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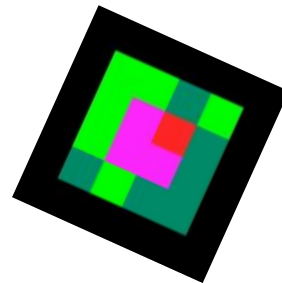
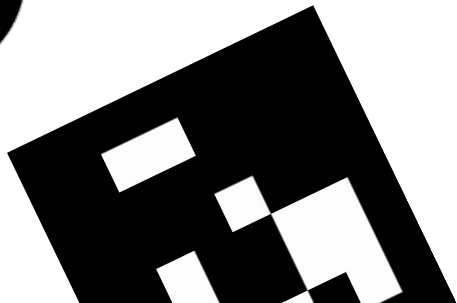
Artificial
Vision
Applications

A tiny introduction to fiducial markers

Software engineering

Computer vision

Pattern recognition



Fiducial markers?

- Anyone can guess what are they?
- Artificial fiducial markers?
- Usages?

Are they uncommon?

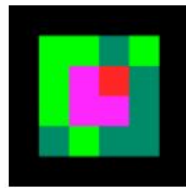
- How many types?
- How we define what is an artificial fiducial marker?
- How are they detected and used?



Intersense



TopoTag



ChromaTag



AprilTag



RuneTag



CCTag

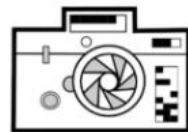


Aruco



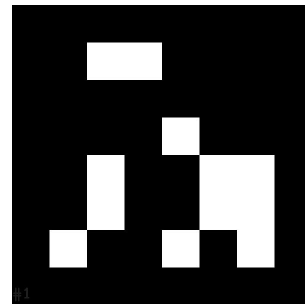
Stag

And much more!

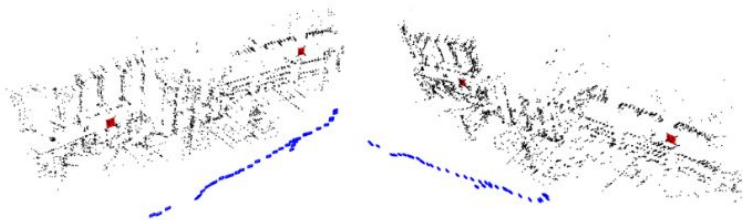


Jumarker

Aruco: A widely used artificial fiducial marker system



[1] Aruco: Generated marker example



[2] UcoSLAM: Reconstruction example combining keypoints detection plus aruco markers



[3] DodecaPen: Accurate 6DoF Tracking of a Passive Stylus

[1] S. Garrido-Jurado, R. Muñoz-Salinas, F. J. Madrid-Cuevas, and M. J. Marin-Jimenez. Automatic generation and detection of highly reliable fiducial markers under occlusion.

[2] Rafael Muñoz-Salinas and R. Medina-Carnicer. Ucoslam: Simultaneous localization and mapping by fusion of keypoints and squared planar markers.

[3] Po-Chen Wu, Robert Wang, Kenrick Kin, Christopher Twigg, Shang-chen Han, Ming-Hsuan Yang, and Shao-Yi Chien. Dodecapen: Accurate 6dof tracking of a passive stylus.

References

Artificial Vision Applications

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- <https://twitter.com/ucoava?lang=es>

Fiducial markers

- **Intersense** → L Naimark and E Foxlin. **Circular data matrix fiducial system and robust image processing for a wearable vision-inertial self-tracker.**
- **TopoTag** → Guoxing Yu, Yongtao Hu, and Jingwen Dai. **Topotag: A robust and scalable topological fiducial marker system.**
- **ChromaTag** → Joseph DeGol, Timothy Bretl, and Derek Hoiem. **Chromatag: A colored marker and fast detection algorithm.**
- **AprilTag** → Edwin Olson. **AprilTag: A robust and flexible visual fiducial system.**
- **RuneTag** → Filippo Bergamasco, Andrea Albarelli, Emanuele Rodola, and Andrea Torsello. **Rune-tag: a high accuracy fiducial marker with strong occlusion resilience.**
- **CCTag** → L. Calvet, P. Gurdjos, and V. Charvillat. **Camera tracking using con-centric circle markers: Paradigms and algorithms.**
- **Stag** → Burak Benligiray, Cihan Topal, and Cuneyt Akinlar. **Stag: A stable fiducial marker system.**
- **Jumarker** → David Jurado-Rodriguez, Rafael Munoz-Salinas, Sergio Garrido-Jurado, and Rafael Medina-Carnicer. **Design, detection, and tracking of customized fiducial markers.**