ARIA
APPLIED RESEARCH IN ACTION

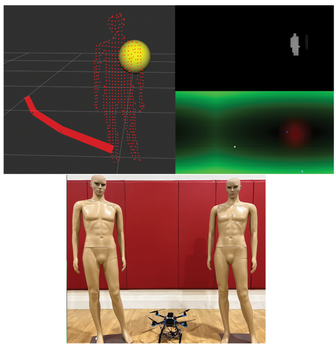
Reactive-Proactive Obstacle Avoidance for Autonomous UAVs in Dynamic Indoor Environments

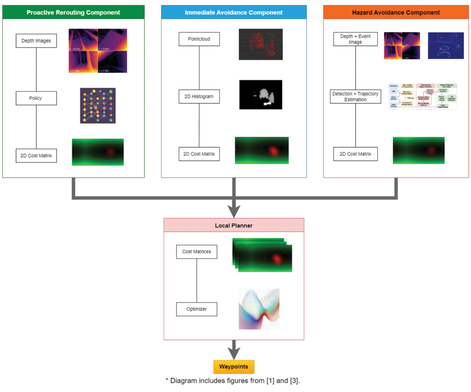
Drones Coexisting Peacefully with Humans & Gracefully Evading Unplanned Encounters

Jazib Ahmad

Igor Gilitschenski
ACADEMIC SUPERVISOR

Sunil Jacob
INDUSTRY SUPERVISOR





* Diagram includes figures from [1] and [3].

PROJECT SUMMARY

Structured industries have been revolutionized by robotics, but now the focus is on the more complex, human-populated unstructured environments. Safety, once a byproduct of isolation, now hinges on advanced autonomy in robots. SOTI's development of an autonomous indoor drone is an example of such a system that is expected to operate safely alongside human agents in cluttered indoor environments. However, the existing obstacle avoidance systems have not kept up with the increasing safety expectations of an indoor, cluttered, and dynamic environment with humans. To bridge this gap, we unveil a tri-component system: one component leverages depth images, proactively rerouting around dynamic obstacles with our novel learning-based method; the second employs a pointcloud combined with the 3DVFH* algorithm for swift, close-range obstacle avoidance; and the last uses an event camera, deftly dodging fast-approaching hazards. These components are modular for flexible integration. To unify these components into a single system, each component generates a cost matrix, which are then collectively analyzed to chart the most efficient course. Validated through simulations (Gazebo and AirSim) and real-world drone tests, our system excels in navigating intricate environments such as a dynamic office space, impressively doing so in real-time without relying on any prior environmental mapping.

REFERENCES

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SOTI

Computer Science
UNIVERSITY OF TORONTO
Master of Science in Applied Computing