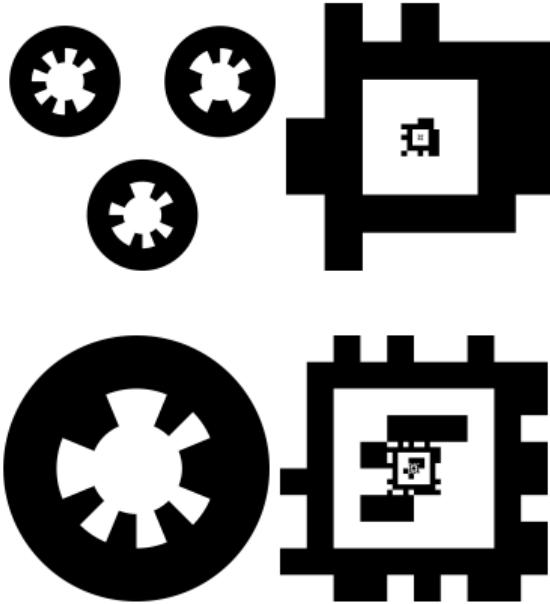
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Orientation ambiguity problem
- ▶ Fixed-camera paradigm



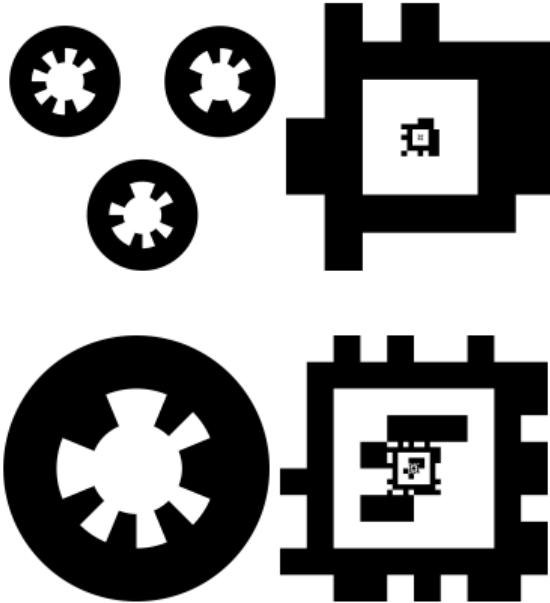
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Orientation ambiguity problem
- ▶ Fixed-camera paradigm
- ▶ Contribution: moving-camera paradigm
([Video](#))



Part 1: Fiducial Markers



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Orientation ambiguity problem
- ▶ Fixed-camera paradigm
- ▶ Contribution: moving-camera paradigm
([Video](#))
- ▶ Next: use orientation from camera IMU
(unambiguous)

Part 2: Terrain Analysis



- More flexible



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- ▶ More flexible
- ▶ Solidified lava flows



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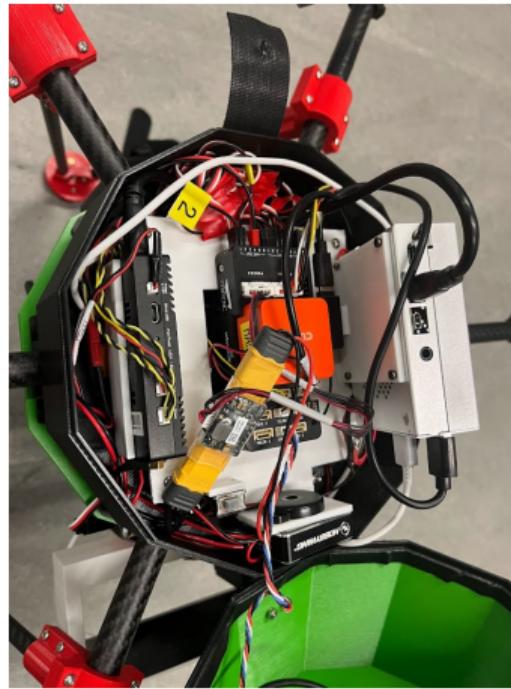
- ▶ More flexible
- ▶ Solidified lava flows
- ▶ Application: Mars exploration/geology
(RAVEN, analog research)
- ▶ D455 Depth Camera
- ▶ Google Coral, Jetson Nano, Raspberry Pi



Depth Drone



Depth Drone



Depth Drone



[Video](#)

Ask me questions

