

# 16-899C Subterranean Robotics

## Mine Fire Response

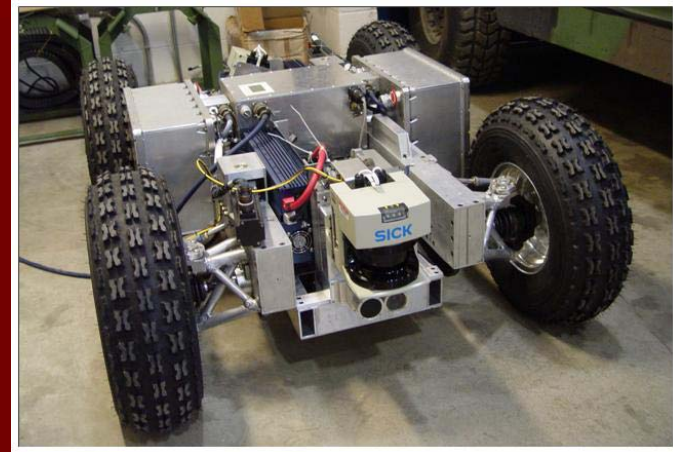


# About Subterranean Robotics

## *Robotic Systems*



Groundhog



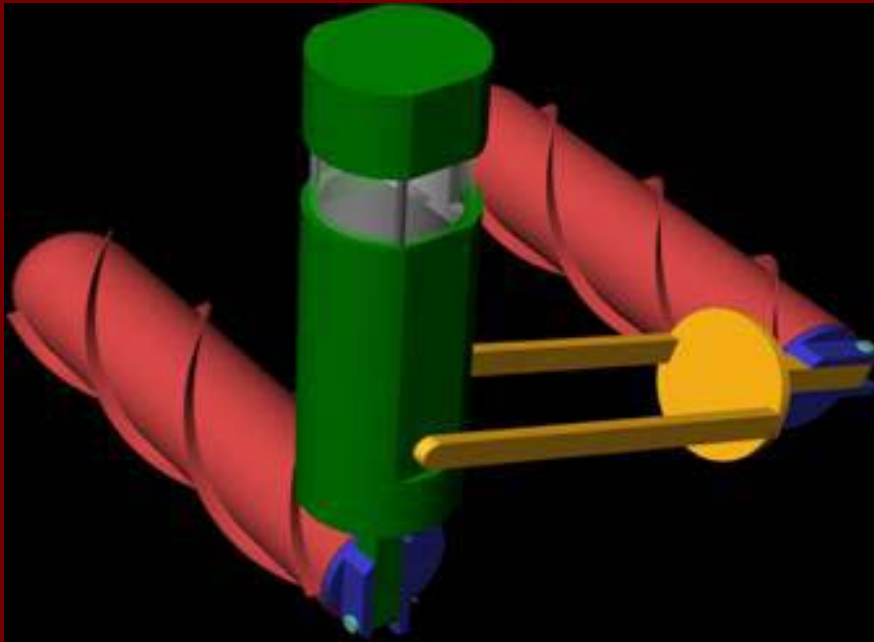
Cave Crawler



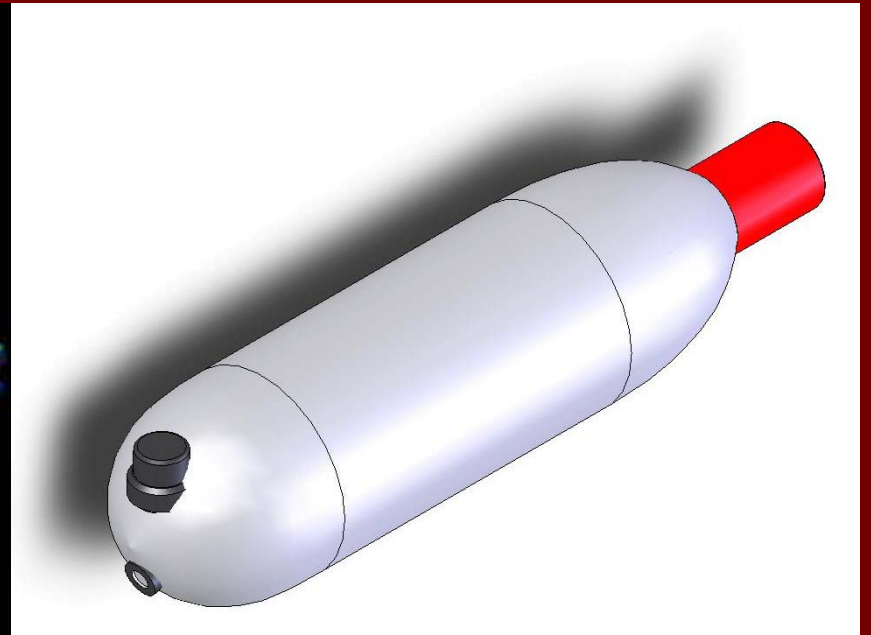
Ferret

# About Subterranean Robotics

*Robotic Concepts*



Helix



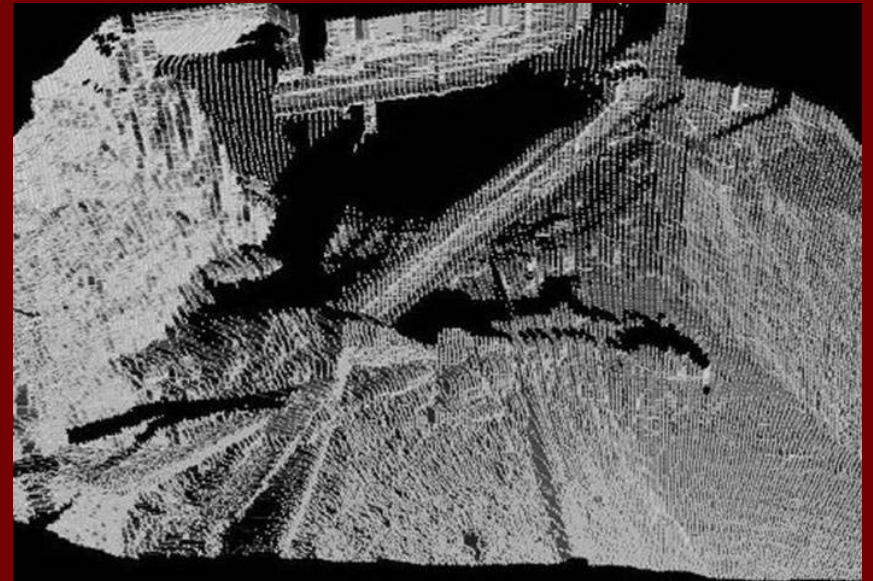
Mine Fish

# About Subterranean Robotics

*Sensors and sensor processing*



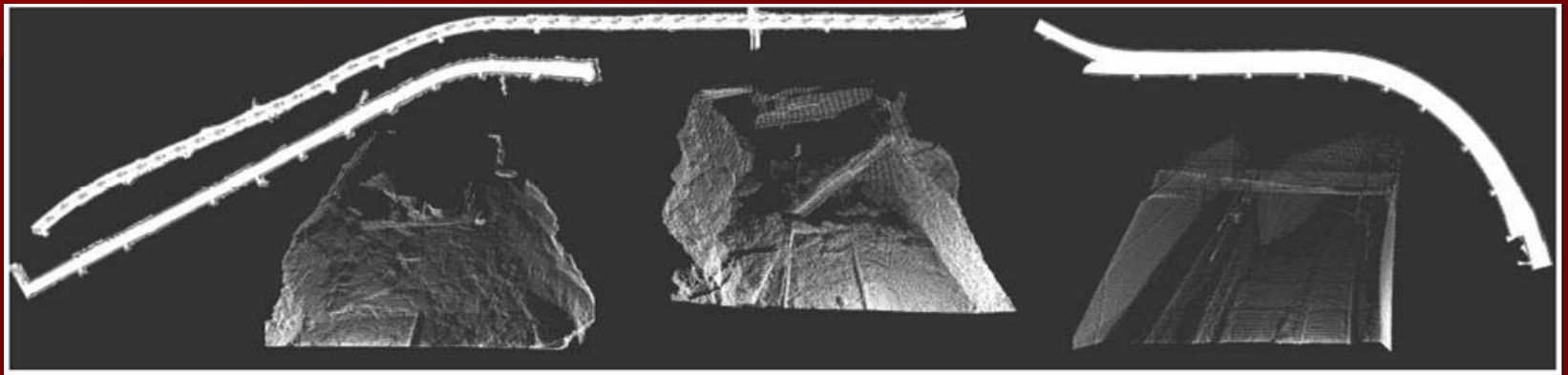
The Real World



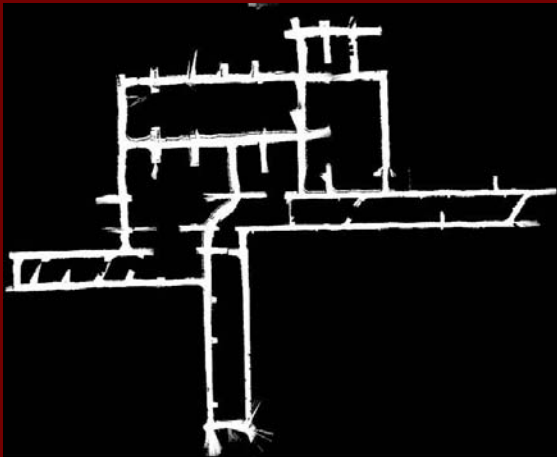
The Perceived World

# About Subterranean Robotics

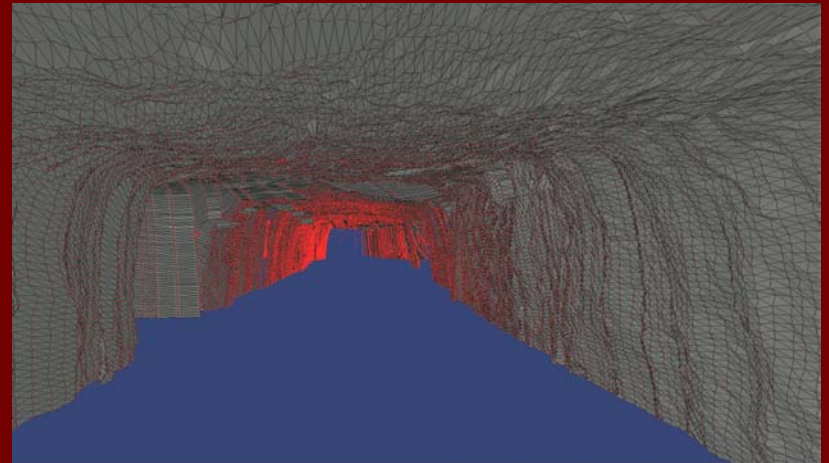
*Data, Maps, Models*



Maps from autonomous runs



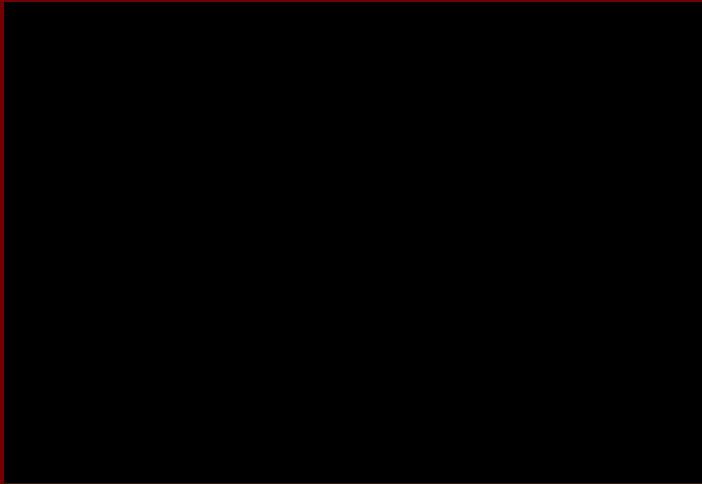
Mine Map



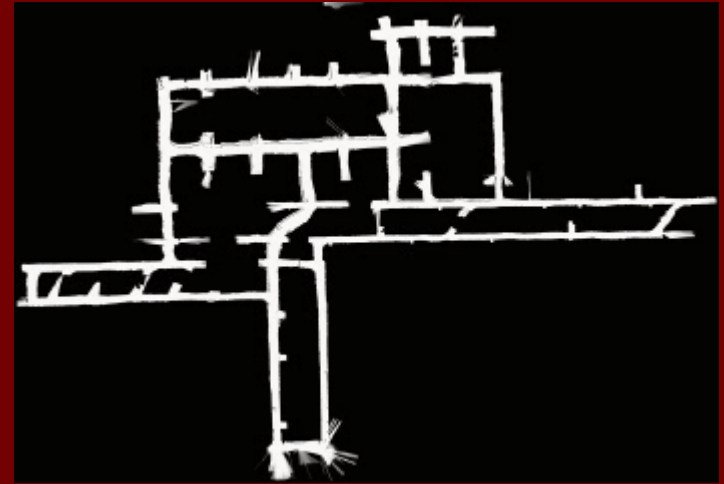
Mine Models

# About Subterranean Robotics

*Robot Autonomy*



Streaming data



Mine model

# About Subterranean Robotics

*Real problems, real places*



Quecreek rescue



Abandoned mine portals

# About Subterranean Robotics

*Team building and connections*



Mathies Mine, Spring course 2003:  
First fully autonomous run of Groundhog

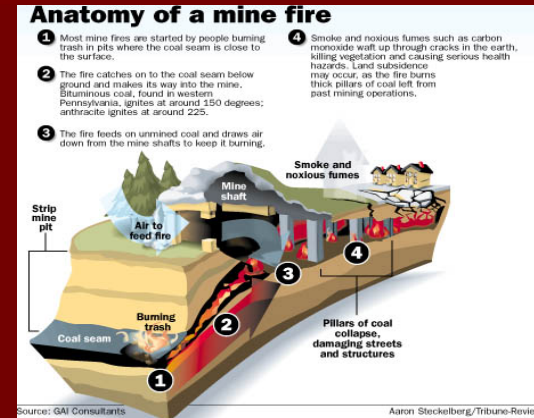


# Spring Offering 16-899C

*Our Objective*



Centralia, PA – since 1961



Understanding mine fires



Smoke and fire



Thermal cameras

# Course Topics

- Sensors
- Algorithms
- Mechanisms
- Mobile Robots
- Fire, smoke
- Subterranean environments - mines

# Contact

Robotics 16-899C Subterranean Robotics

[www.minemapping.org](http://www.minemapping.org)

[www.subterraneanrobotics.org](http://www.subterraneanrobotics.org)

NSH 1109, MW 1:30-2:50PM

Scott Thayer: [sthayer@ri.cmu.edu](mailto:sthayer@ri.cmu.edu)

Aaron Morris: [acmorr@ri.cmu.edu](mailto:acmorr@ri.cmu.edu)