Technical Release

kudan

Kudan Visual SLAM (KdVisual) in action: Forklift in a dynamic warehouse

Autonomous Forklifts: Manual intervention and continuous scenery changes make robot localization challenging

When we talk about intralogistics automation, low-height autonomous mobile robots (AMRs) comes first to many people's mind. However, forklift automation is as important and impactful as them. You can either deploy autonomous forklifts or retrofit existing manual forklifts into autonomous ones. In these forklift automation applications, you would face 2 major challenges.

1. <u>Operators need to switch between manual mode and autonomous mode</u>: The forklift needs to figure out its position anywhere within the mapped facility quickly and reliably when the autonomous mode engages after some manual operation. This can pose a major challenge in the typical 2D-Lidar SLAM approach. Also, the system needs to continue tracking its position even if it goes outside of the mapped area.

2. <u>Significant scenery changes over time</u>: A warehouse or factory is full of pallets sometimes and it's almost empty at other times. This type of dynamic environment is also quite difficult to deal with using 2D-Lidar or other Visual SLAM systems due to mapped features becoming unrecognizable

Kudan Visual SLAM robustly deals with these challenges with its "Robust Against Change" mode

This time, our demo showcases Kudan Visual SLAM solving these challenges in an actual warehouse environment. Our partner company, ROSTEK Vietnam, mounted an Intel RealSense D455 on a forklift in a tilted position and we tested our Visual SLAM on this dataset.

Demo video :

[Kudan Visual SLAM in action: Forklift in a scenery-changing warehouse](#)

(The data credit: ROSTEK Vietnam)
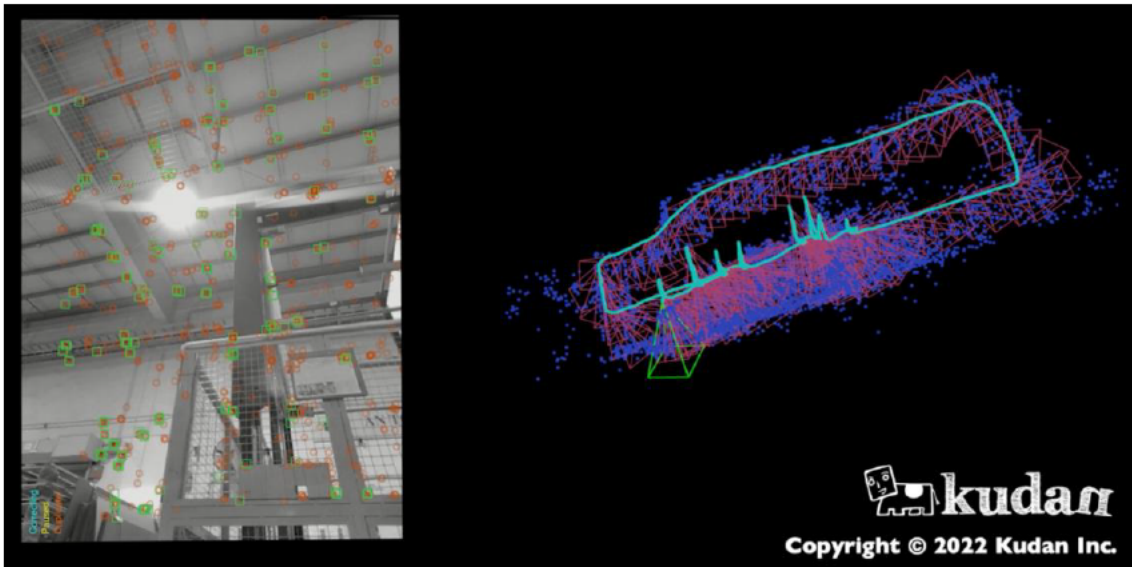
Our Visual SLAM enabled relocalization at random positions on the map and continued tracking. Also, our "Robust Against Change" mode together with the tilted camera mount allows robots to operate in environments where the scenery changes quite significantly over time. It can keep tracking on the map for a certain period of time even when 95% of the scenery is changed.

Here are some of the details of the environment,

- Size of the area: 120 x 15m. Total trajectory length of the localization was ~320m
- Sensor: Intel RealSense D455
- The SLAM video is processed and generated in real-time frame rates

Please feel free to reach out to us if you operate within these types of environments or have other challenging environments that you need a solution for. See the difference commercial-grade Visual SLAM software can make compared to 2D-Lidar SLAM or other open-source Visual SLAM software that may be part of your solution. We are happy to solve the problems together.

(For reference)

Usecase with ROSTEK

[Kudan Visual SLAM (KdVisual) in action: In an operating factory for autonomous mobile robots](#)

About Kudan Inc.

Kudan (Tokyo Stock Exchange securities code: 4425) is a deep tech research and development company specializing in algorithms for artificial perception (AP). As a complement to artificial intelligence (AI), AP functions allow machines to develop autonomy. Currently, Kudan is using its high-level technical innovation to explore business areas based on its own

milestone models established for deep tech which provide wide-ranging impact on several major industrial fields.

For more information, please refer to Kudan's website at https://www.kudan.io/.

■Company Details

Name: Kudan Inc.

Securities Code: 4425

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■For more details, please contact us from here.