SCITT SOUTHERN COLORADO INSTITUTE OF TRANSPORTATION TECHNOLOGY

COLORADO STATE UNIVERSITY PUEBLO

HOW TO USE ROBOTS FOR CONTAINER SORTING IN PORTS AND RAILROAD YARDS?

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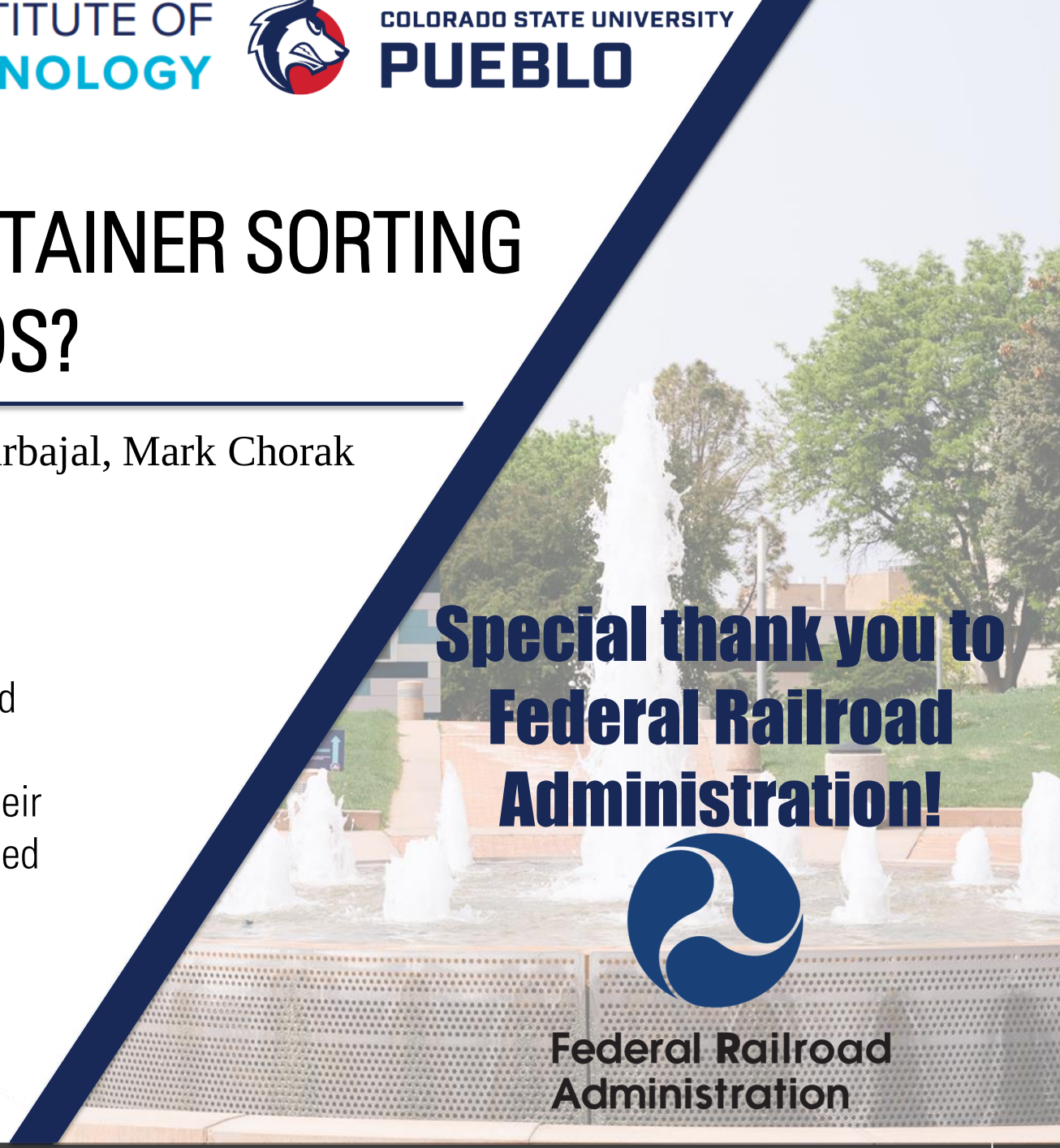
Project Details: Middle schoolers explored real-world transportation issues through creative projects that encouraged research, problem-solving, and teamwork. This presentation gave them the chance to practice public speaking and share their innovative ideas. Join us as they showcase what they've learned about robots implementation for transportation needs.

June 27, 2025



QUESTIONS (BASED ON IDEAS)

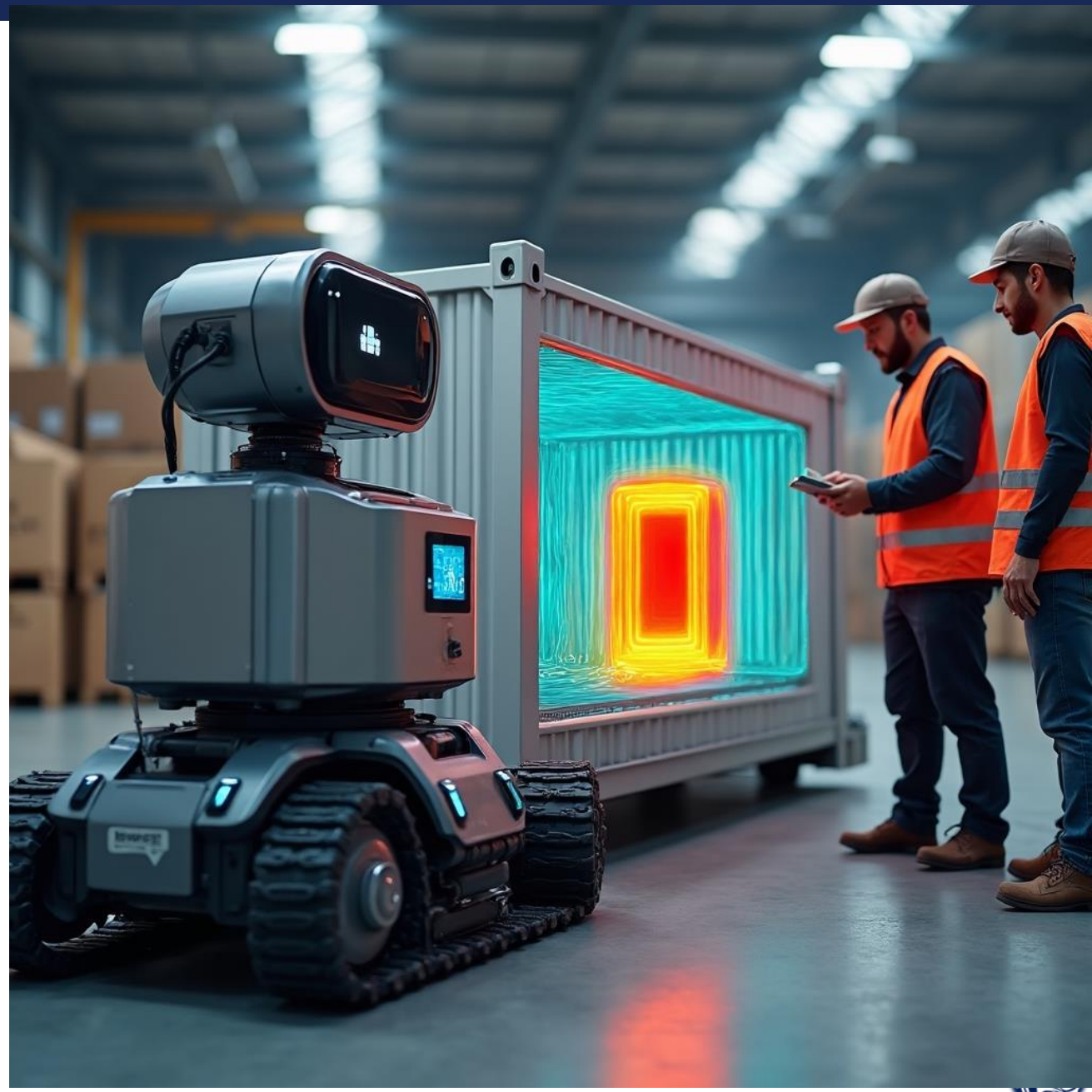
- What robots are used in warehouses, ports, and railroad yards?
- Autonomous Mobile Robots (AMRs)
- What tools for scanning can be used in conjunction with robots (for example, ultrasonic technologies)
- Non-Destructive Testing (NDT).
- How can AI help to "read" images? (for example, for locating missing items or for identifying where to put the container according to a QR code)
- Features are extracted: AI models extract important features from images, such as edges, shapes, and textures. Images are classified: Based on the learned patterns and extracted features, the AI model can classify or categorize images and identify objects within them
- What robots can move containers? Are they used in warehouses today?
- Automated Guided Vehicles (AGVs)
- Autonomous Mobile Robots (AMRs) Automated Storage and Retrieval Systems (AS/RS Robotic Arms

A robot that scans what's in a cargo container and tells you exactly where to put it.

Robot is equipped with 3D cameras and sensors can scan the interior of the container to create a detailed map of the items inside.

Machine vision and AI algorithms analyze this data to identify the location, orientation, and characteristics of each item, including size, weight, and potentially fragility.

Using its screen, it displays a message telling workers where to put it.



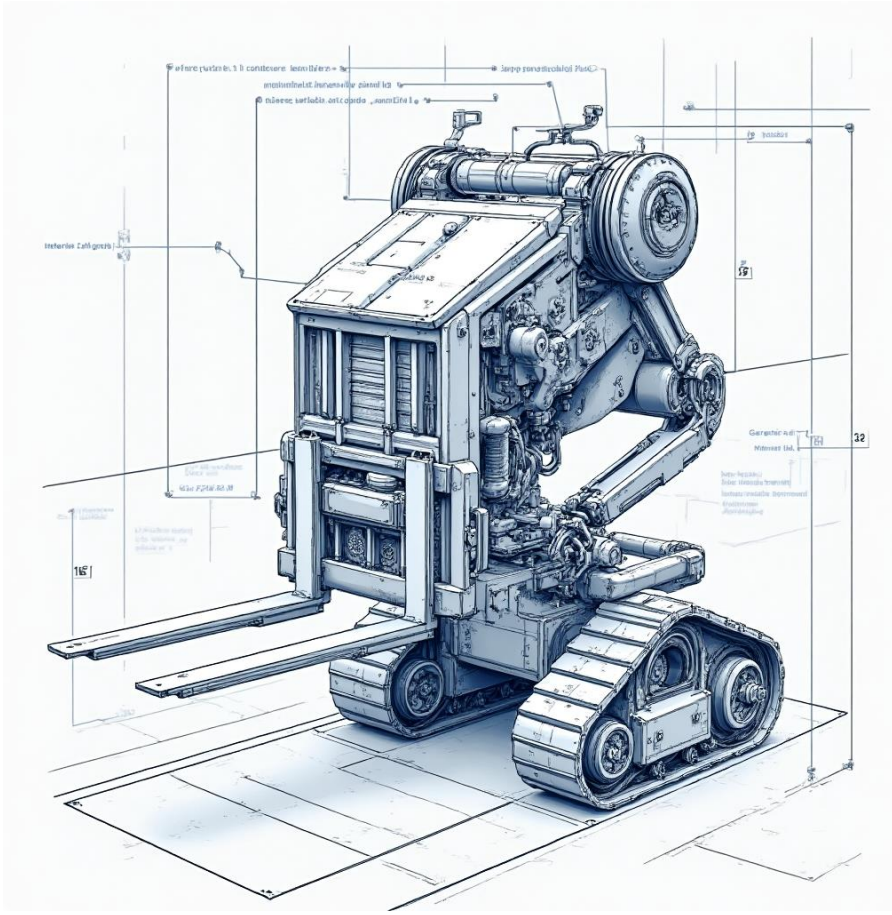
A robot that you tell where to put a cargo container and then moves it like a forklift.

This robot is otherwise known as a Autonomous Forklift.

Autonomous forklifts use various technologies to navigate their environment. Some rely on pre-programmed paths, while others use AI-driven mapping and dynamic routing.

These forklifts are equipped with sensors like LiDAR, radar, and cameras to detect obstacles, people, and other equipment.

They can automatically adjust fork height and width based on container size and can detect the presence and position of container. Autonomous forklifts receive tasks from a central system, such as a warehouse management system (WMS).



A robot that you tell where to put a cargo container and then moves it like a forklift.

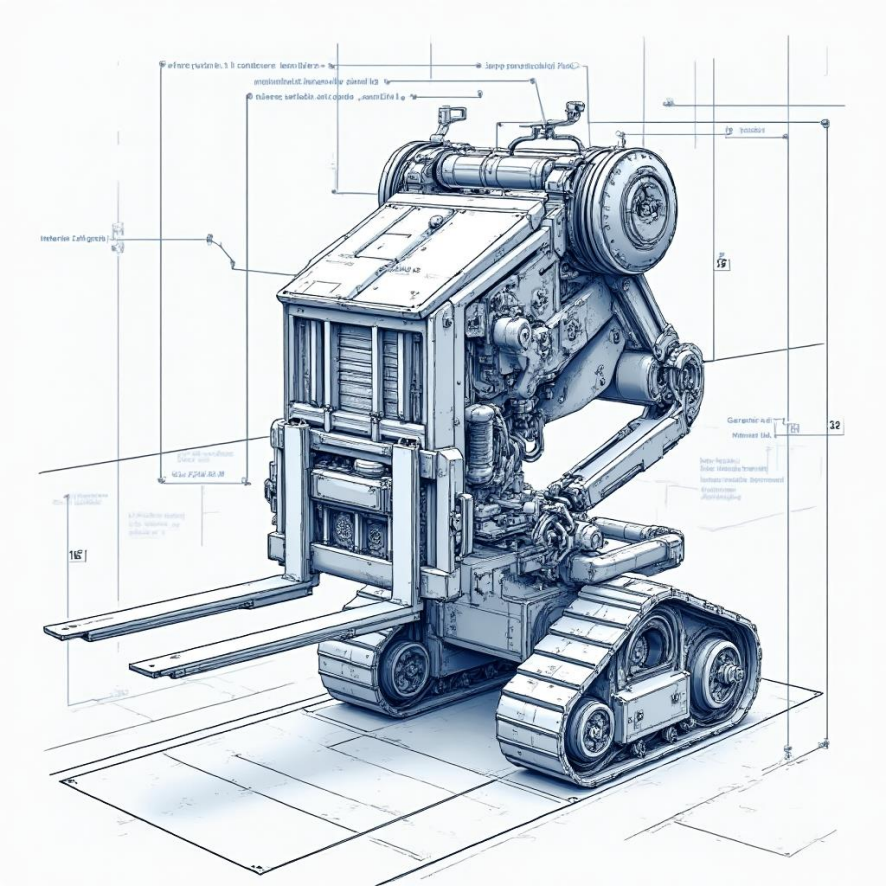
They can detect and avoid obstacles, and some systems can even reroute to avoid traffic jams or blocked paths.

Once they reach their destination, they can precisely place the load and update the WMS with relevant information like cycle time and location.

AI algorithms analyze sensor data to make decisions about navigation and obstacle avoidance.

Enables forklifts to "see" their environment, identify pallets, and read barcodes.

These sensors provide detailed information about the surrounding environment for navigation and safety.



A robot with a scanner that can identify what might potentially leak or drip chemicals or what chemicals are in the air.

The ANYmal robot, developed by ANTIbiotics, is a robot designed for inspection tasks in industrial environments, particularly those involving hazardous conditions like gas leaks in chemical plants.

Key features for gas leak detection:

- Integrated sensors: ANYmal is equipped with advanced sensors, including a 360° acoustic imaging camera and modular gas detectors.
- Acoustic imaging: The acoustic imaging camera helps in precisely pinpointing the location of leaks, even in hard-to-reach areas where static sensors are limited.

A robot with a scanner that can identify what might potentially leak or drip chemicals or what chemicals are in the air.

- Modular gas detectors: The modular design allows for customization with various gas detectors tailored to specific needs.
- Quantification: The system can quantify the leak rate and estimated cost of detected leaks.
- Autonomous operation: ANImals autonomous navigation enables regular inspections without constant human supervision.
- Data integration: The collected data is fed into ANYbody's Data Navigator platform.

Any Questions???

Thank you for listening