Urban Search and Rescue Robots

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Vincent Leiß

Structure

- Idea of Rescue Robots
- Development
- Pros and Cons of Rescue Robots
- Fukushima
  - Packbot
  - Requirements
  - Quince 1
  - Conclusion

Rescue Robots?

First attempt

PackBot used in the World Trade Center

Current state of research

Packbot used in Fukushima (2011)

Pros of Rescue Robots

- safe search
- general overview & data gathering
- perform small tasks
- Rescue Robots are quite small

Disadvantages

- can‘t directly rescue survivors
- mobility problems
- many robots for different tasks
- non-autonomous (limited range)

Fukushima

Improvements to the Rescue Robot Quince Toward Future Indoor Surveillance Missions in the Fukushima Daiichi Nuclear Power Plant

Tomoaki Yoshida, Keiji Nagatani, Eiji Koyanagi
Chiba Institute of Technology, Chiba, Japan
Satoshi Tadokoro and Takeshi Nishimura
Tohoku University, Sendai, Japan

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Fukushima-Introduction

- On March 11 2011 an earthquake and tsunami seriously damaged four reactors.
- Because of high radiation levels the assistance of robots was required.
- Japan itself didn't have a single rescue robot that was ready to be used in a nuclear power plant.

Fukushima-Packbot

- The American Packbot robots managed to open an airlock gate to enter the building.

Fukushima-Packbot

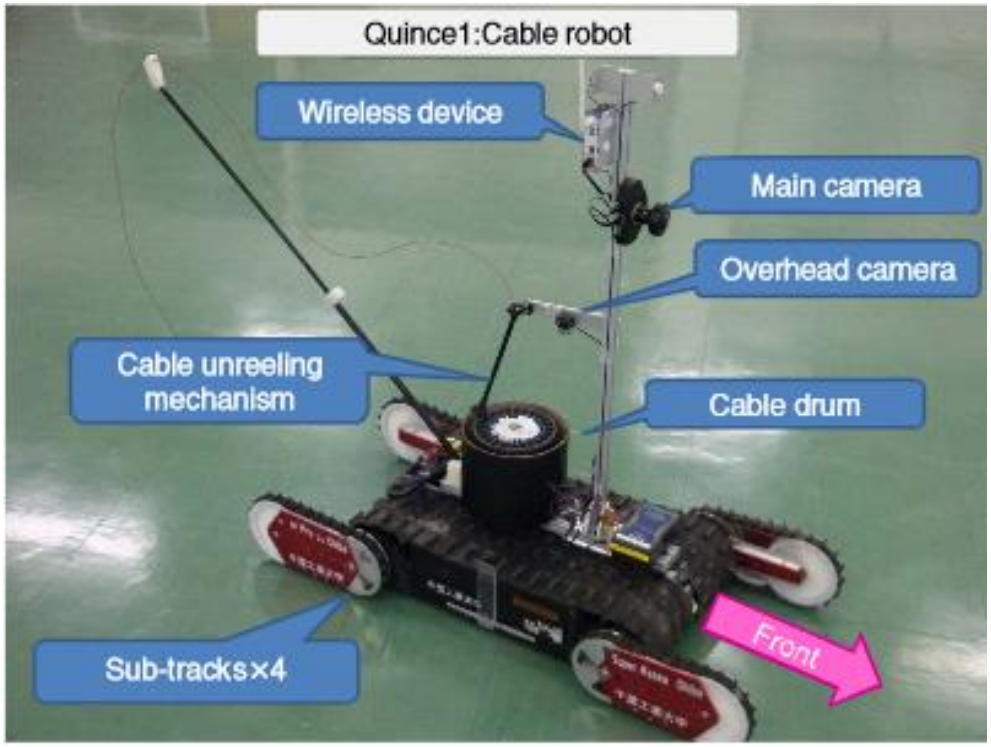
- Packbots were only able to gain access to the first floor
- Measurements confirmed high radiation dosage
- Another robot was needed to reach the higher floors and perform tasks

Requirements

- Ability to climb stairs
- Cable communication system
- A good user interface
- Additional sensors
- Radiation protection
- Waterproof

Fukushima-Quince1

- Redesign of Quince



Quince1- Control Panel

Quince1- Missions(1)

Mission 1

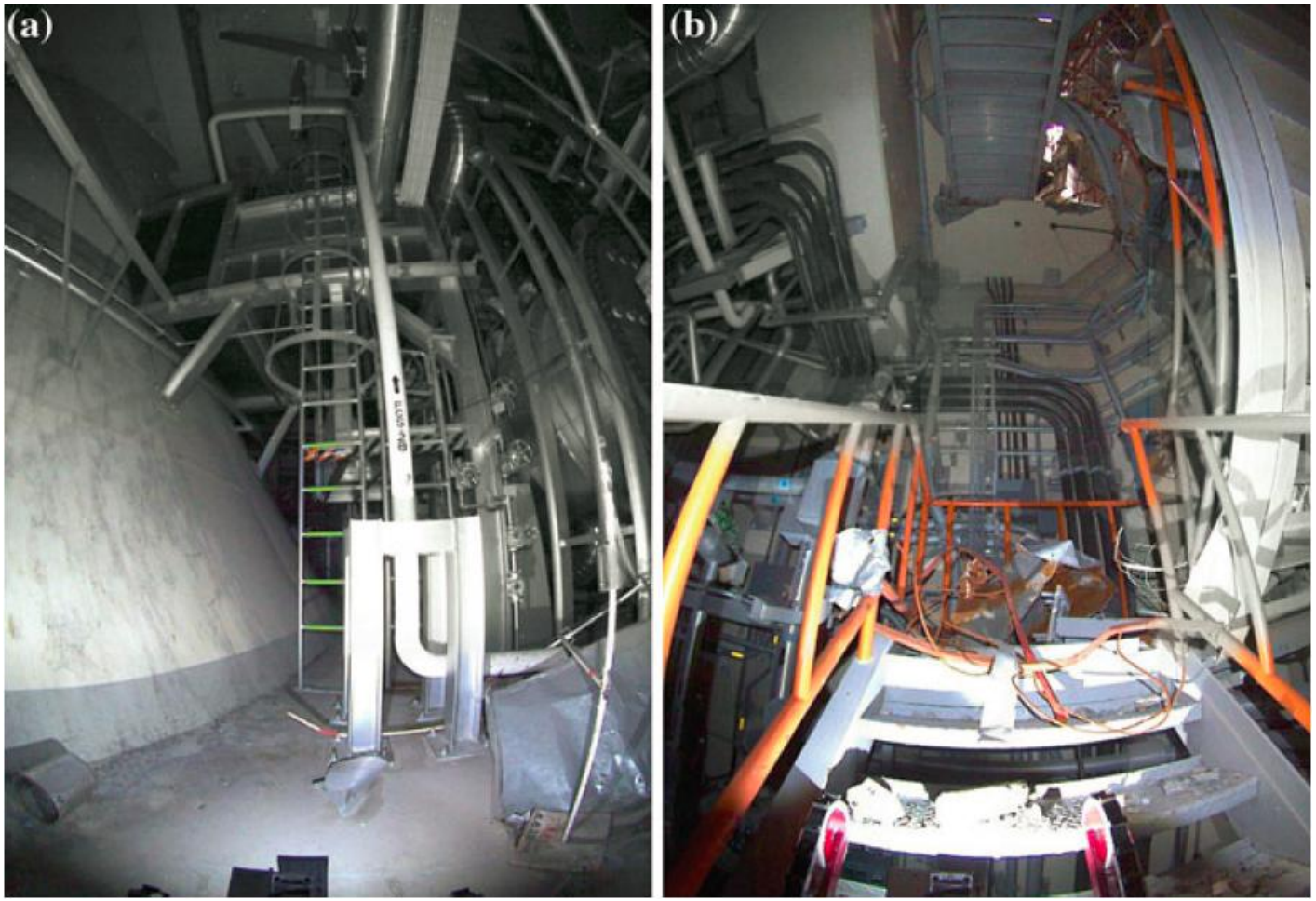
- task: install a water level measuring device
- problems: stair landings in the blueprints were larger than in reality
- result: failure

Quince1- Missions(2-5)

Missions 2-5

- task: capture air dust samples and perform several measurements in different reactor units
- problems: overheated motor driver boards and rubble blocking staircases
- result: successful

Quince1- Missions(2-5)



Quince1- Missions(6)

Mission 6

- task: reach the 5th floor and observe the situation
- problems: on the way back the communication cable was jammed in the cable drum
- result: success, but the communication cable had to be cut off and Quince1 remains inside the reactor

Fukushima-Conclusion

Rescue Robots had a big impact on getting control over the situation in Fukushima and showed how important further development is.

Fukushima-Conclusion