RESEARCH2030

AUTONOMOUS WHEELCHAIR

Collision Avoidance with Depth Camera

Applied Autonomy Lab

Digital Futures Mentor: Bryan Kowalczyk

Akshaya Bala Subramani

Computer Science

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What?

What was your research project & what was your role?

Project Overview:

- **Objective:** Develop an autonomous vehicle capable of making smart decisions without human intervention.
- **Applications:** Enhancements for specific tasks such as delivery, human assistance, etc.
- **Specific Focus:** Autonomous wheelchair tailored for assisting individuals with mobility challenges.

Project Goals:

- **Autonomous Navigation:** Ensure the wheelchair can effectively sense its surroundings.
- **Human Assistance:** Enable the wheelchair to assist users in daily mobility tasks without human intervention in controlling it.

My Role:

- **Task Assignment:** Exploration of potential strategies for autonomous functionalities.
- **Focus:** Integration of Intel RealSense Depth Camera D435i.
- **Contribution:** Developed algorithm for environment sensing and obstacle detection.

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So What?

Why Does This Research Project Matter To You, The Future, And/Or The World?

Significance to Me:

•**Real-World Problem Solving:** Opportunity to address and solve practical mobility challenges.

•**Learning Opportunity:** Gained hands-on experience with cutting-edge technology.

•**Interdisciplinary Knowledge:** Expanded my expertise across multiple fields such as robotics, ROS, OpenCV, and sensor integration.

Future Implications:

•**Advancing Mobility Solutions:** Developing more reliable and efficient transportation options.

•**Innovative Healthcare:** Enhancing the quality of life for individuals with mobility impairments.

•**Technological Progress:** Contributing to the broader field of autonomous/smart systems and AI.

Global Impact:

•**Social Benefits:** Providing greater independence and mobility to those in need.

•**Economic Advantages:** Potential to reduce healthcare costs and increase productivity.

•**Sustainability:** Promoting smarter, more efficient transportation systems.

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Now What?

How Has This Experience Affected You And What Will You Do As A Result Of Your Growth And Transformation?

"This experience has profoundly affected me by providing valuable insights into the nature of research. Research has always been a word that fascinated me, but now I realize the fun, challenges, time, and knowledge that go into it. This project allowed me to gain a deep understanding of what research entails, from the initial ideation to the final implementation. Working with the depth camera, I had the opportunity to experiment and explore its potential applications. This hands-on experience not only enhanced my practical skills but also solidified my passion for this field."

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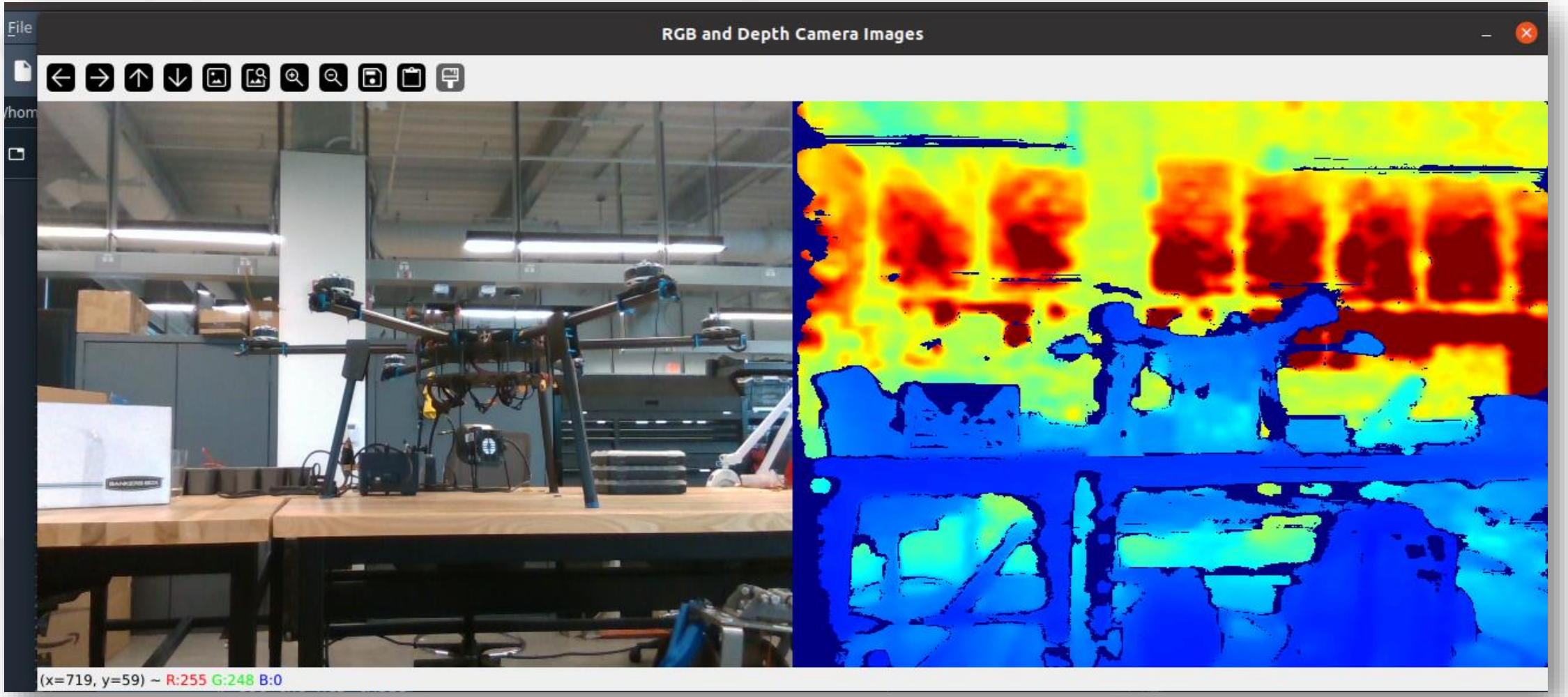
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RGB and Depth Camera Images
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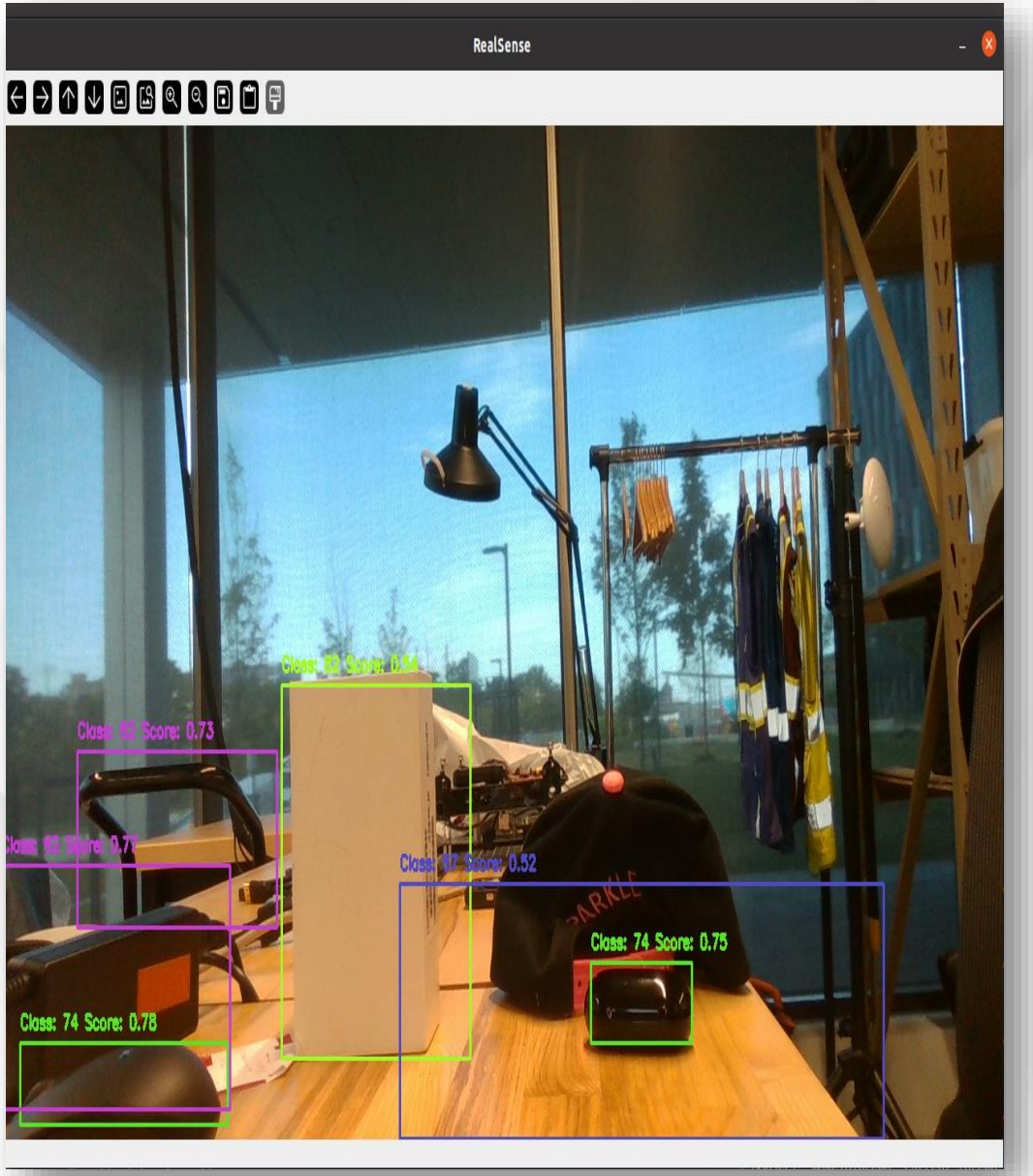

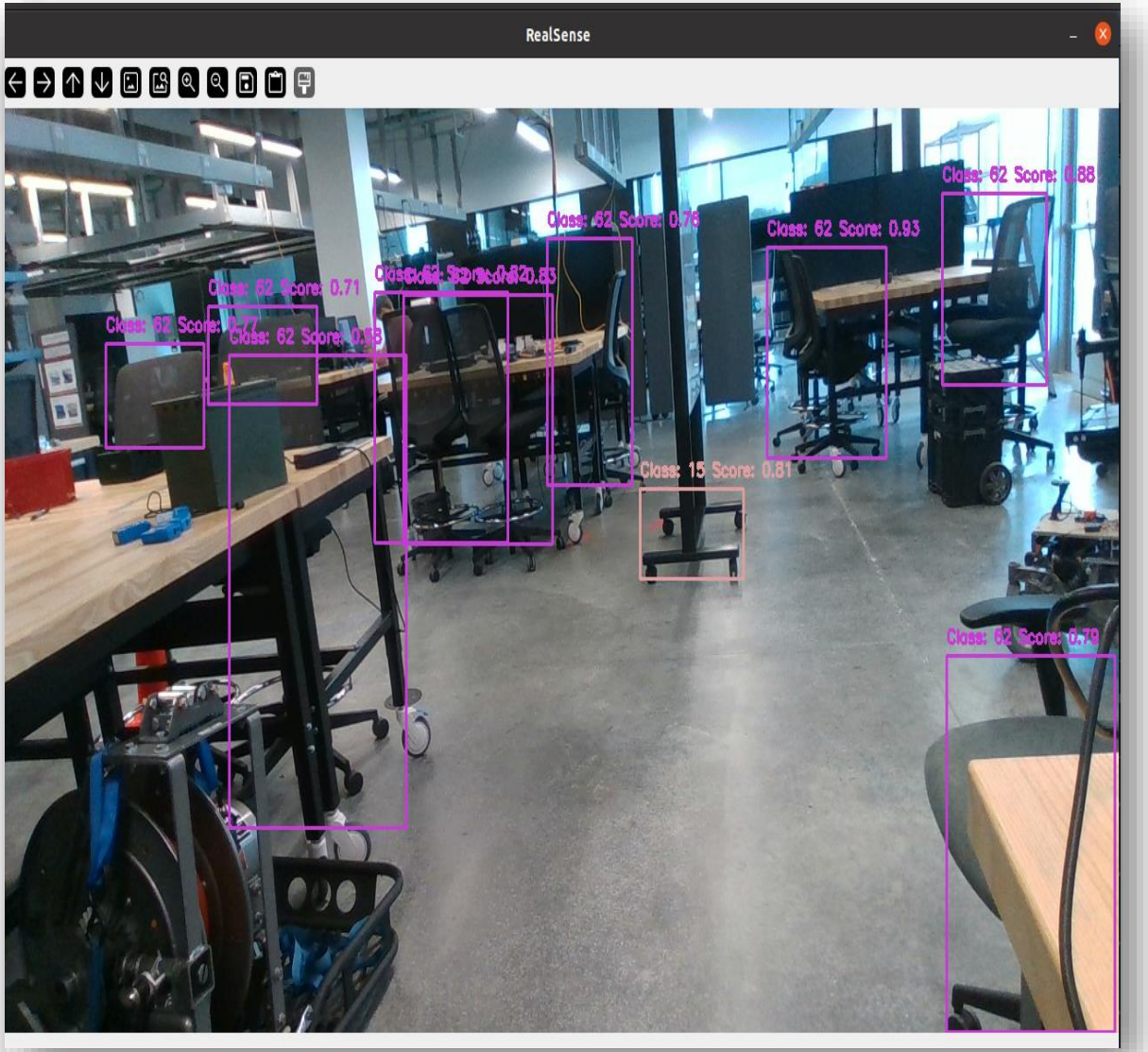

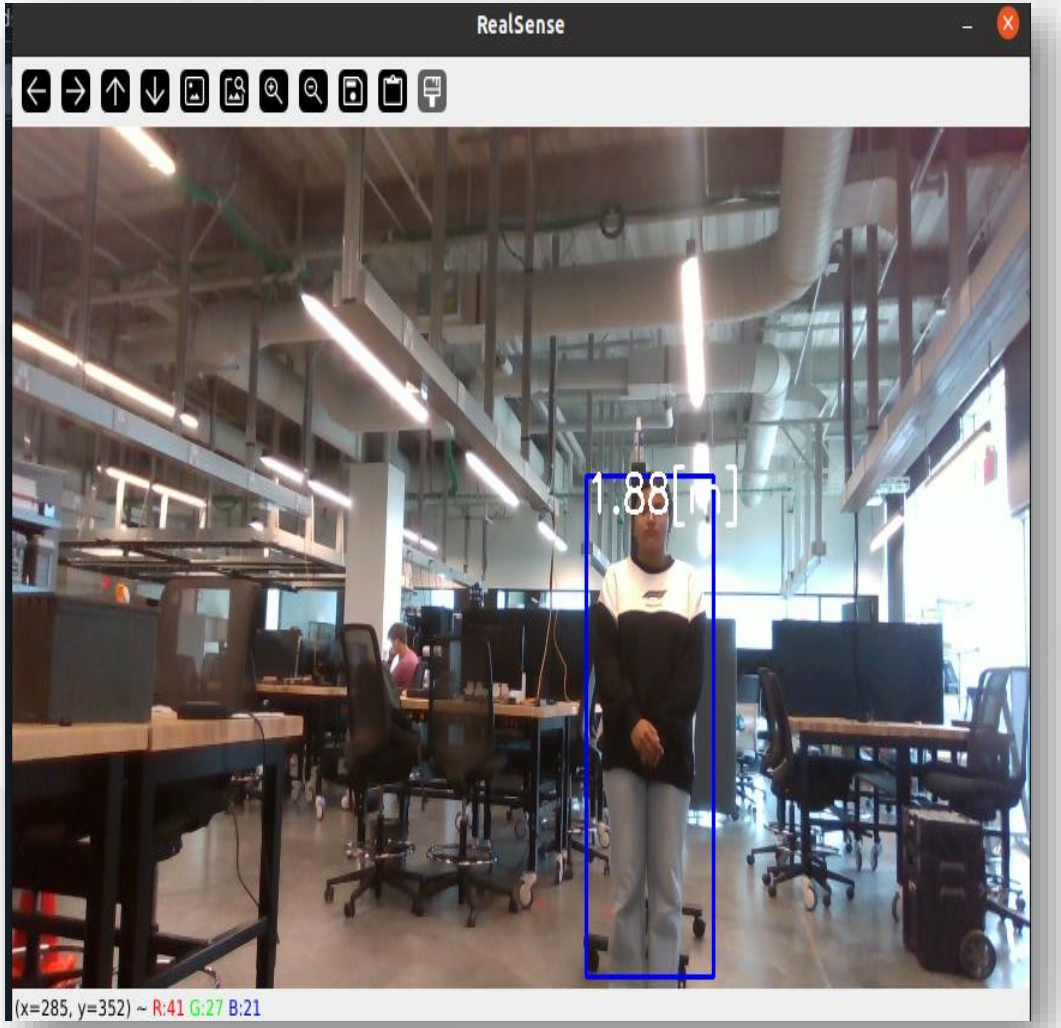

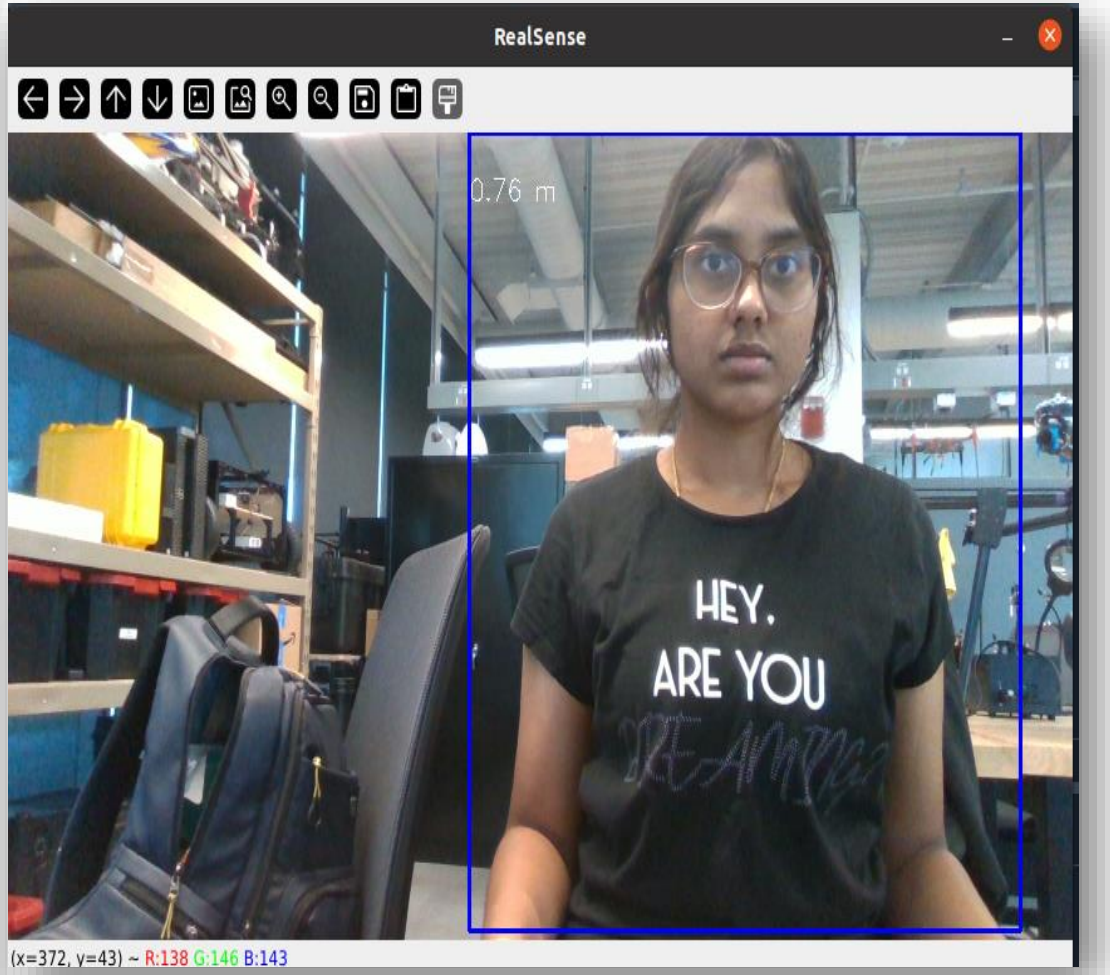

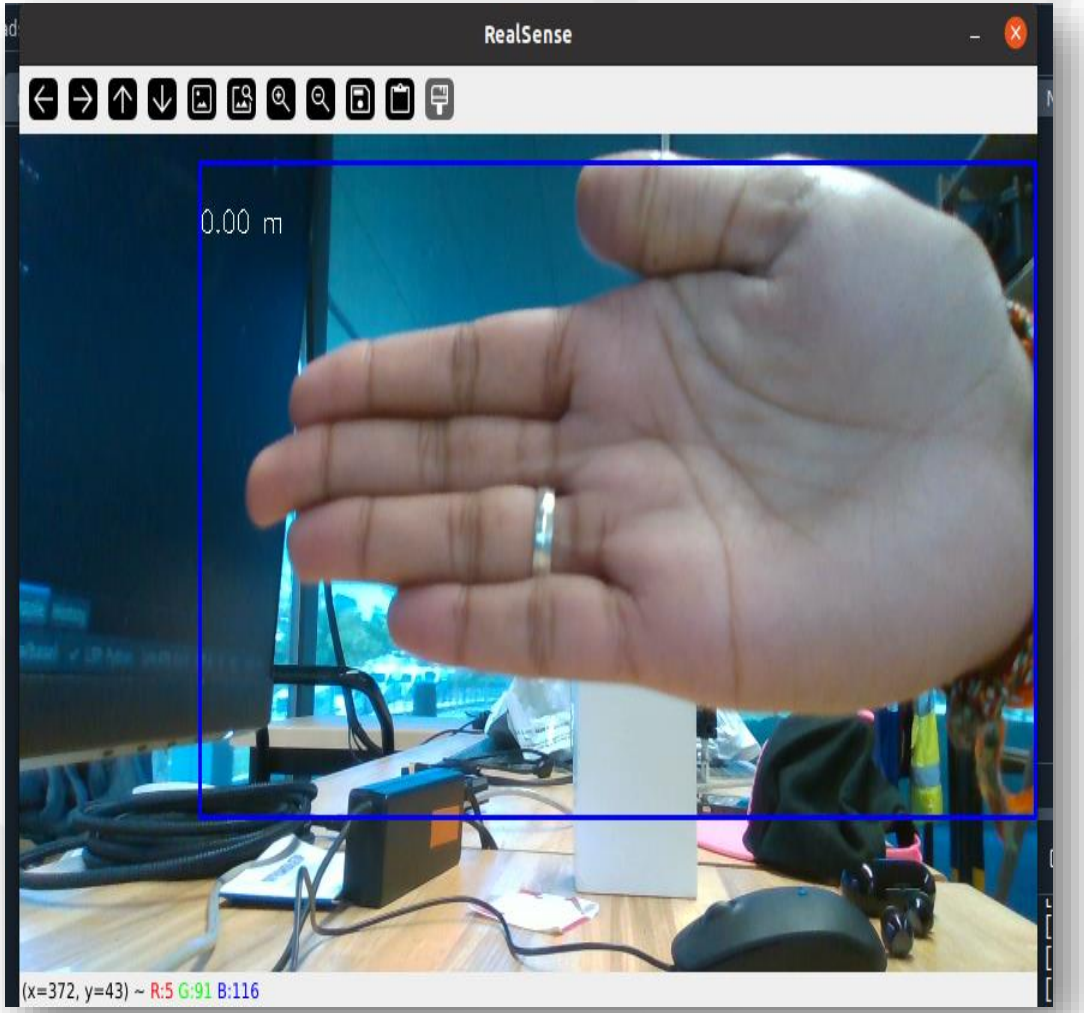

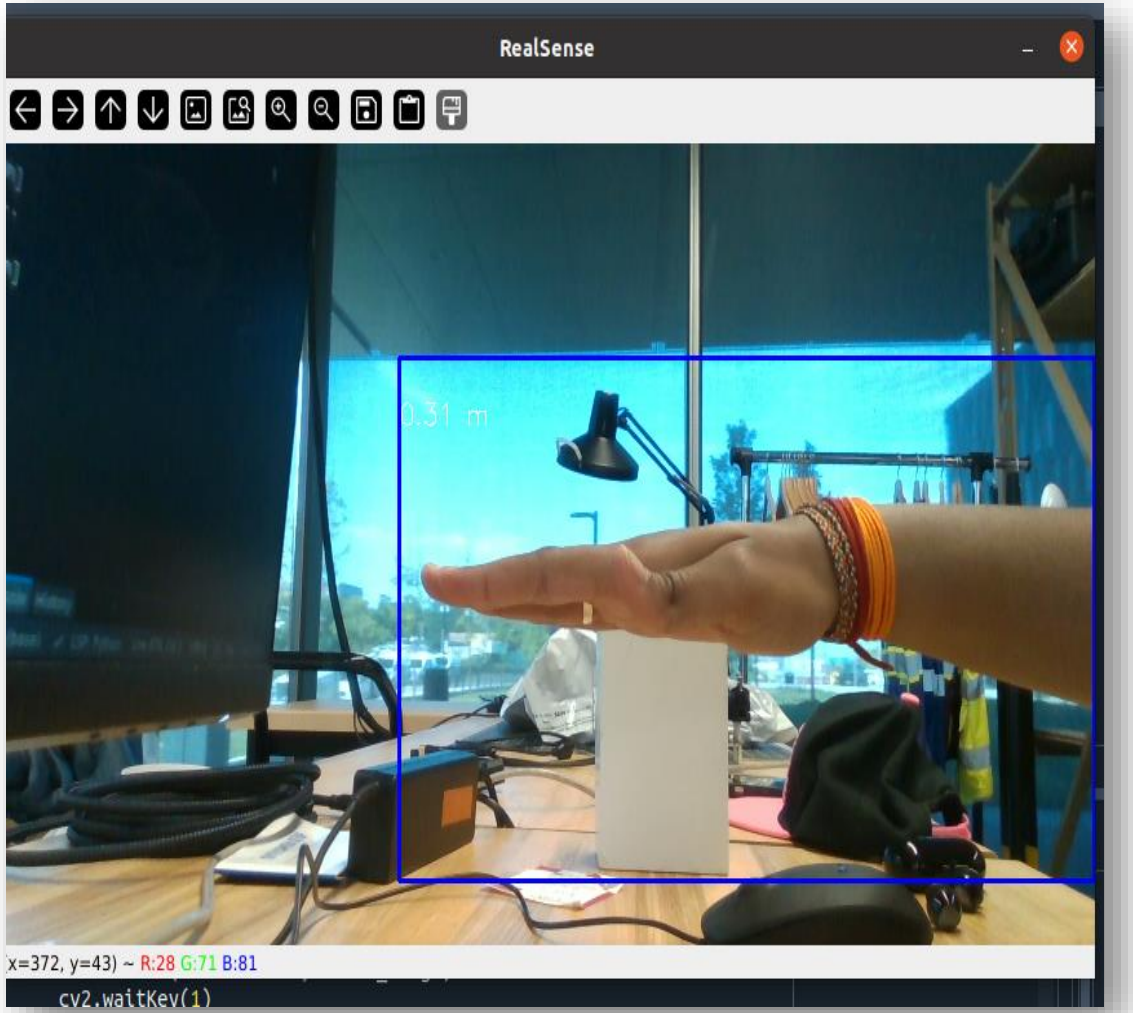

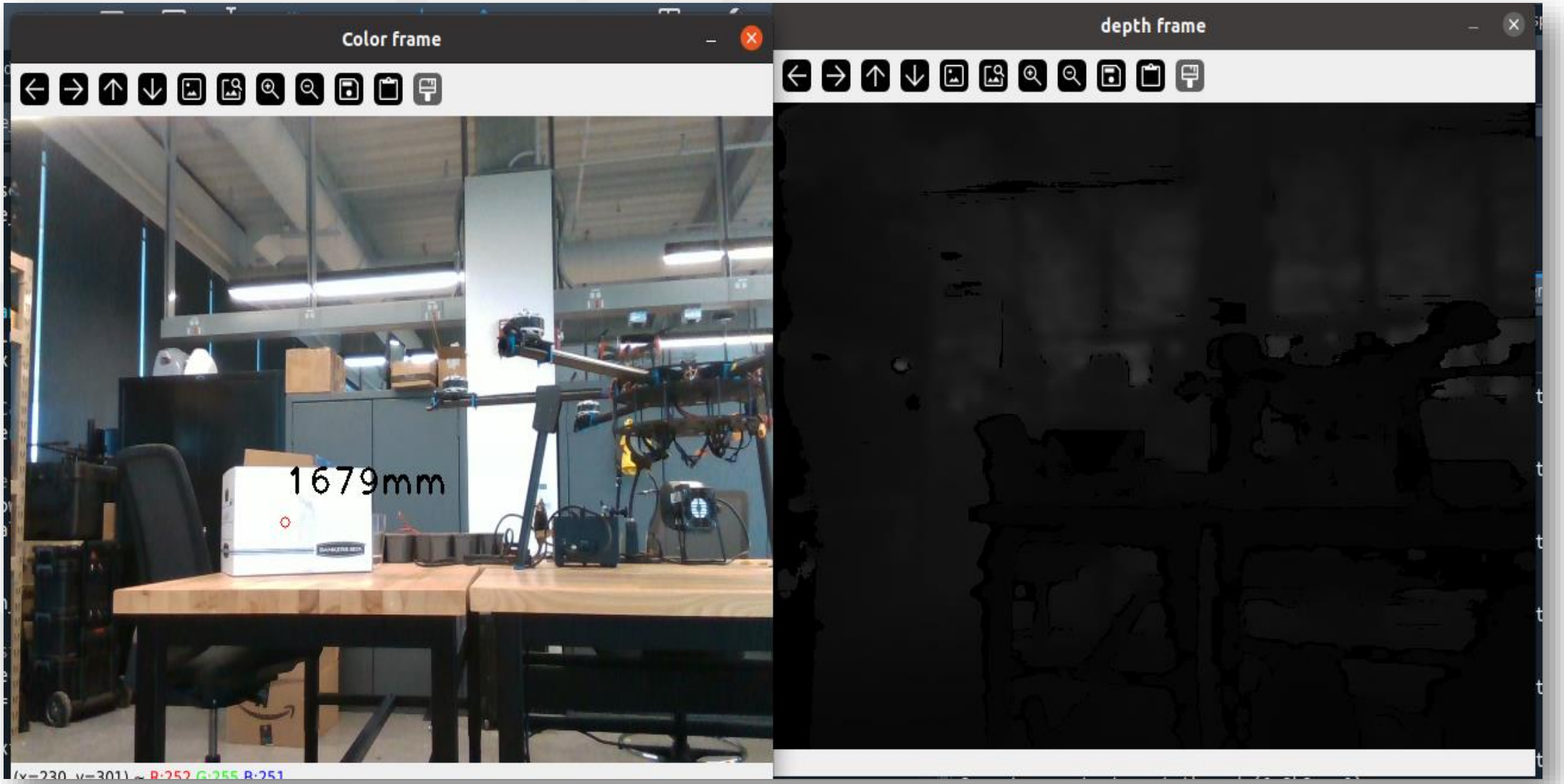
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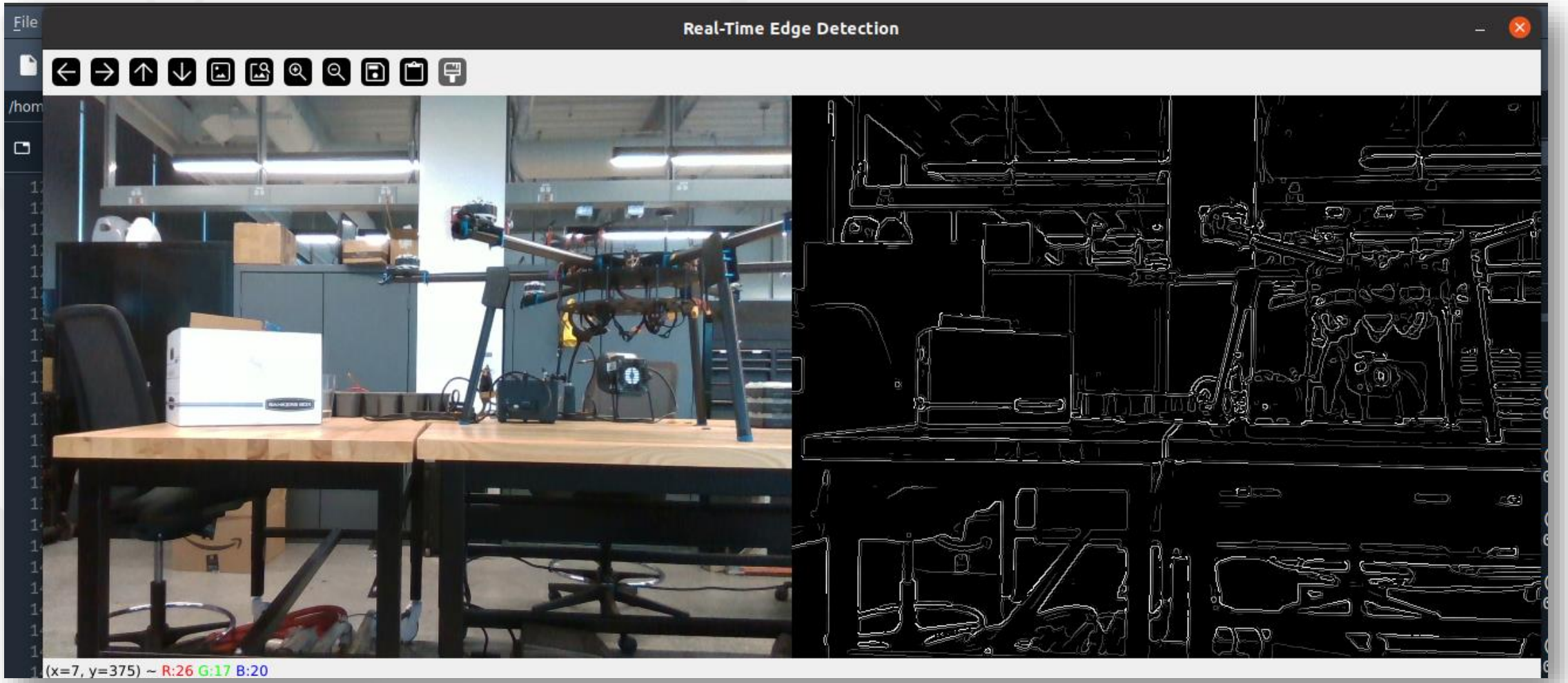
1679mm
depth frame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Real-Time Edge Detection
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Depth Image
Stretched Image
Canny Edge Detection
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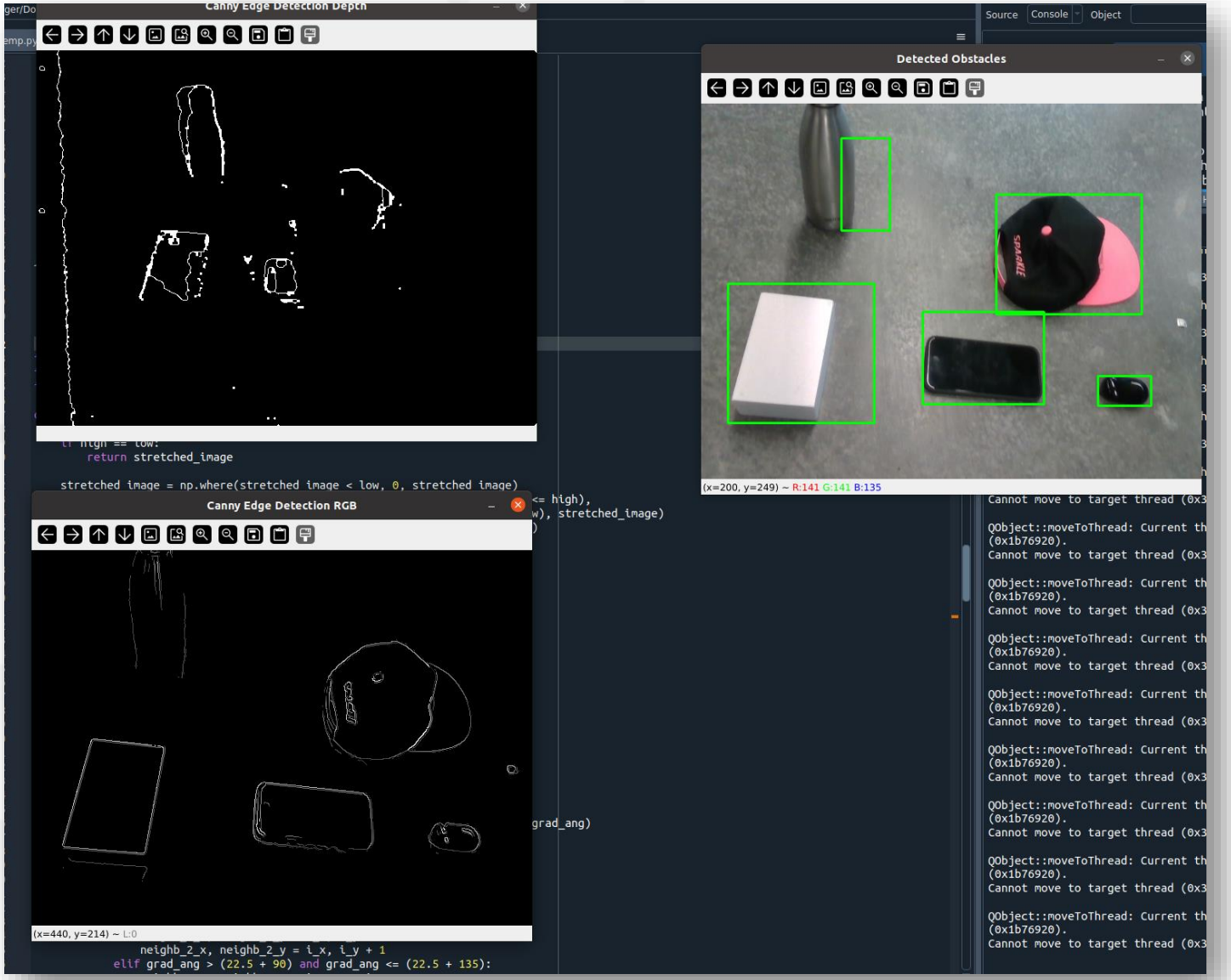

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