SCITT SOUTHERN COLORADO INSTITUTE OF TRANSPORTATION TECHNOLOGY

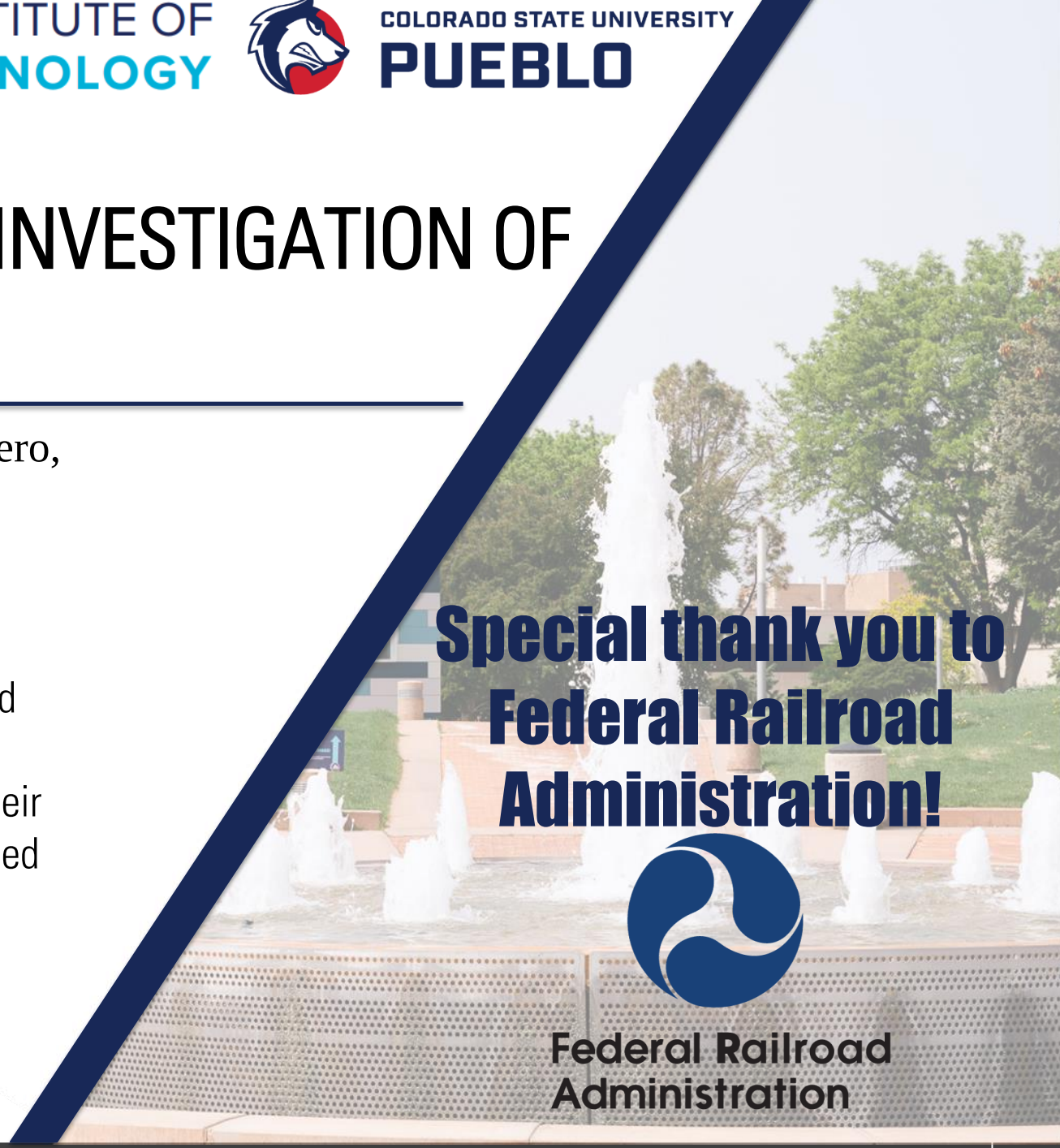
COLORADO STATE UNIVERSITY PUEBLO

THE FUTURE LABORATORY FOR INVESTIGATION OF RAILROAD CRASHES

Presenters: Alice Obrien, Ethan McIntire, Lillianne Lucero, Meichel Blazek, Gabriel Muñoz

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 and imagined for the future of transportation.

June 27, 2025



The Future Laboratory for Investigation of Railroad Crashes

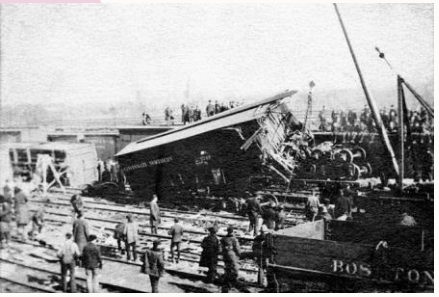
Alice Obrien, Ethan McIntire, Lillianne Lucero,
Meichel Blazek, Gabriel Muñoz

Ideas

- Investigate crashes and safe railroad operations, and compare them
- Find a fix after determining the problem in either the rail or the train
- Track whatever went wrong and fix it
- Make a test track to test railroads and vehicles before production
- Implement airbags to protect in a crash
- Organize the work of professional teams to predict what might happen to a train
- Reinforce the rails

Questions to answer (based on ideas)

- What modern tools can help you to compare crash situations and safe situations? (for example, experiments, modeling, simulation)
- What problems can lead to railroad crashes?
- What modern tools can help you in railroad crash monitoring? (for example, GPS, drones)
- What modern tools can help you test railway equipment before production (for example, testing loops, ultrasonic technologies)
- What modern technologies can help you to predict crashes (for example, AI technologies)
- What new materials can we use to reinforce rails?



Answers based on ideas

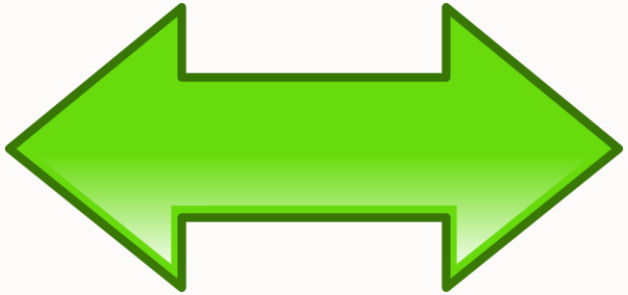
- Some tools that can be used to compare crash and safe situations are video footage,a simulation on what can go wrong, and people to predict what might happen.
- Some problems that can lead to railroad crashes are, Tracks defect that are broken or warped rails , Equipment failure which is faulty wheel bearings , and hazardous weather like ice , and heavy rain.
- Some equipment that can be used in crash monitoring are drones, planes, and GPS.
- Tools that can help test railroads before production are using the rails that have been produced already and testing them on test tracks using random objects to test if they will derail the train off of the tracks and if they do we have to reproduce and test the new rails
- Some modern technologies that can help predict railway crashes are AI, people to predict, test track, and regular cleaning and checkups.
- Some new materials we can use to reinforce rails are daily checkups, rail maintenance, new parts in place of broken ones, and test sturdiness.

Idea one

Investigate crashes and safe railroad operations, and compare them When there is a crash and we have to investigate we will have to go through the important pieces and look what might of gone wrong or maybe a small bolt or screw got unlatched and may have caused an important piece to break out or fall out, so we would either have to tighten the screws even more or we could upgrade the screws so they won’t fall off as easily and for the safety of people we could reinforce the walls and windows so they can't break as easily when items hit it.

Idea two

In this slide we have to figure out if the problem is the train or the rail. If there is a problem the cause would be from the train. Some examples of the train failing is elaboration ,train related problems, and other factors. This shows that if there was a problem it would be from the train not the rail.



Idea three

with this slide we will track whatever went wrong and fix it. To do this we will look at footage, investigate the piece (if it was a piece) , track it to the source and look at any production problems.

If a accident occurs but the problem was not found then interview and look at production records then fix whatever the problem was. Some examples of what may go wrong are , warped and destroyed or missing pieces (due to thieves stealing and selling for scrap). If an employee claims to have seen something unusual then we can investigate it.

Idea four:

Make a test track to test railroads and vehicles before production. We can make a fake rubber train and put mannequins in the train, while testing the trains for future crashes.Make a test track to test railroads and vehicles before production.

Also, we could put a bunch of fake unexpected obstacles Like, Animals that might wander onto the tracks or sometimes cars might get on the track and collide the 2 vehicles, so we could try and add a powerful emergency break before a crash.

Idea Five

Implement airbags to protect in a crash

On trains there are no airbags so obviously we have to add airbags but we have to figure out *where* to add airbags. If people are sitting in booths we could put diagonal cupboards that have the airbags inside of them. So now we could add a little sensor in the front of the train so when it gets destroyed it will automatically send out a pulse to all the airbags and launch them out.

Idea six

To organize professional teams to predict what might happen to a train, you would need to focus on a multi-faceted approach involving data analysis, technology, expert evaluation, and proactive intervention. Install and maintain sensors across the train and tracks to collect real-time data on various parameters like vibration, temperature, wheel wear, and track geometry.

Manage and analyze the massive amounts of data collected from sensors. They use advanced techniques like big data analytics, machine learning, and AI to identify patterns and predict potential failures. Provide crucial domain knowledge to help interpret the data and understand the operational context of potential issues. They can also contribute to developing and refining predictive models.

Idea seven

In this slide we will find out how to reinforce the rails. Reinforcing the rails includes daily checkups and maintenance, extra strong tools, and LOTS of tests. This will help make sure that there will be no crashes, accidents, and “whoops!” this will ensure the safety of all passengers and cargo.

End of project

Thank you for listening.

Have a good day.

Questions?