



KDE at the Pyramids

Using KDE software for archeological discovery in Egypt

About Me

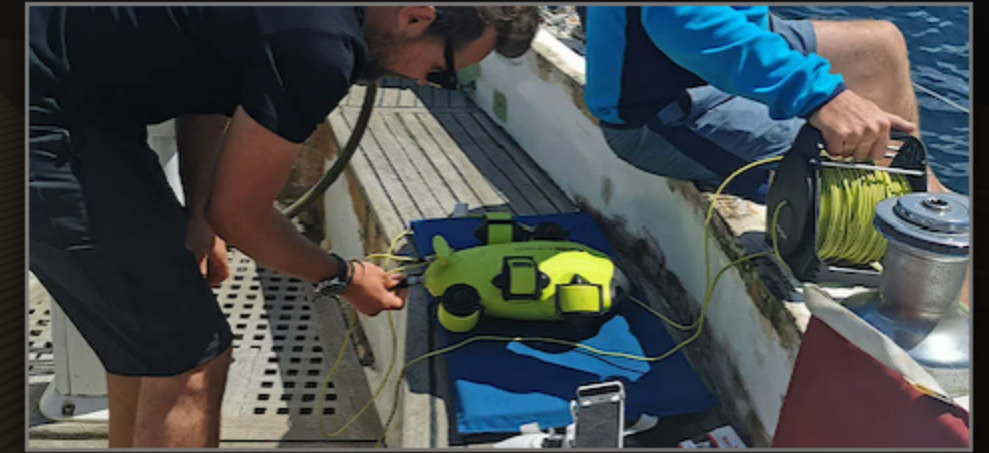


Eike Hein

- Software architect, programmer, embedded engineer
- KDE contributor for 20+ years
- Treasurer on the KDE e.V. board
- Chief Architect at MBition (Mercedes-Benz)

ODIN Discovery

- International team of scientists, engineers and historians
- We find lost things—items, places, knowledge
- A non-invasive, non-destructive approach to discovery
- We use a lot of technology
 - Custom robotics, imaging and geophysics tools



The ODIN Team



Radar specialist and geophysicist **Dr. Jan Francke.**



Roboticists **Prof. Rob Richardson, Jake Smith and Jason Liu.**



Precision machinist **Ian Parker.**



Filmmaker **William Westaway.**



Project lead **Shaun Whitehead.**



Electrical engineer **Andy Pickering.**



Software specialist **Eike Hein.**

And many more!

The Great Pyramid



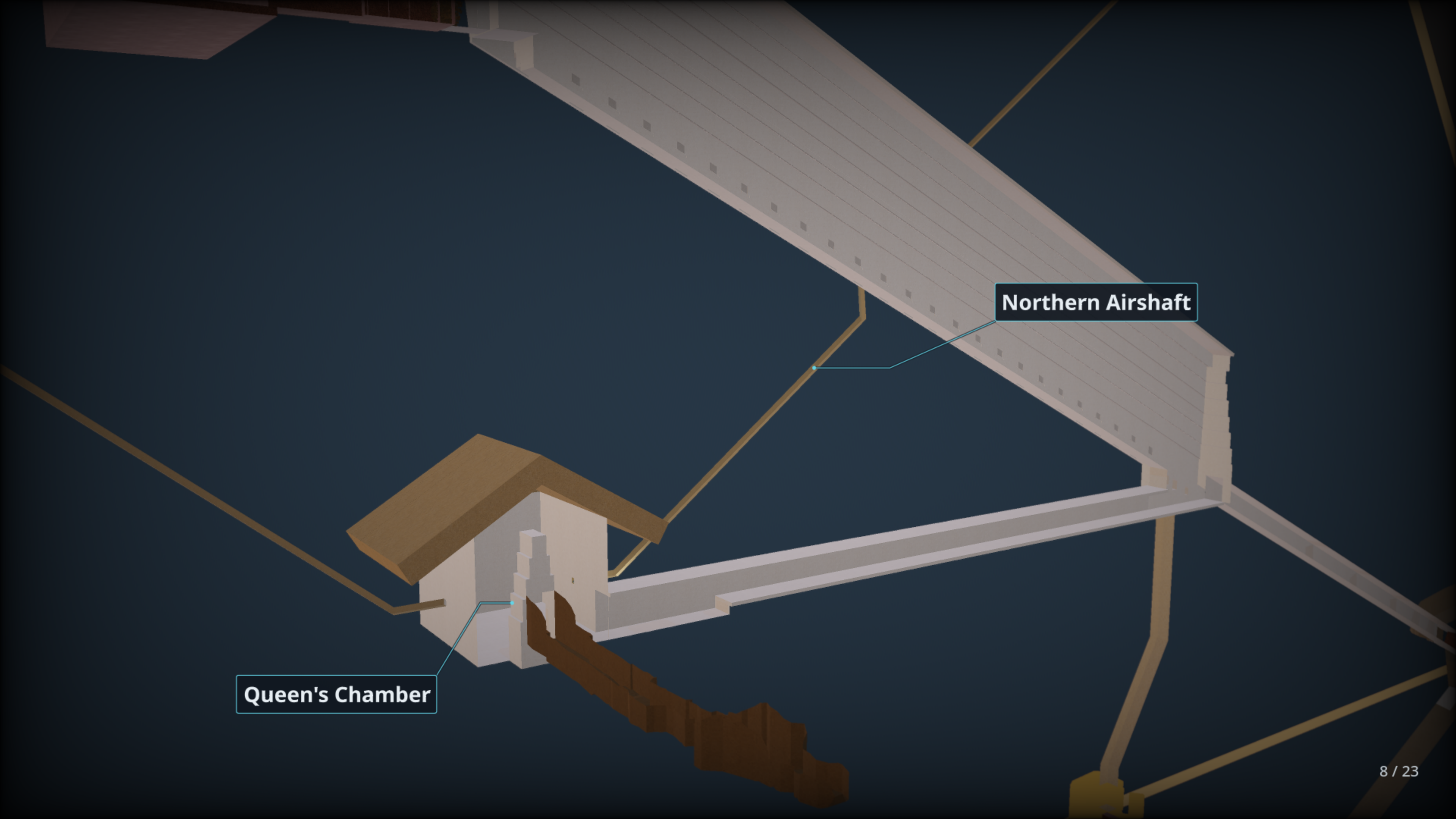
King's Chamber

Grand Gallery

Queen's Chamber

King's Chamber

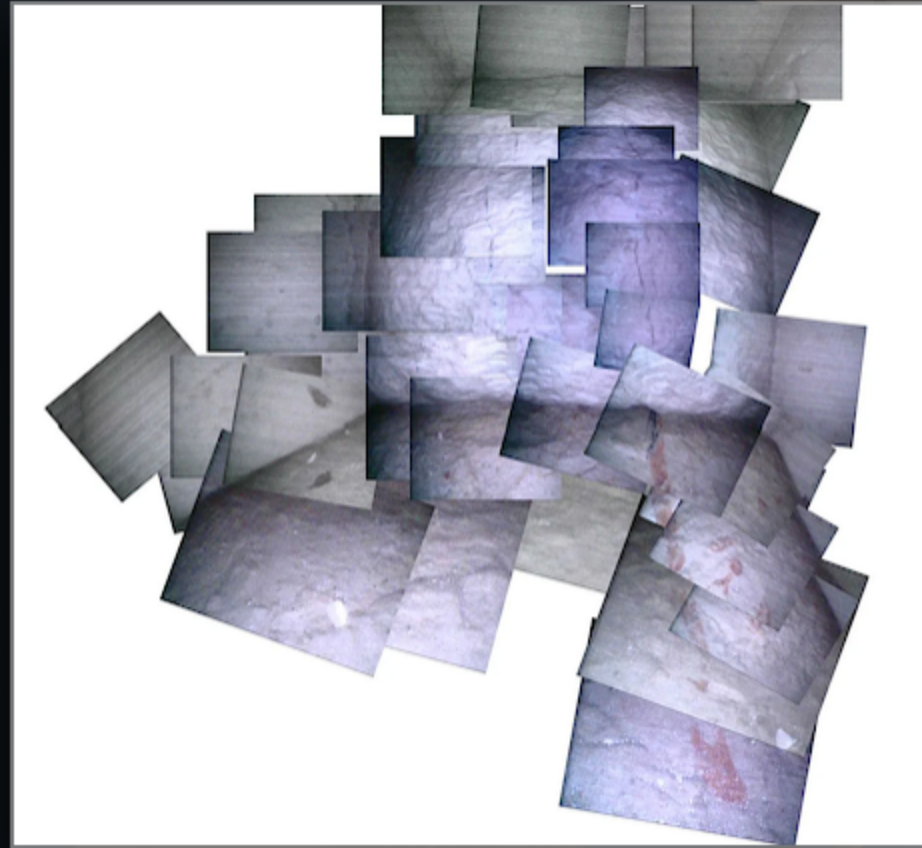




Northern Airshaft

Queen's Chamber

What Might Be Behind the Blocking Stone?



Djedi Project (2013)

Northern Airshaft

Queen's Chamber

nature

Search

Log in

Explore content ▾

About the journal ▾

Publish with us ▾

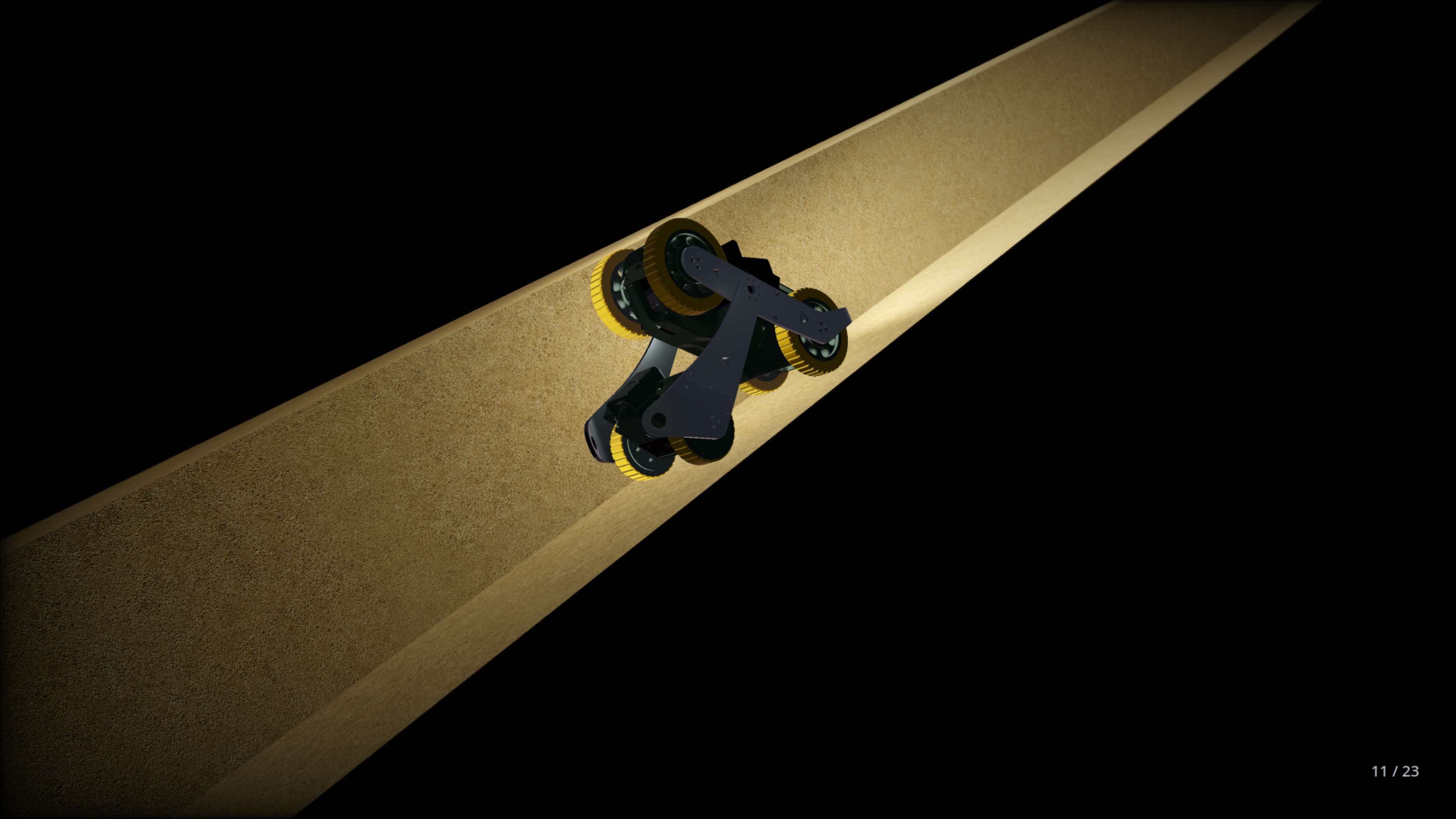
nature > letters > article

Letter | Published: 02 November 2017

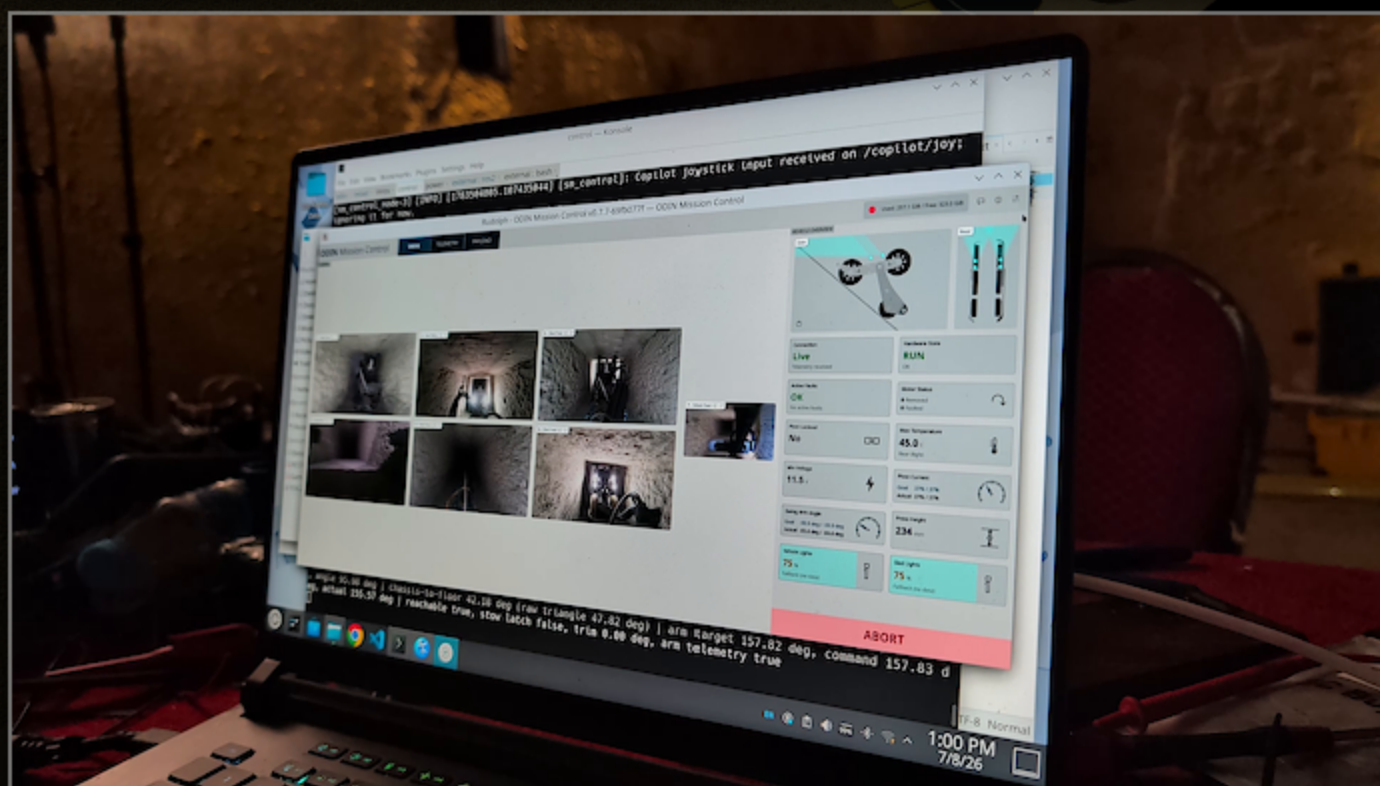
Discovery of a big void in Khufu's Pyramid by observation of cosmic-ray muons

Kunihiro Morishima [✉](#), Mitsuaki Kuno, Akira Nishio, Nobuko Kitagawa, Yuta Manabe, Masaki Moto, Fumihiko Takasaki, Hirofumi Fujii, Kotaro Satoh, Hideyo Kodama, Kohei Hayashi, Shigeru Odaka, Sébastien Procureur, David Attié, Simon Bouteille, Denis Calvet, Christopher Filosa, Patrick Magnier, Irakli Mandjavidze, Marc Riallot, Benoit Marini, Pierre Gable, Yoshikatsu Date, Makiko Sugiura, ... Mehdi Tayoubi [✉](#)

ScanPyramids Cavity



Shaft Climbing Robots



Mission Control as KDE App

Rudolph - ODIN Mission Control v0.7.2 — ODIN Mission Control

ODIN Mission Control | DRIVE | TELEMETRY | PAYLOAD

Used: 1.4 GiB / Free: 218.3 GiB

CAMERAS

1 - Forward

3 - Left

2 - Rear

4 - Right

5 - Arm

6 - Sled

7 - Overview

8 - Aux 1

9 - Aux 2

0 - Aux 3

VEHICLE OVERVIEW

Side

Rear

Vehicle: **Rudolph**
rudolph

Connection: **Live**
Telemetry received

Hardware State: **OK**

Active Faults: **OK**
No active faults

Motor Status:
Removed
Faulted

Pivot Lockout: **No**

Max Temperature: **36.0** °C
Pivot Left

Min Voltage: **12.1** V

Pivot Current:
Goal: 50% / 47%
Actual: 52% / 52%

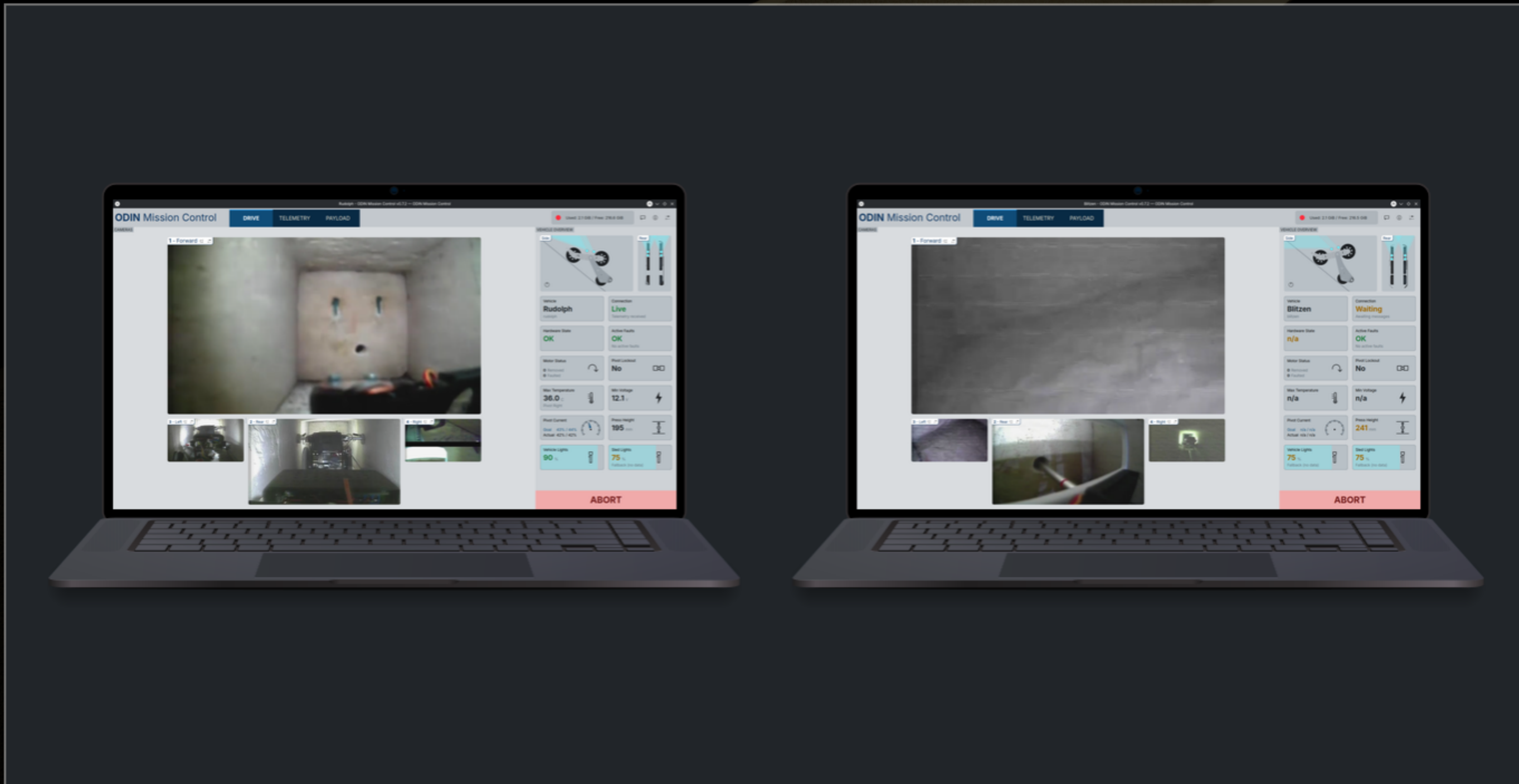
Press Height: **189** mm

Vehicle Lights: **100** %

Sled Lights: **75** %
Fallback (no data)

ABORT

Pilot & Co-Pilot Stations

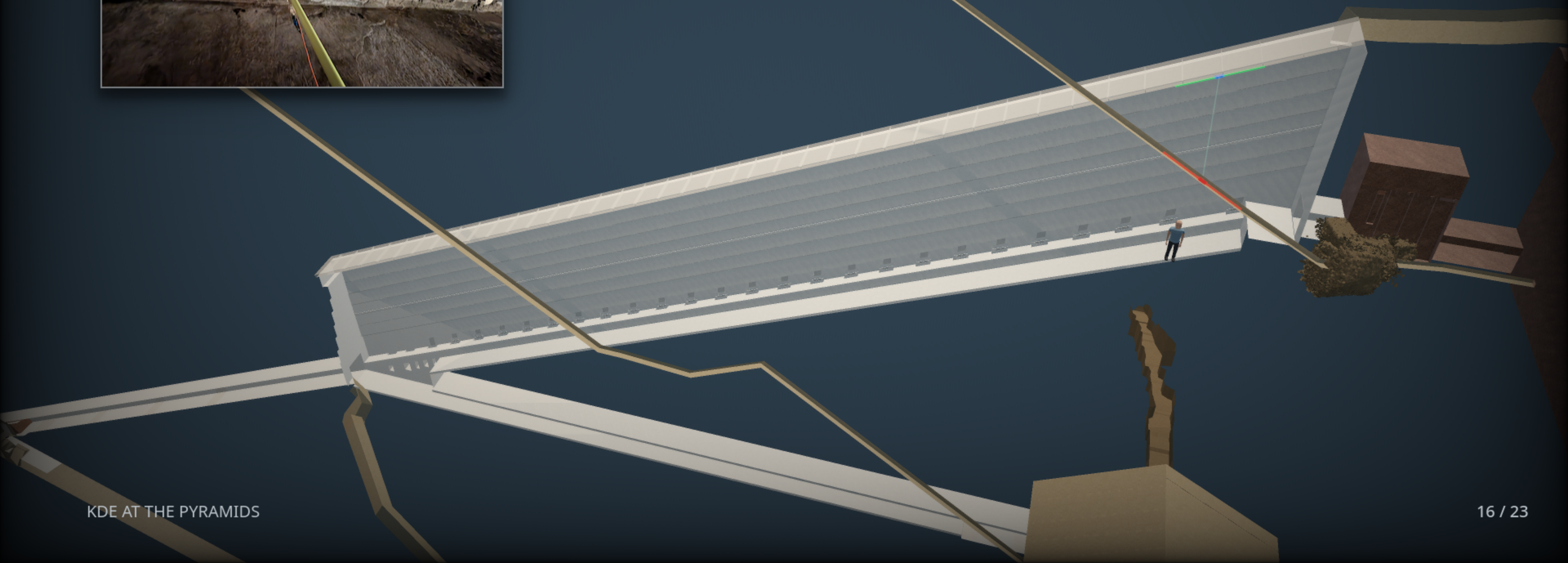


Ground-penetrating Radar

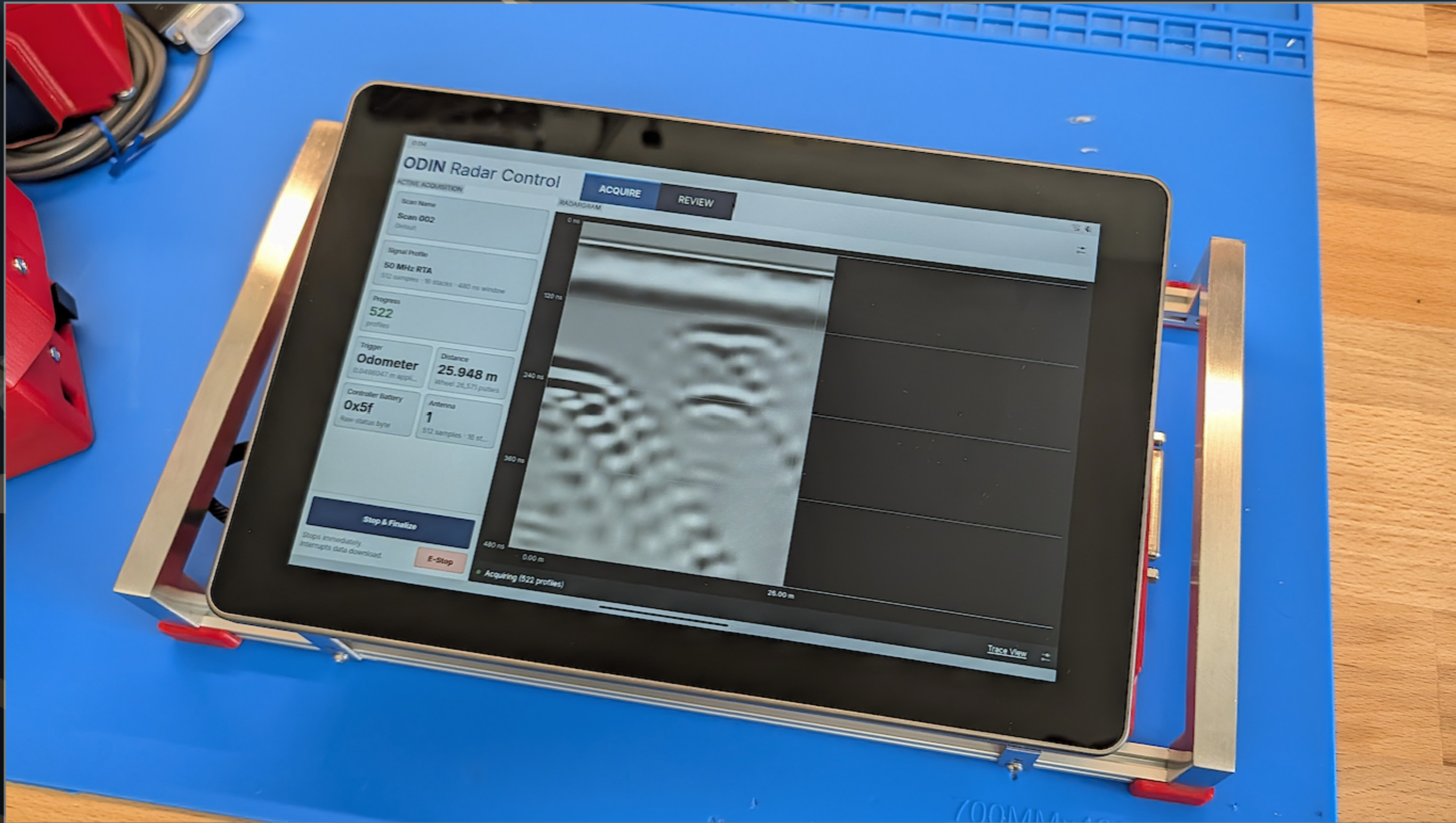
- A radio transmitter (Tx) emits energy into the masonry
- Changes in material properties (including cavities) reflect some of this energy back
- An antenna (Rx) picks up the signal
- Repeat measurements, e.g. along a path, assemble into a 2D depth map



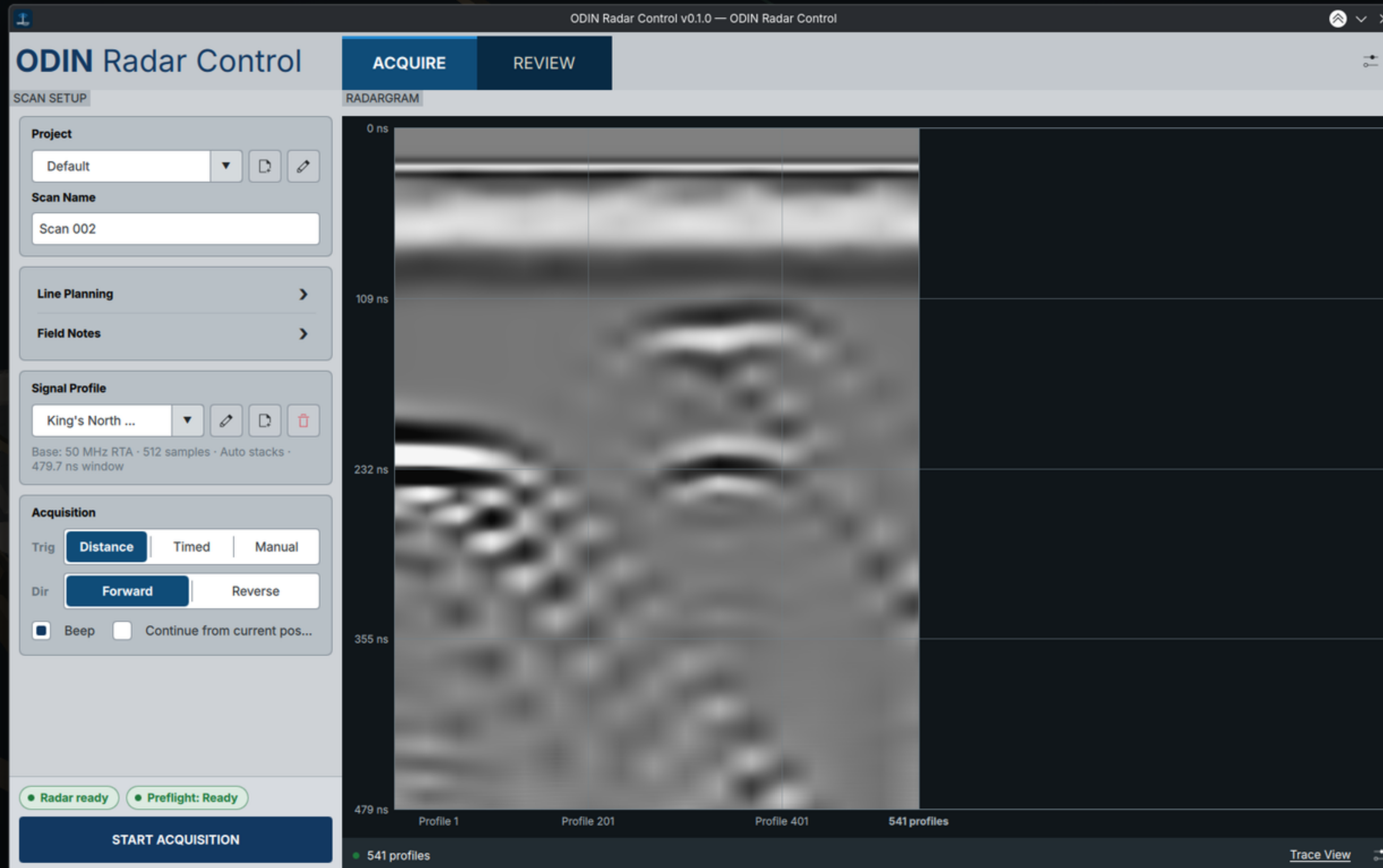
GPR Transillumination



GPR Scanning with Plasma Mobile



Radar Control as KDE App



But ...



But ... No But!

- KDE stack has worked well for us
- We are experienced; others might have a harder time

Software in the Field

- Critical information must be clear at a glance
- Destructive actions should exhibit friction
- Automation can backfire in a dynamic situation
 - It should be available, but usually not be the default

KDE seems to agree.



Android version



“Simple by Default, Powerful When Needed”

Source: <https://develop.kde.org/hig>

Thank you!



Pull on me during the conference if you have further questions!

Happy to show you our KDE applications.



Slides, images, contact info