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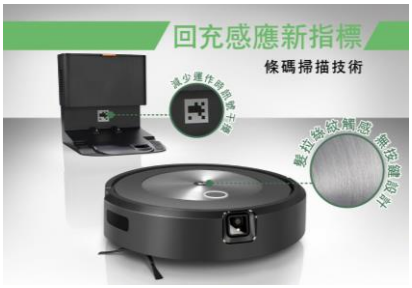
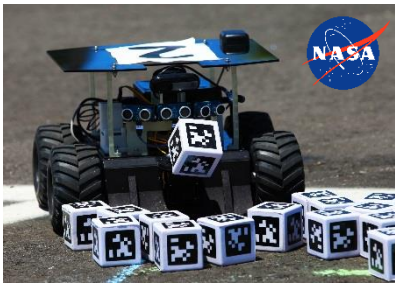
PixArt Imaging Inc.

Topic:
Visual fiducial localization system for intelligent sensing applications

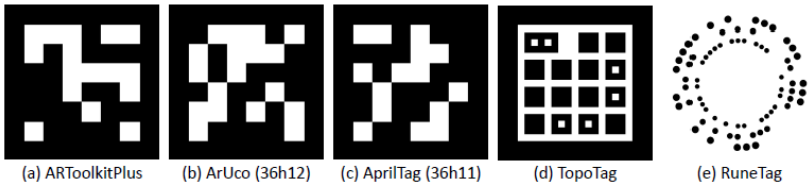


Description:

Fiducials are artificial visual features designed for automatic detection, and often carry a unique payload to make them distinguishable from each other. Visual fiducial system has many applications in computer vision, augmented reality, and robotics since they greatly simplify the perception problem. By leveraging PixArt's ultra-low-power image sensor with visual fiducial localization system, we can achieve smarter sensing and interaction for different applications.

Challenge: Visual fiducial localization system for different applications

- Step.1 Choose the fiducial marker (Ex: ARTag, ArUco, AprilTag…etc)
- Step.2 Idea proposal (What's application?)
- Step.3 Proof concept (Implementation: USB/Web camera)


(a) ARToolkitPlus (b) ArUco (36h12) (c) AprilTag (36h11) (d) TopoTag (e) RuneTag

ArUco: (OpenCV 3.0 ⇧ support)
https://docs.opencv.org/4.x/d5/dae/tutorial_aruco_detection.html
AprilTag: https://github.com/AprilRobotics

(Product) PixArt Imaging Inc.: https://www.pixart.com/products/tw/



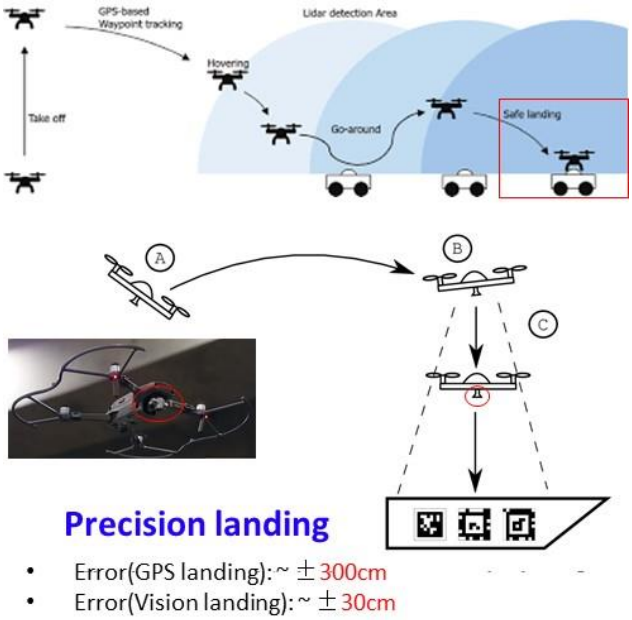
Evaluation index:

1. Innovation (40%)
2. Feasibility (30%)
3. Completeness (20%)
4. Product fit (10%)

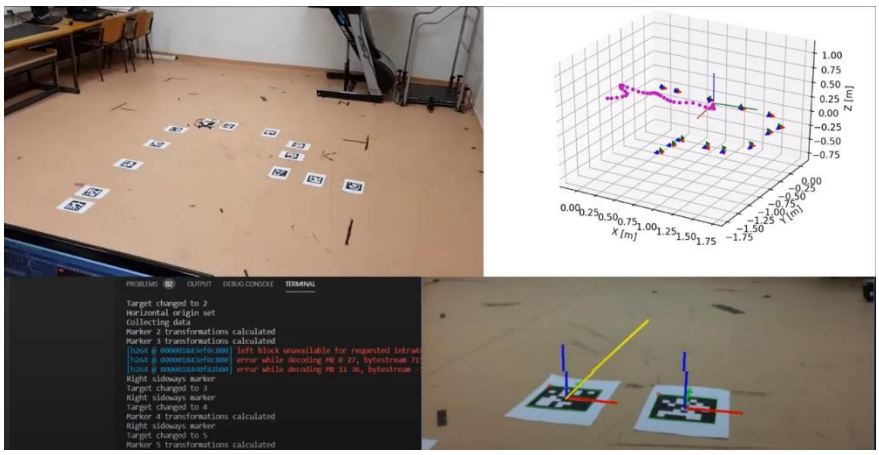
Ex 1: Precision landing (Drone)

Precision landing is a crucial ability to make drones truly autonomous. One of the main technologies is IR-LOCK for tracking an IR emitting beacon. However, the IR-LOCK sensor is expensive. Therefore, we can use the visual fiducial marker (Ex: ArUco, AprilTag) for achieving the low-cost precision landing.

Concept:



Results:



Ex 2: Body tracking system (VR/AR)

Body tracking system (VIVE tracker) can provide better immersive interaction for VR/AR. However, the VIVE tracker is expensive. Therefore, we can use the visual fiducial marker (Ex: ArUco, AprilTag) for achieving the low-cost body tracking system.

Concept:

Results: