PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

Jackrit Suthakorn, Ph.D.
Department of Biomedical Engineering,
Center for Biomedical and Robotics Technology
Mahidol University, Thailand <www.bartlab.org>

Rescue Robots

PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

- Background
  - Problems
  - Rescue Team's Needs
- Testing Methods
  - Advanced Mobility
  - Autonomy
  - Manipulation
- Rescue Robots
  - Autonomous Rescue Robots
  - Tele-Operated Rescue Robots

PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

und

- Disasters
  - Earthquake
  - Landslide
  - Man-made
- USAR
- EMS

PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

Robot Tasks

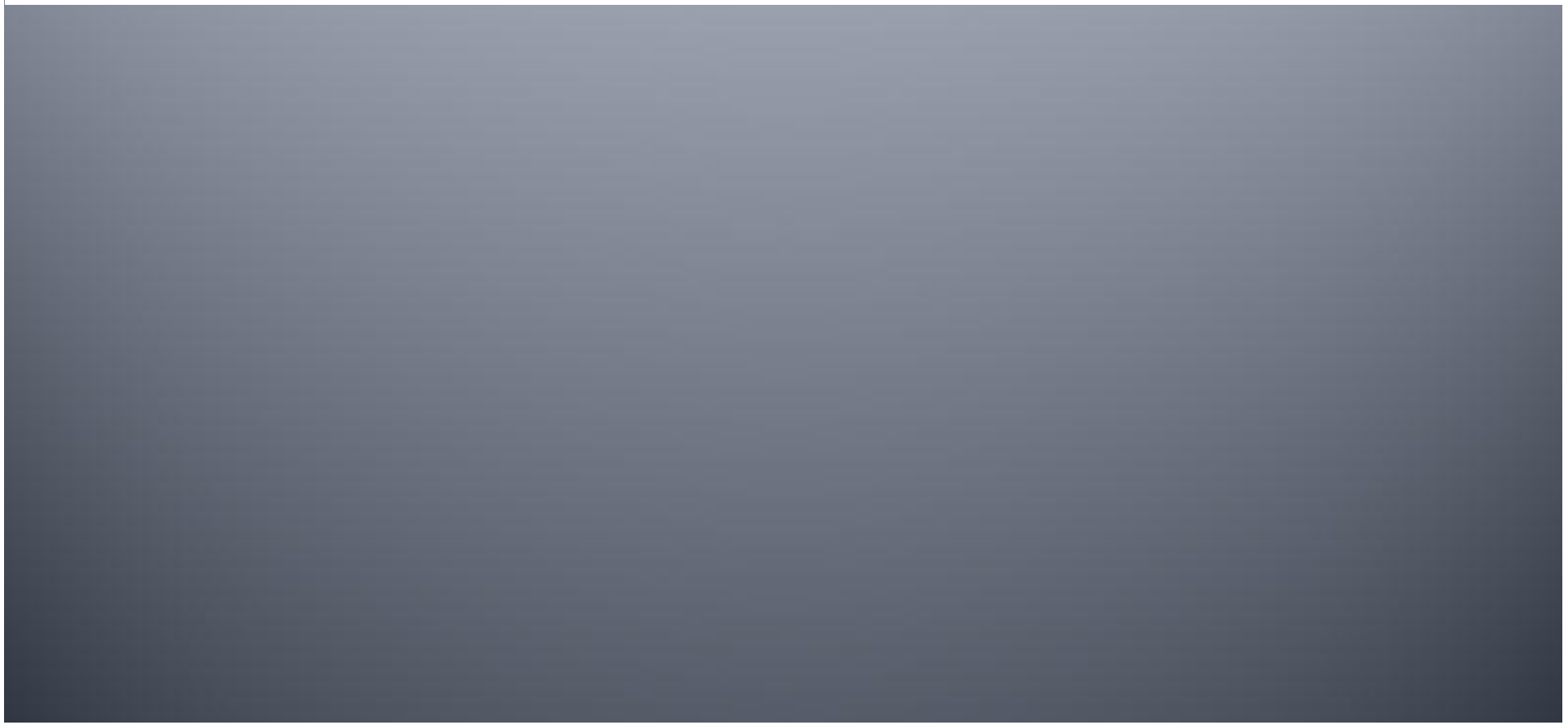
- Disasters
  - Earthquake
  - Landslide
  - Man-made
- USAR
- EMS

- Responder's Smart Tool
- Capabilities
  - Advanced Mobility
  - Autonomy
  - Manipulation

PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

Testing Methods

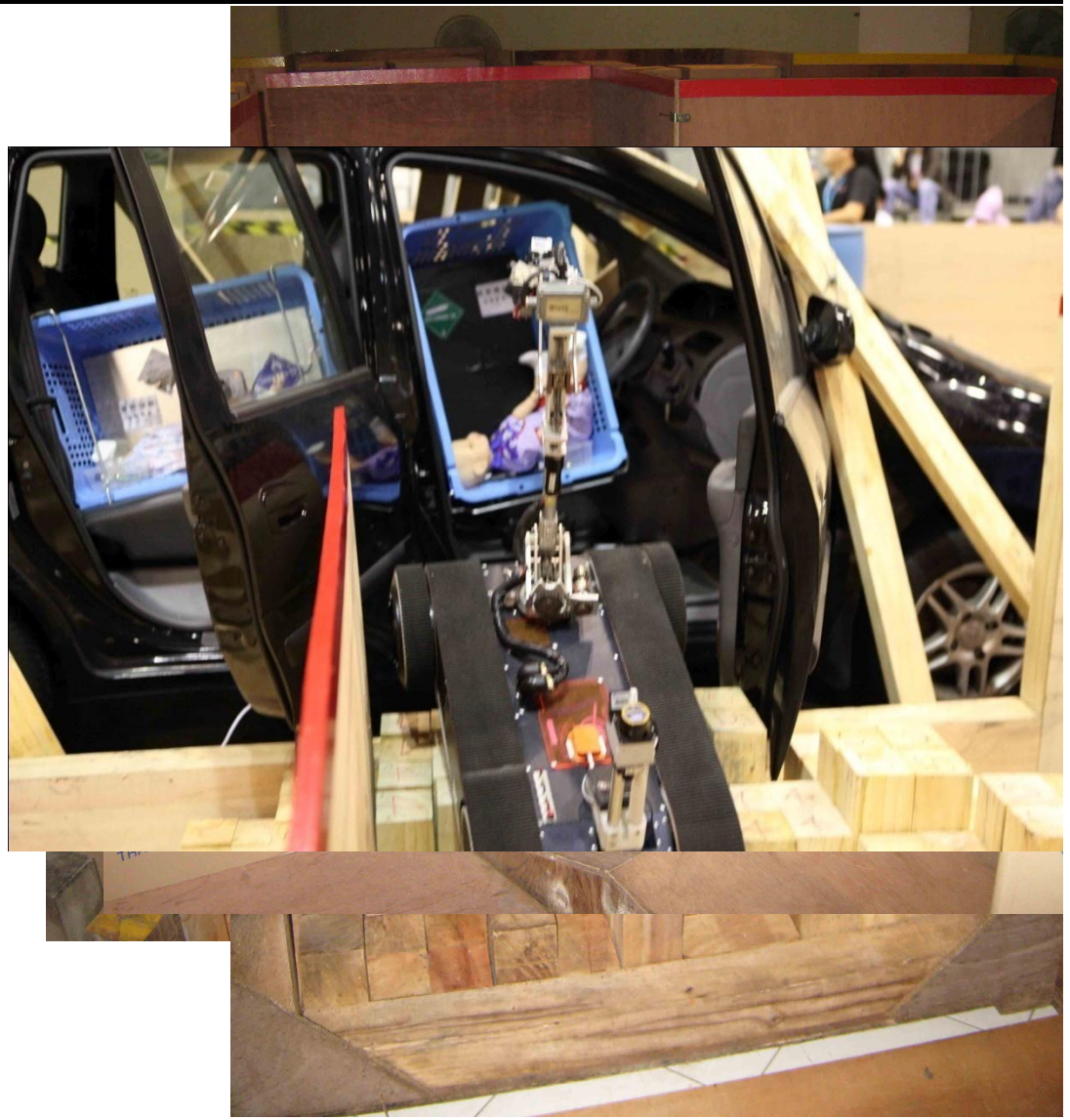
Advanced Mobility Autonomy Manipulation



PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

Method:
Advanced Mobility

- Slippery Floor
- Stair Way and Slope
- Japanese House
- Random Step-fields
  - Yellow Level
  - Orange Level
  - Red Level
  - Black Level
- Testing Arena



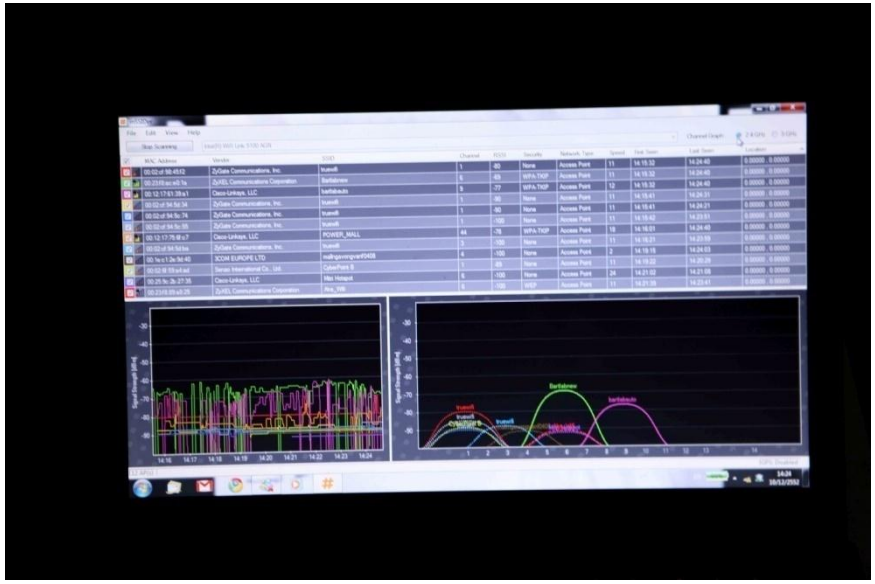
PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

Method:
Advanced Mobility

PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

Method: Autonomy

- Self-Navigation
- Victim Identification
- Radio Frequency Drop Out



PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

Method:

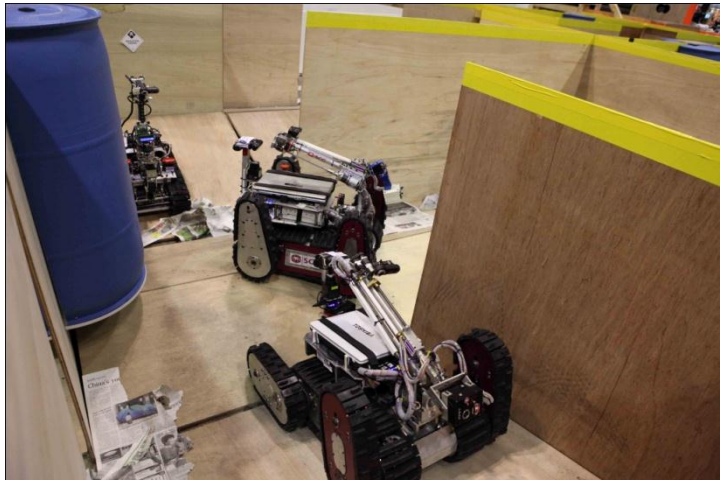
Manipulation

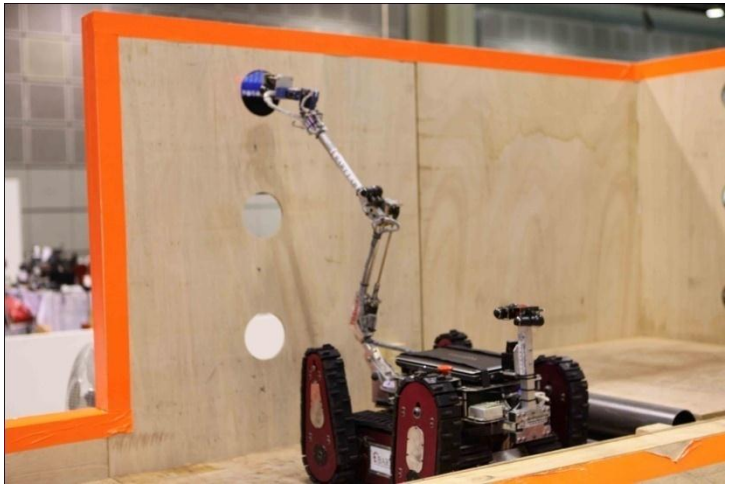
Manipulation

- On Board Manipulator
- Multiple Robots

Applications

- Sensing Manipulator
- Pick and Place



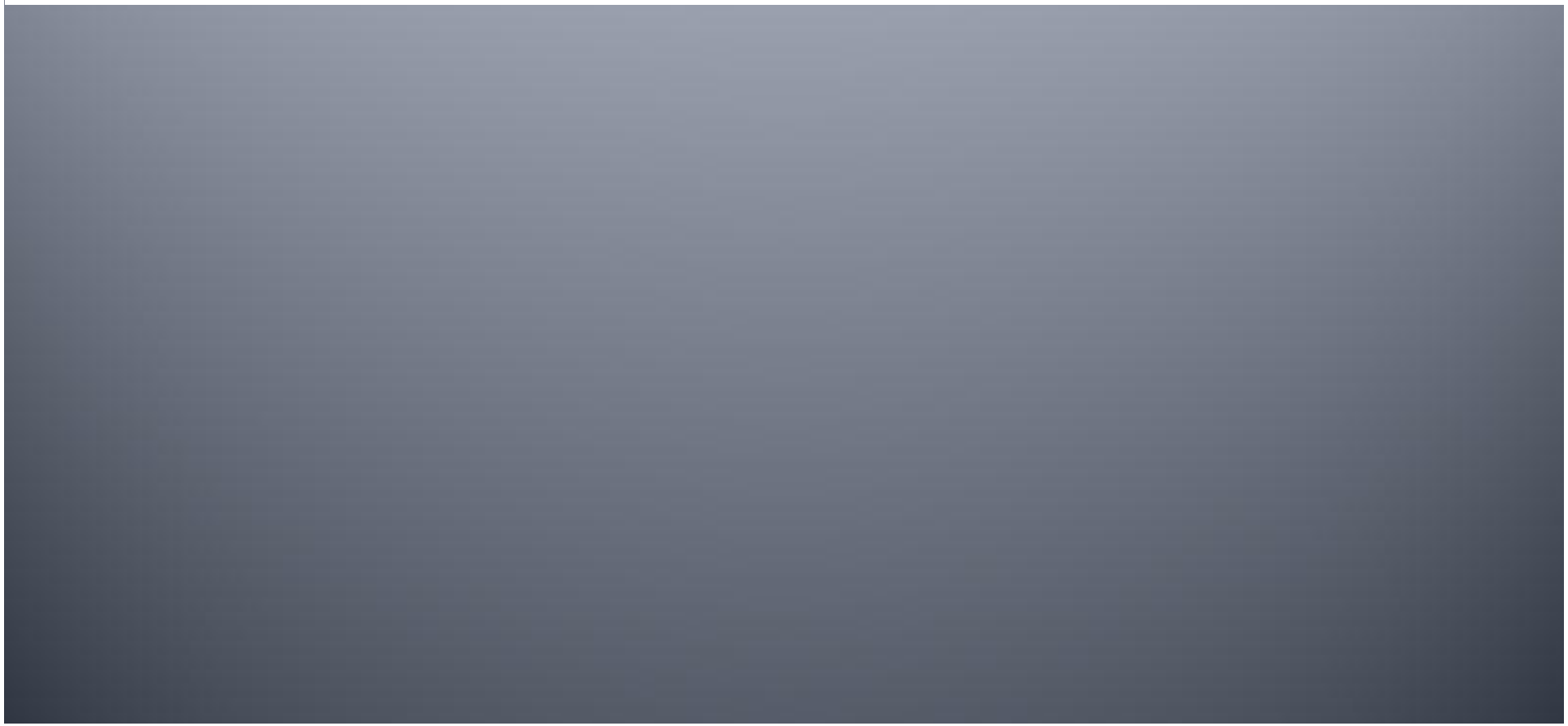


PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

BART LAB Rescue Robots

Autonomous Robot

Tele-Operated Robot



PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

Robots

AUTONOMOUS ROBOT

- Self Navigation
- Victim Identification
- RT-Map Generation
- Sending RT-Data to Station

- Slow
- Low Mobility

TELE-OPERATED ROBOT

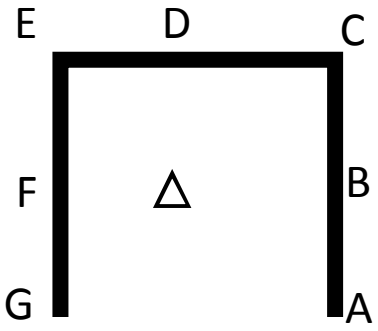
- Human-Made Decisions
- RT-Map Generation
- Sending RT-Data to Station
- High Mobility

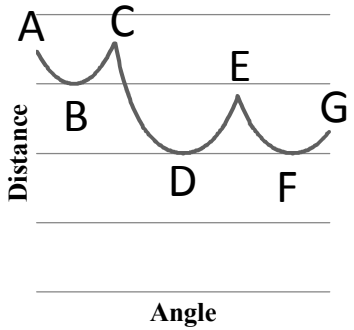
- RF Limitation
- GUI

PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

mous:
Self Navigation

- Navigating Sensors:
  - Laser Scanner (Hokuyo)
  - Gyro
  - X-Y Accelerator
  - Electronic Compass
  - Encoders
- Laser Scanner Output: (Angle, Distance)

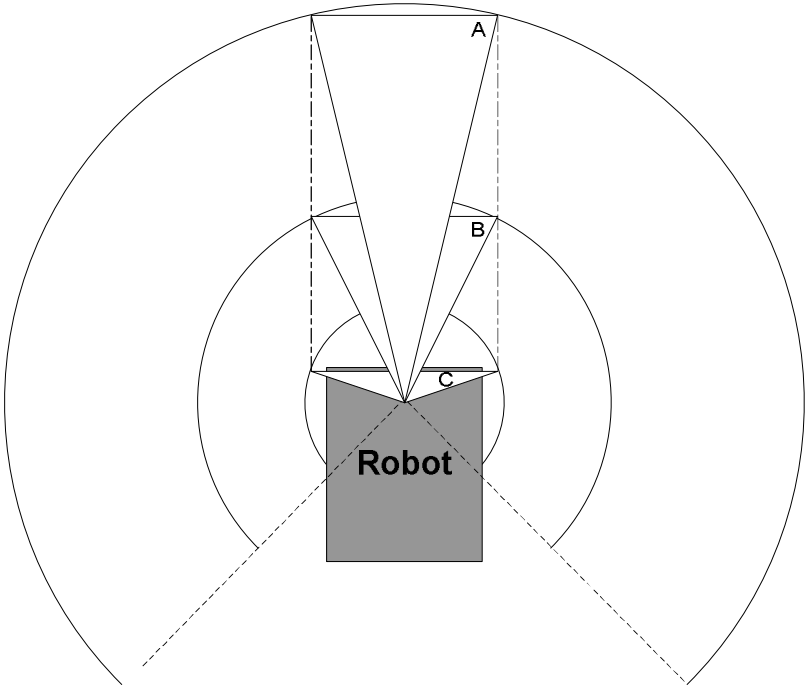




PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

mous Robot:
Self Navigation

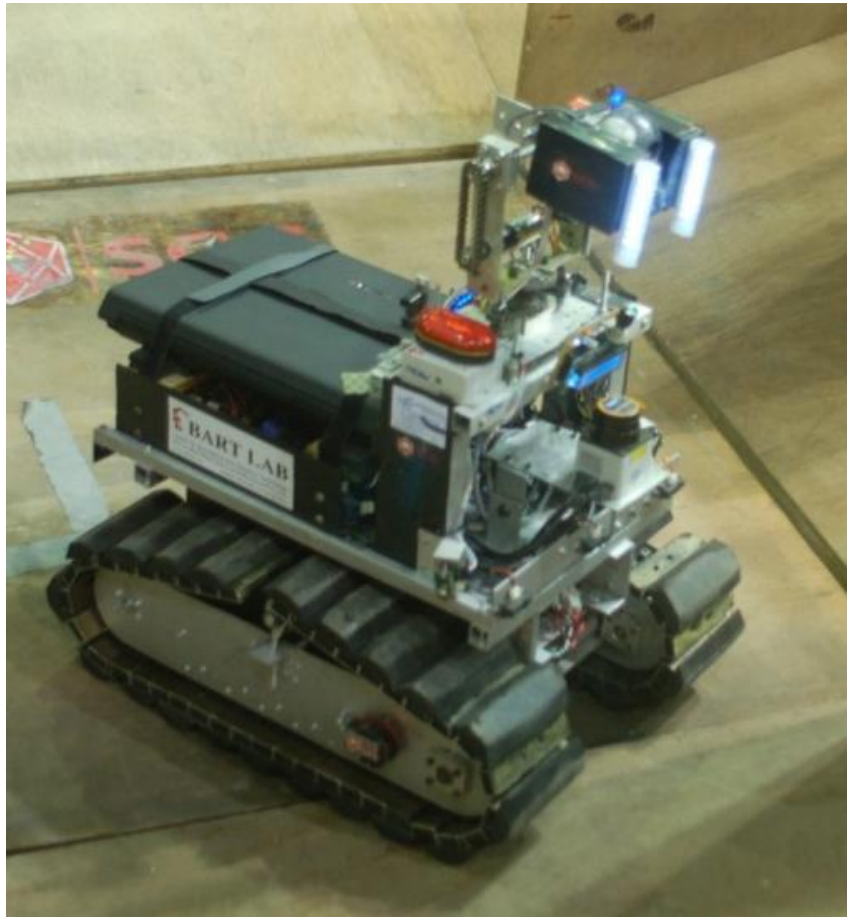
- Algorithm: Layer-Sweeping Search



PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

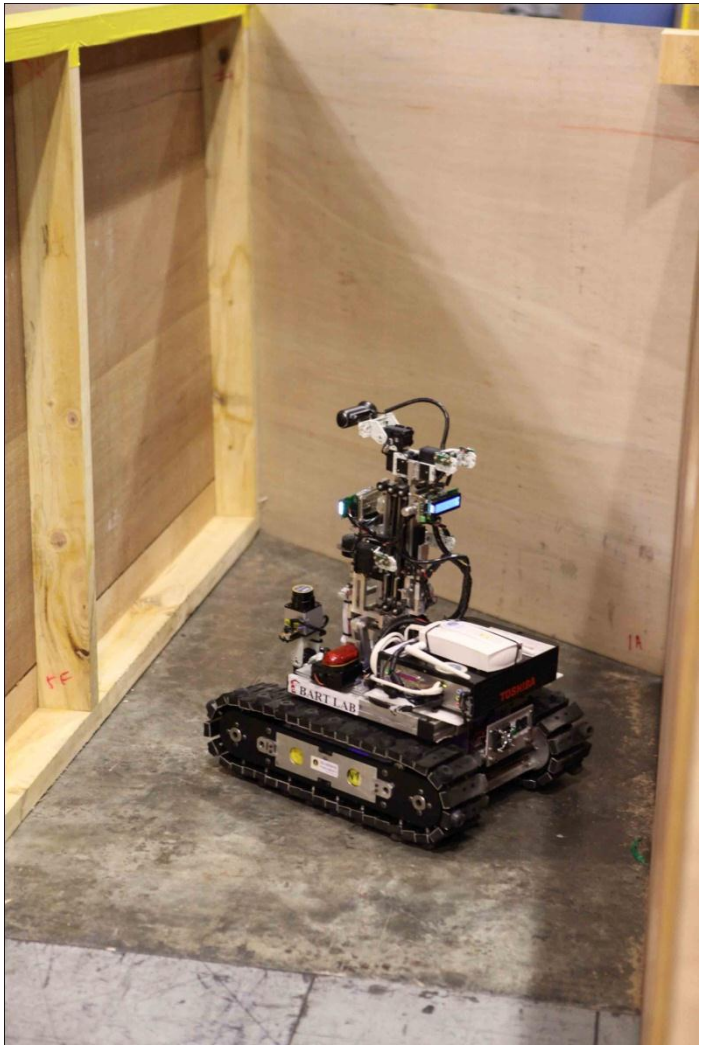
mous Robot:
Victim Identification

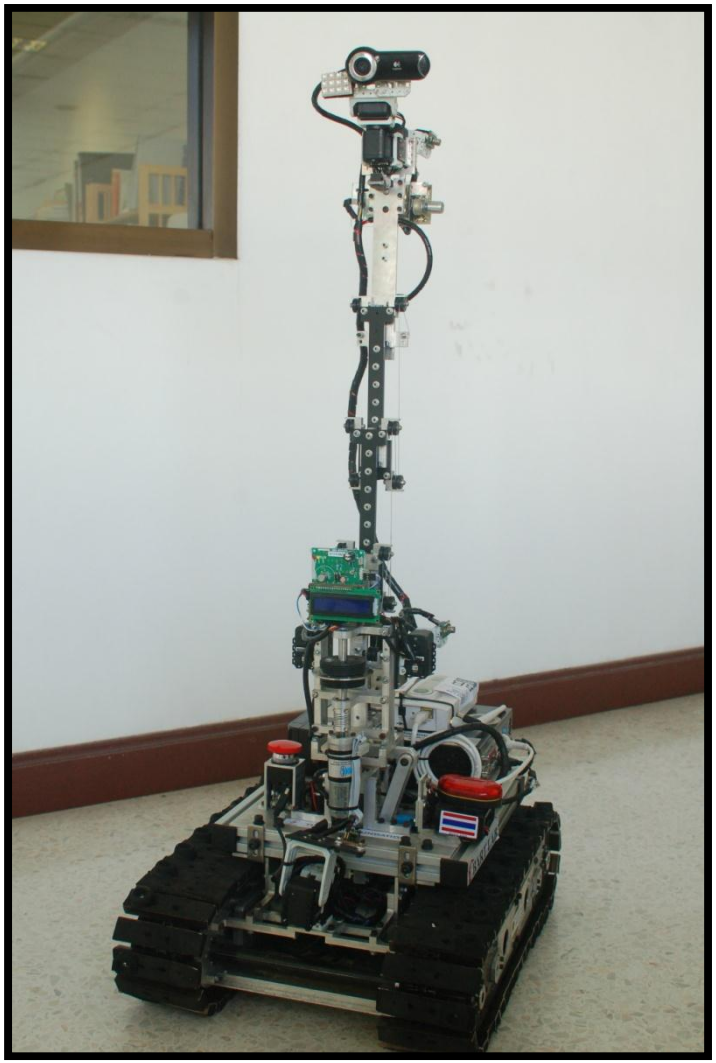
- Heat Sensor
- Image Processing
- Voice Detection
- Motion Detection



PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

nous Robot:
Victim Identification

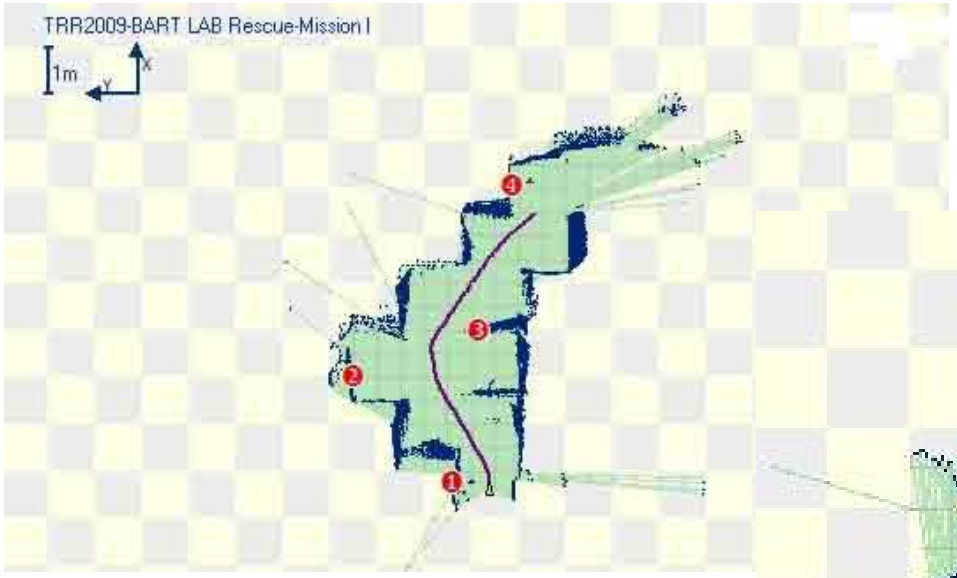


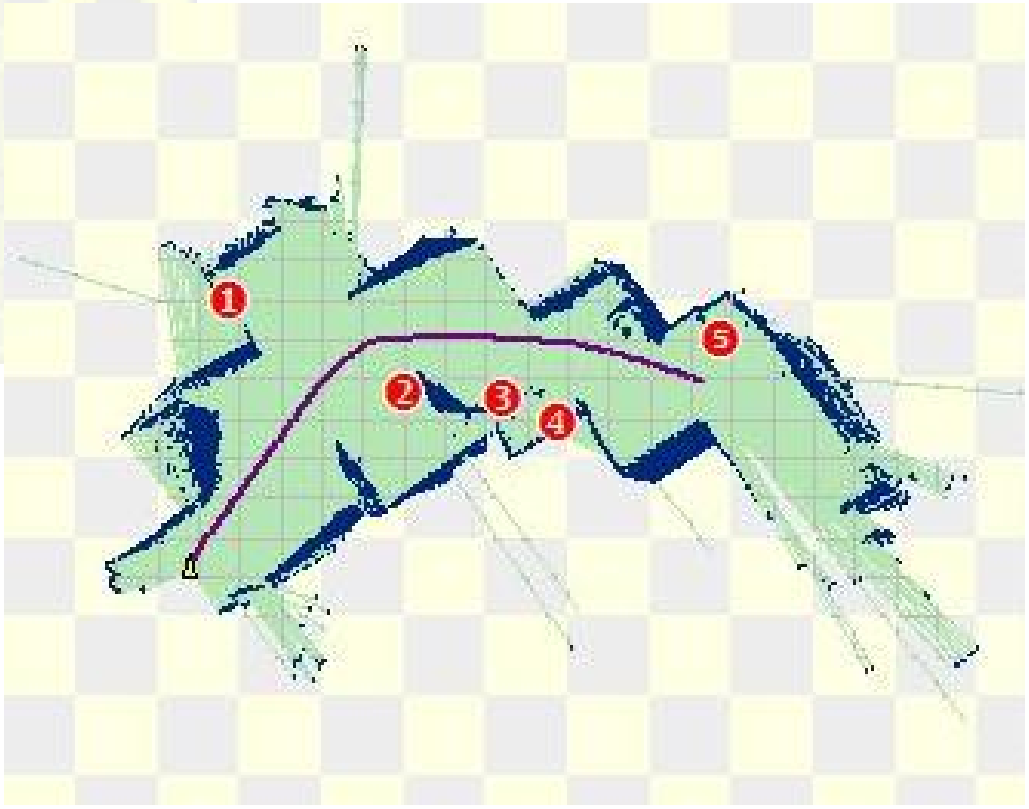


PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

nous Robot:

RT-Map Generation

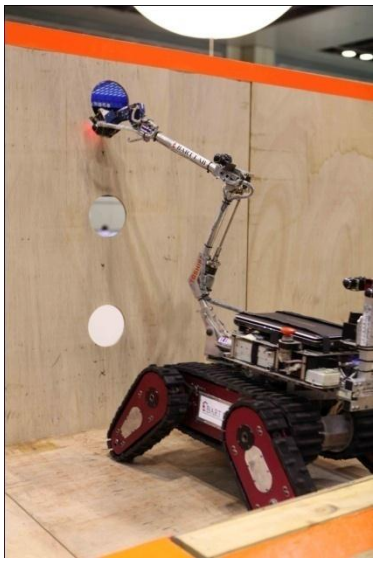


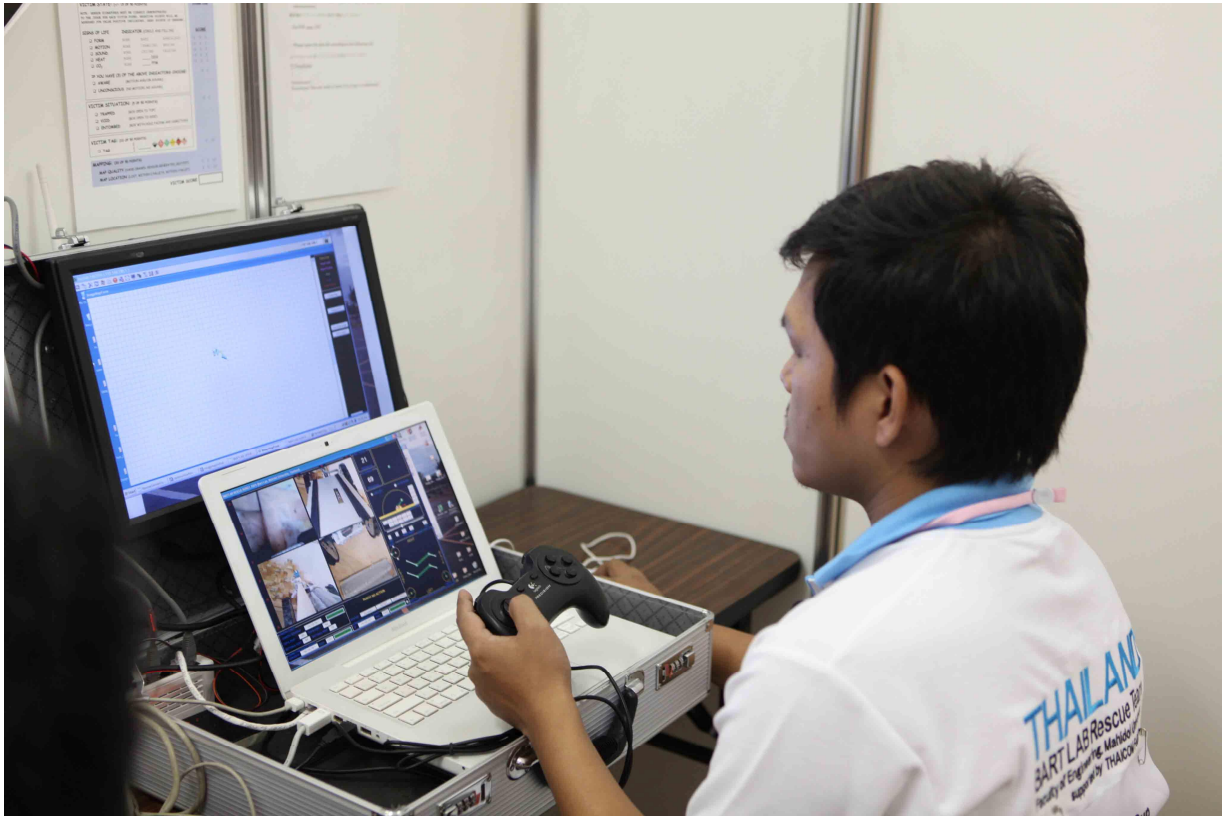


PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

erated Robot:
The System

- Remotely Control Station
- Rescue Robots

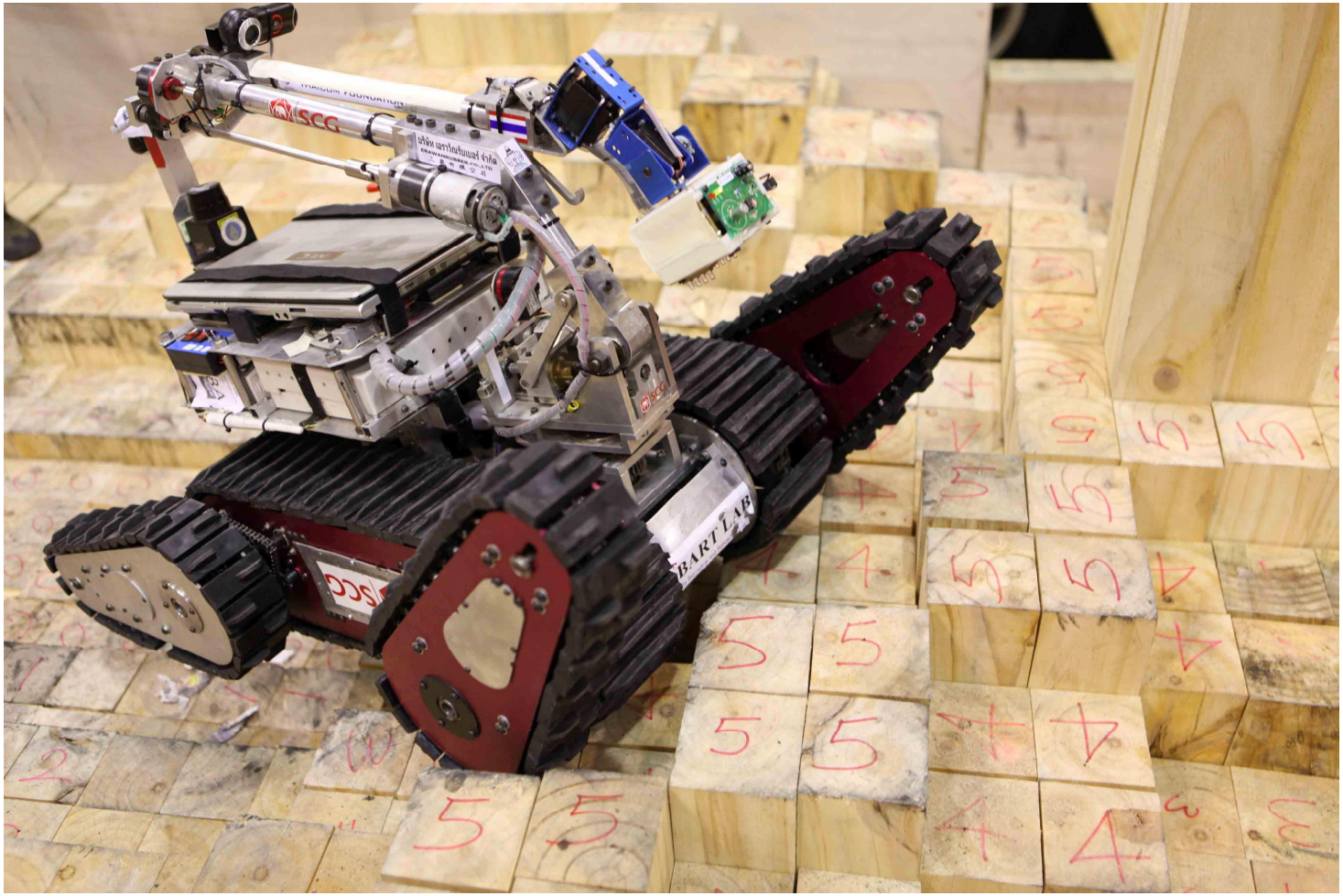




PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

erated Robot:

The Robot

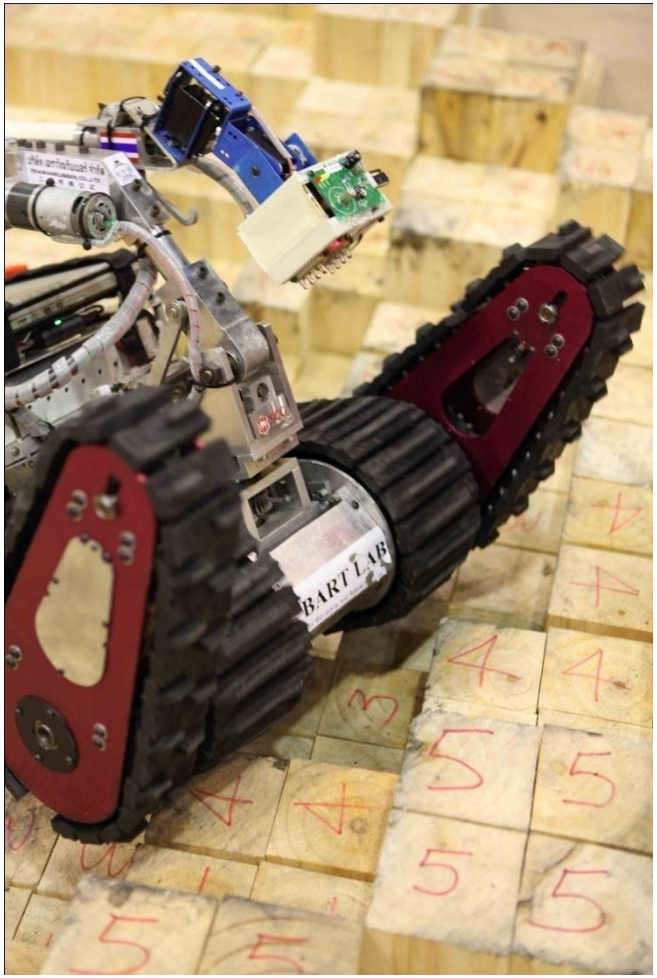


PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

erated Robot:

The Robot

- Sensing Systems
  - Heat Detection
  - Carbon Dioxide Detection
  - Motion Detection
  - Sound Detection
- Navigation Systems
  - Heading
  - Tilt and Level
  - Motion and Speed

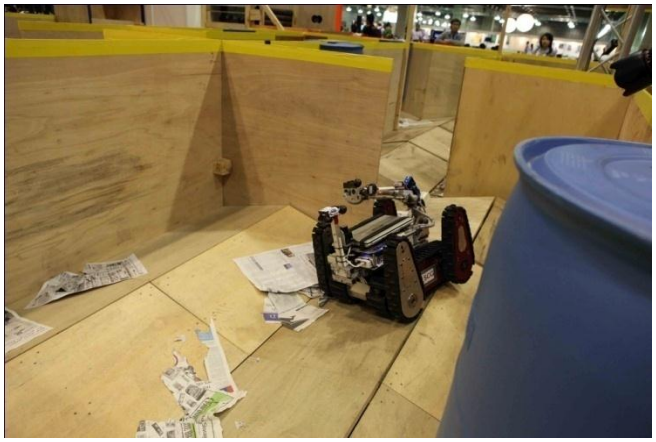


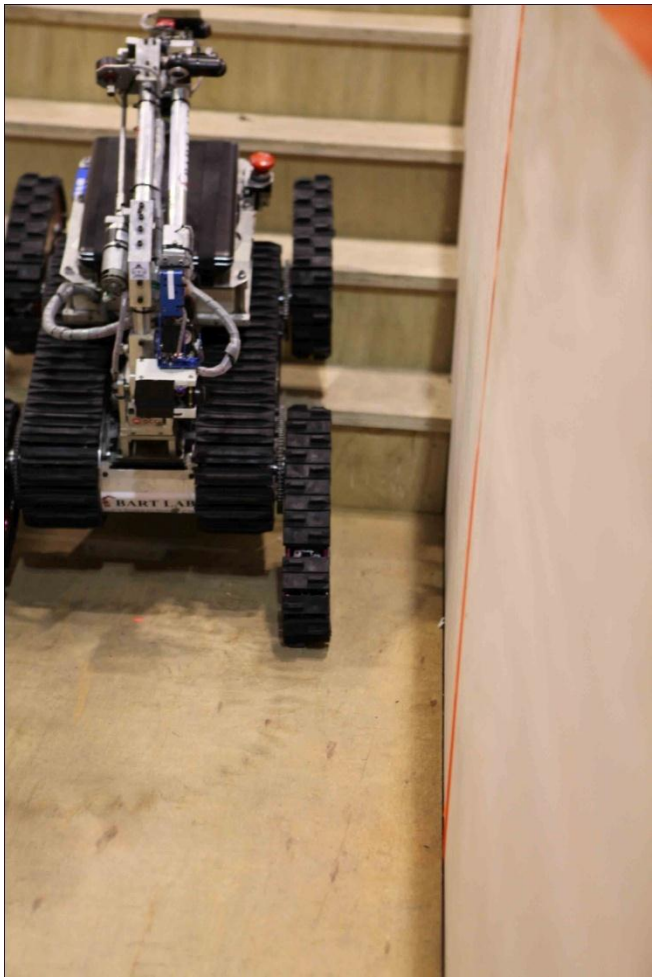
PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

erated Robot:

The Robot

- Advanced Mobility

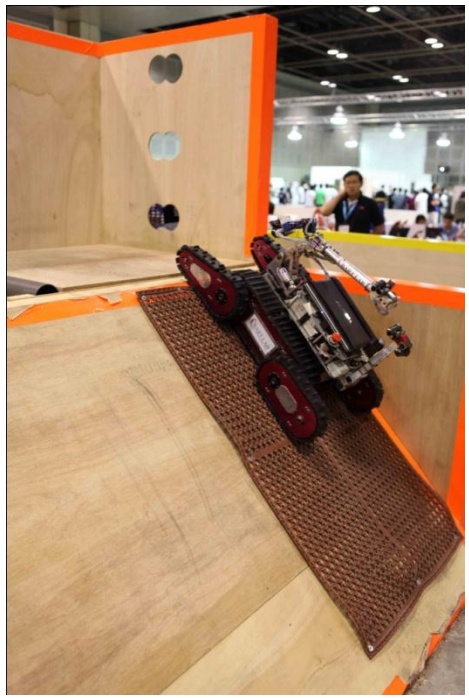
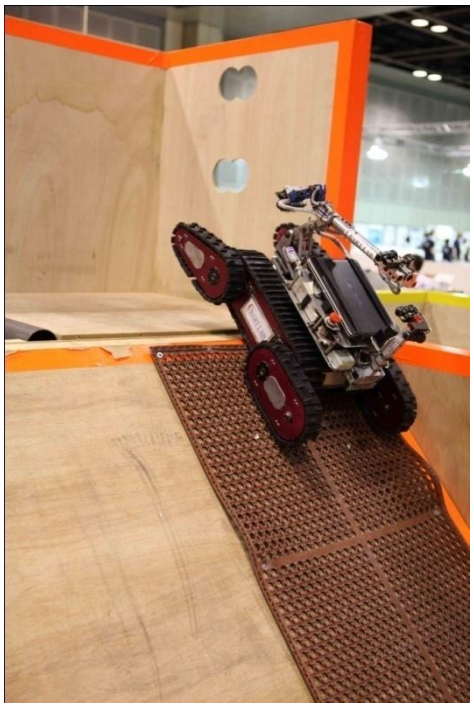




PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

erated Robot: The Robot

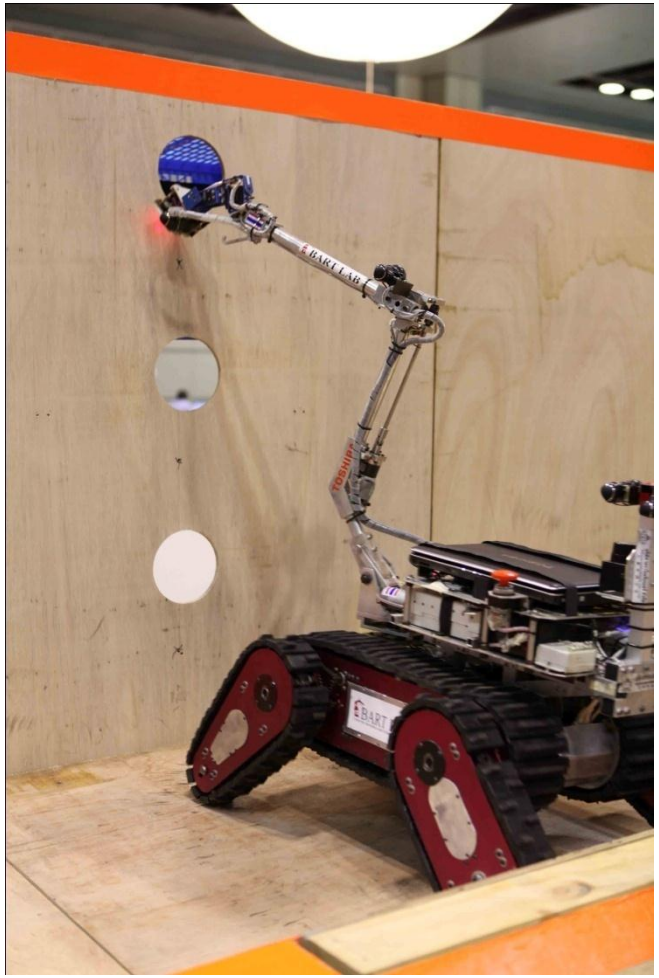
- Advanced Mobility

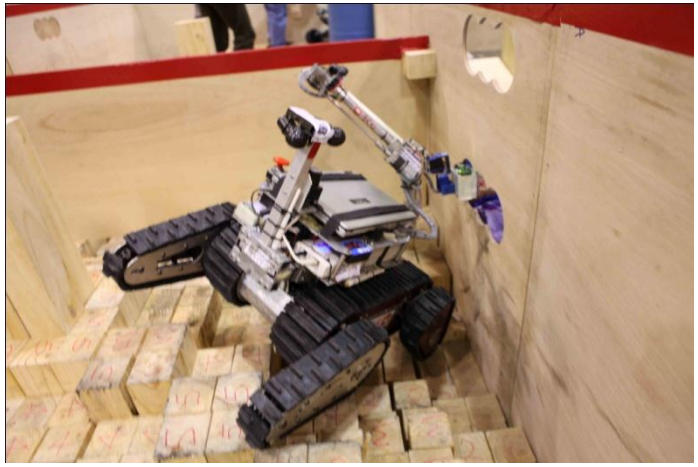



PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

erated Robot:

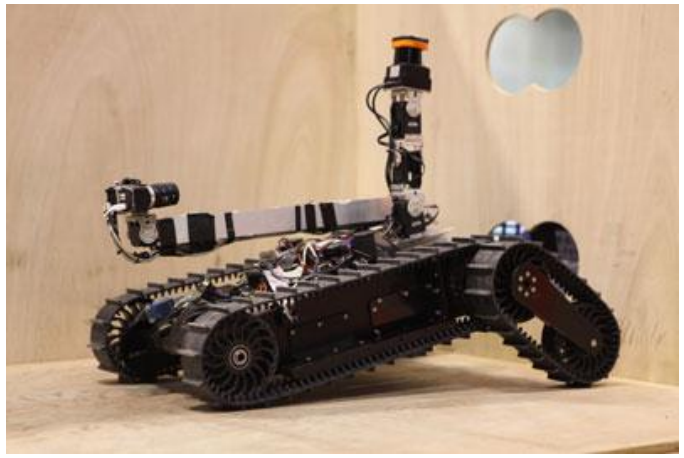
The Robot

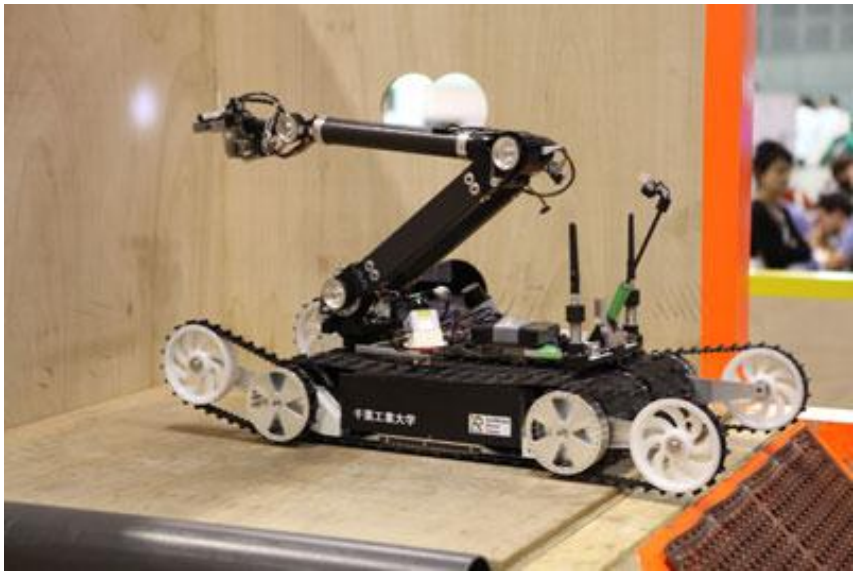


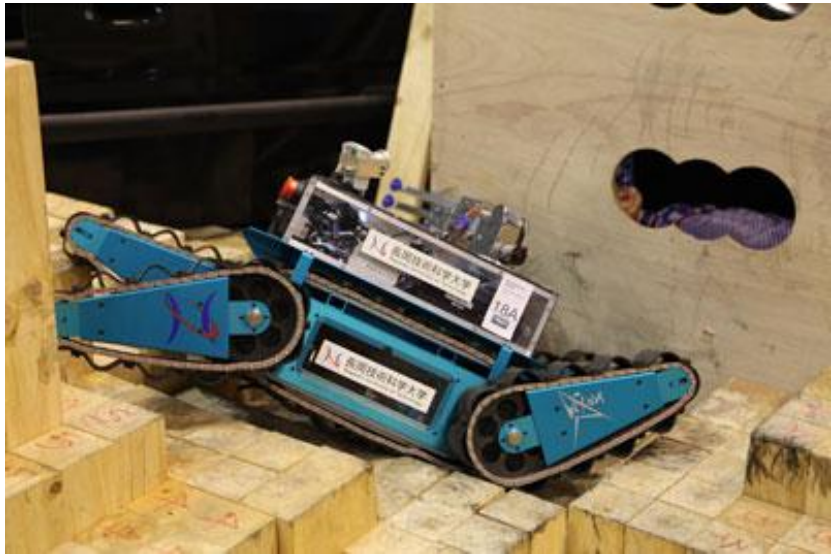


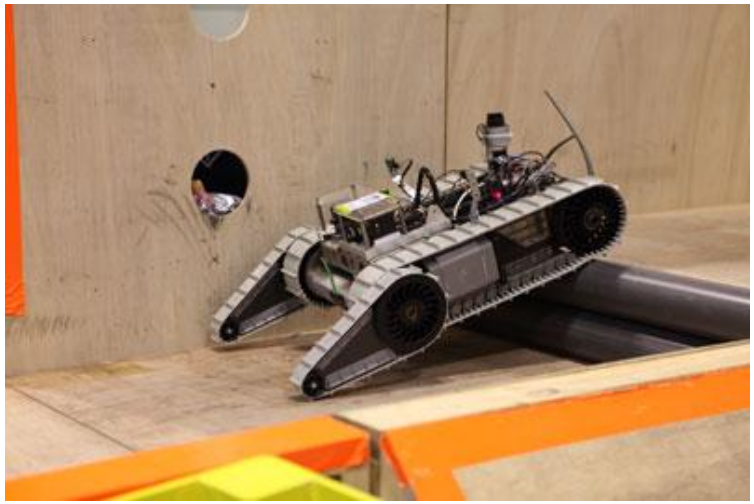
PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

Rescue Robots



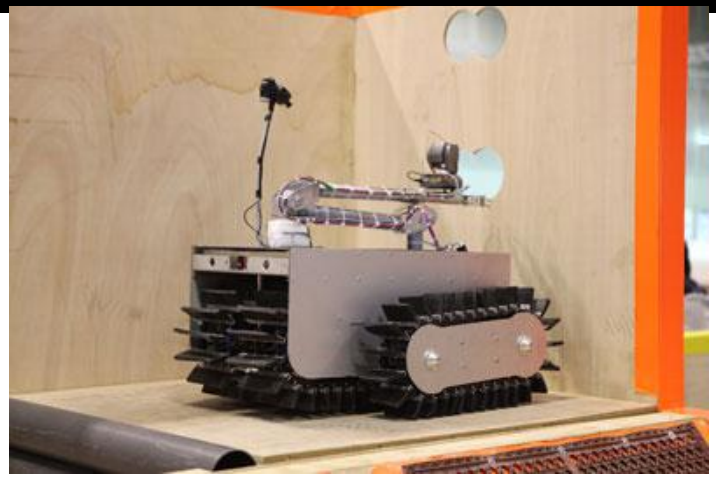


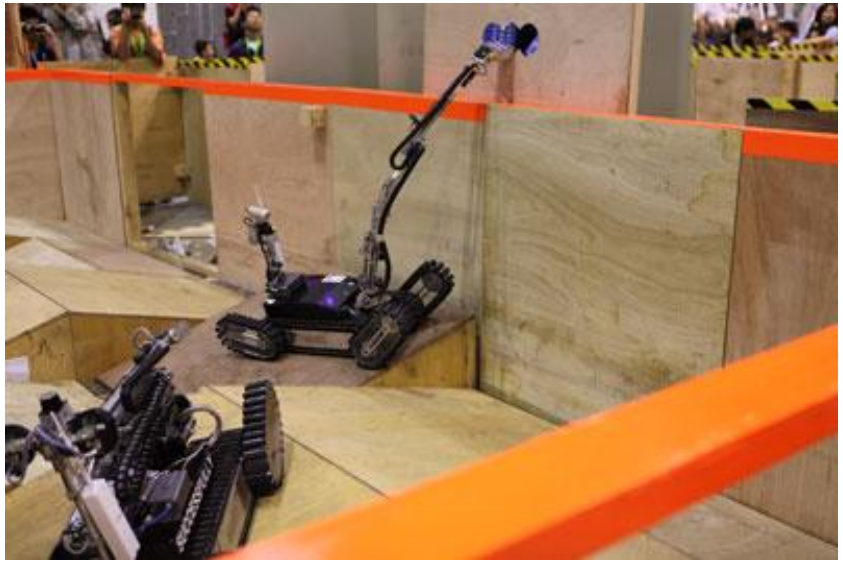




PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

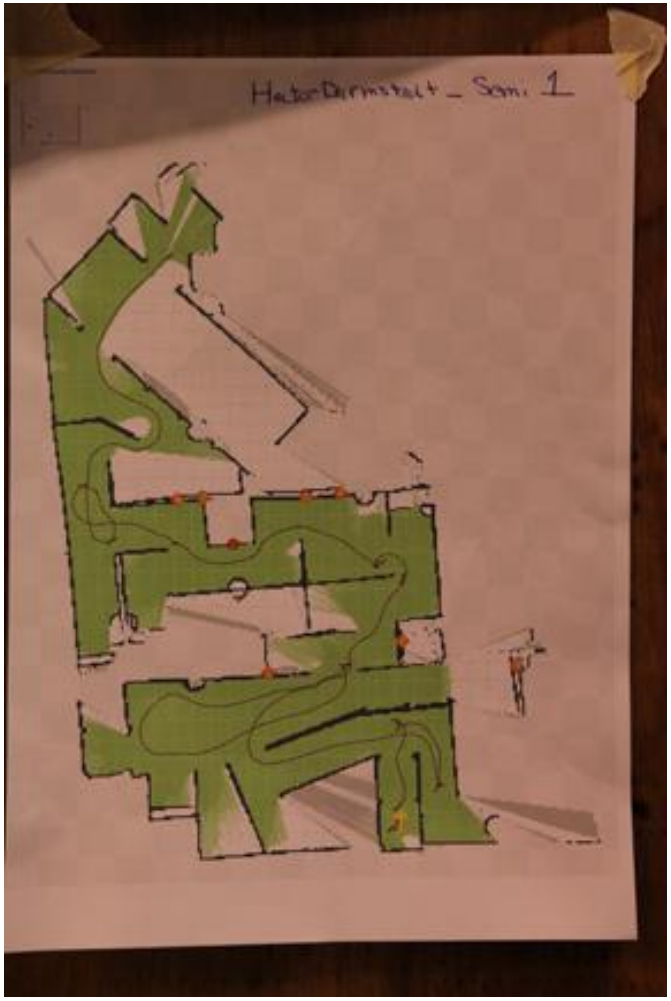
Rescue Robots





PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

Rescue Robots



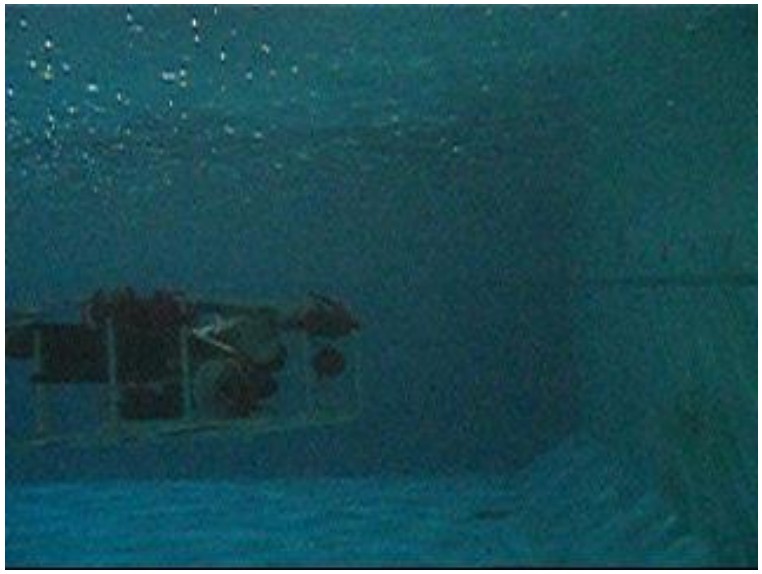
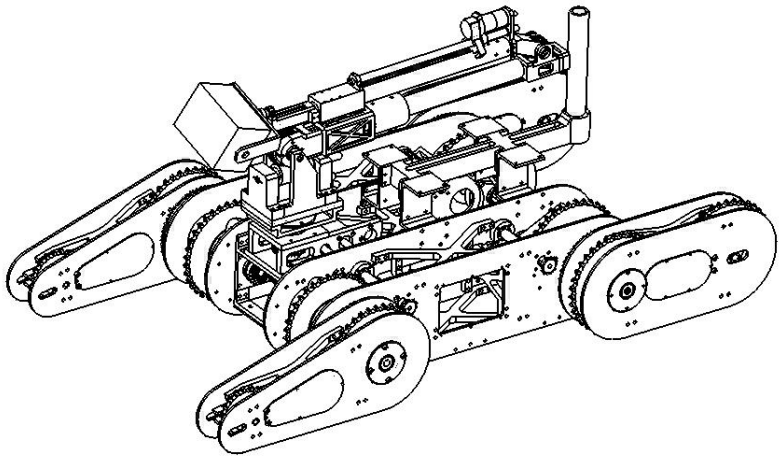
VDO

PDF Complete
Your complimentary use period has ended. Thank you for using PDF Complete.
Click Here to upgrade to Unlimited Pages and Expanded Features

ion

- Problem
- Testing Methods
- Rescue Robots

"Future Rescue Robot"



ThaiXPole+