

FlyMeThrough

FlyMeThrough is a platform for generating 3D maps of interior spaces using only consumer video capable drones, implementing a human-AI annotation pipeline to maximize the efficiency of labeling points of interest on the reconstructed map.

What is the Problem?

Three-dimensional mapping of indoor spaces can be vital for large public spaces such as offices, train stations, stadiums, etc. However, this data is often outdated or scarce. Generation of these maps involves either the transformation of CAD building plans or the deployment of dedicated 3D scanning hardware and services. Both avenues to 3D mapping are high cost and labor intensive, requiring specialized equipment and knowledge. This reliance on expensive methods limits the scalability of these models and thus their ability to be automated.

Automated solutions have emerged in academic research, yet often still rely on expensive hardware. In addition, fully automated approaches to mapping an indoor space tends to be inflexible; points of interest (POIs) are highly variable depending on the type of structure to be mapped, something which automated models are not good at accounting for. Therefore, there is a need to develop a scalable platform for 3D mapping of large interior spaces, automating what can be automated while using more accessible hardware.

What is the Solution?

FlyMeThrough is a human-AI collaborative indoor mapping platform that uses RGB footage from off-the-shelf consumer drones to build a 3D map of an interior space. Points of interest are labeled through collaboration between AI automation and a human familiar with the space, who can provide input on the types of POIs present and what should or should not be included. This is performed and reviewed through an open-source platform, including a user interface designed to be easy to use.

What is the Competitive Advantage?

FlyMeThrough introduces two key contributions among approaches to 3D indoor mapping. First is the reliance on only RGB video data; this bypasses the need for specialized LiDAR drones, which can cost orders of magnitude more expensive than the RGB video drones on the consumer market. The second is the human-AI collaborative annotation pipeline; this model allows users to define and create POIs that would be marked on the maps, balancing task automation with the flexibility to adapt to many different priorities. A user study was performed, where both building managers and occupants tested the interface and mapping system. Participants found the interface intuitive, giving a generally positive rating for the

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Authors

Jon Froehlich

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system's overall quality. Overall, FlyMeThrough significantly improves the cost savings, scalability, and flexibility of 3D indoor mapping for large interior spaces.

References

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