

Novel EOD Robot Design with a Dexterous Gripper and Intuitive Teleoperation



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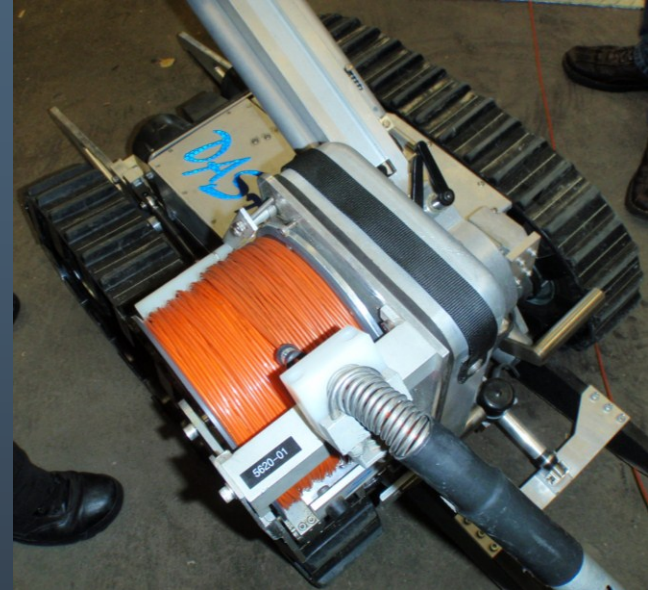
The Problem

“The use of first responder and homeland security robots is based on providing a robot that is less expensive to put in the field than a trained soldier.”

–Homeland Security Newswire



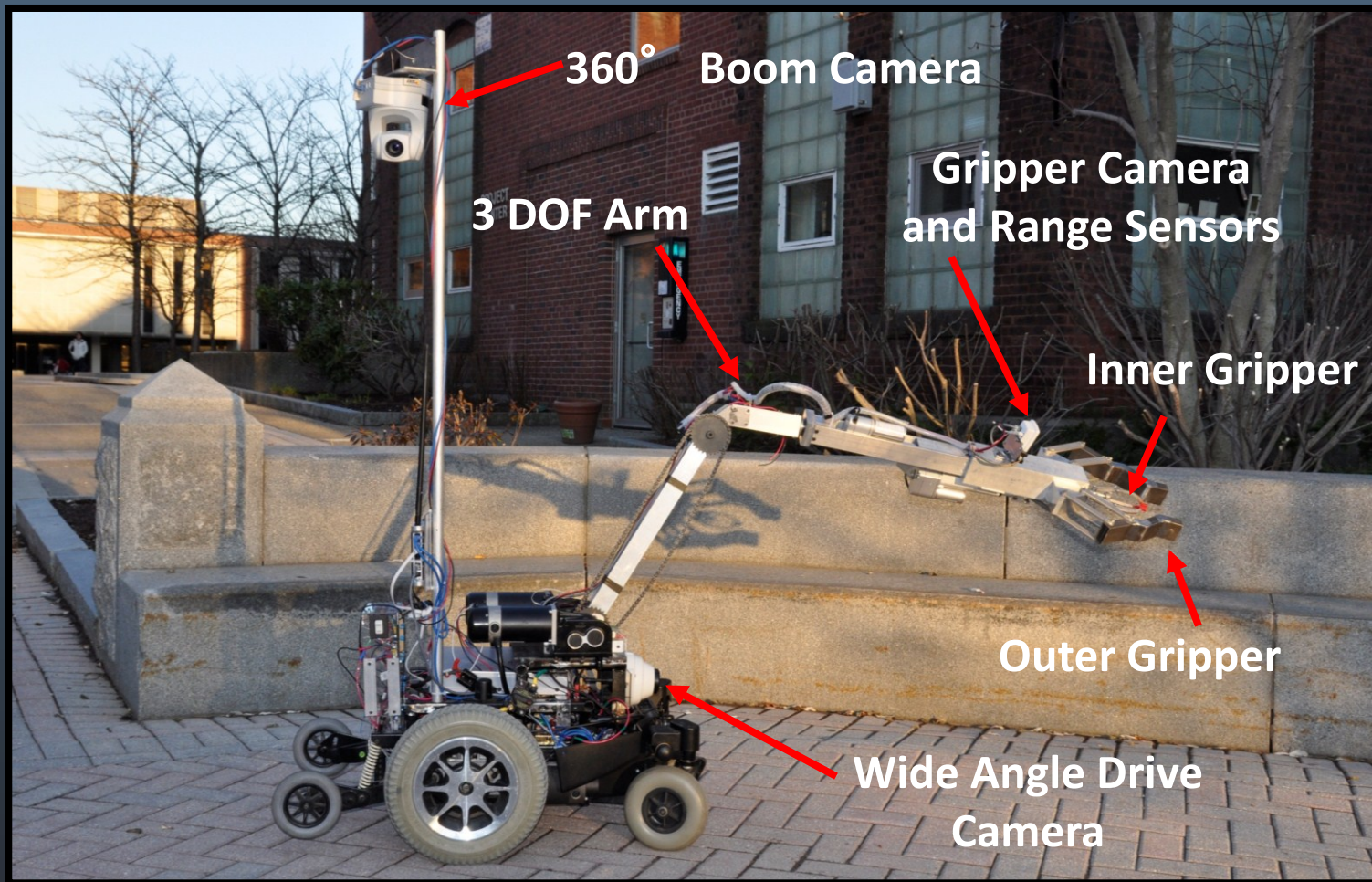
What's left?



"We need a robust enough sensor suite to perceive the environment and operate safely around people and moving obstacles like other vehicles"

-Aerospace and Defense Media Group

- Low Cost
- Sensor Feedback
- Dexterous Gripper
- Intuitive Controls
- Wireless Communication



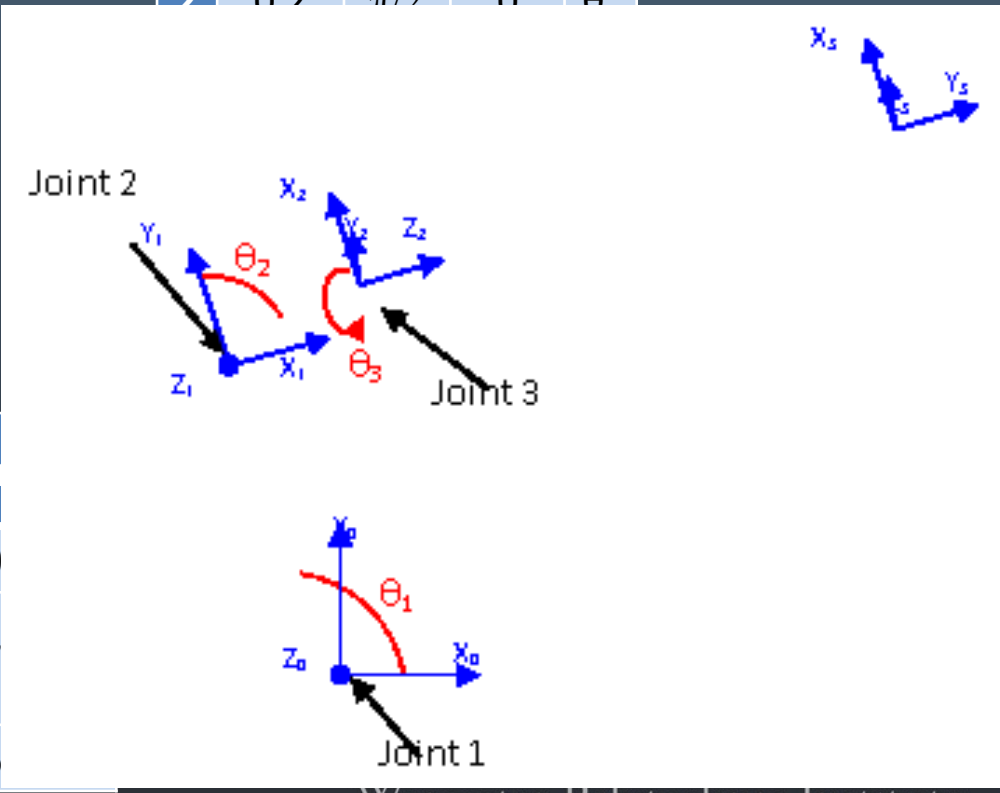
- 3 DOF arm
- Multi-mission use
- Long reach
- Good mobility
- Multiple approach

D-H Parameters

i	l_i (m)	α_i	D_i	θ_i
1	0.48	0	0	θ_1
2	0.2	$\pi/2$	0	θ_2

Arm Motion Control

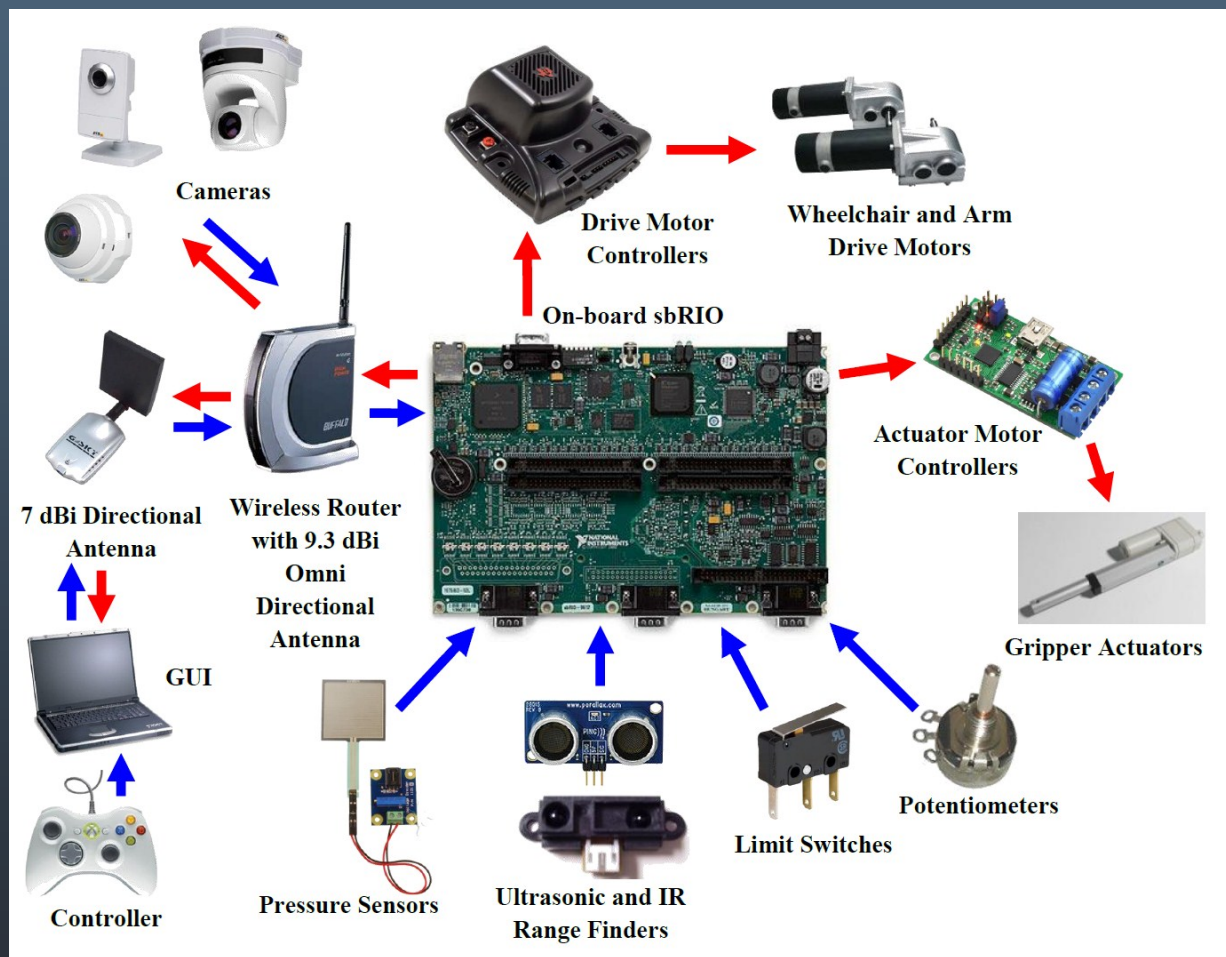
Joint	Drive Method	Rotation
1	Worm-gear gearbox	20°
2	Chain drive through worm-gear gearbox	27°
3	Planetary Gearbox	36°



- Designed for detonator removal
- Driven by linear actuators




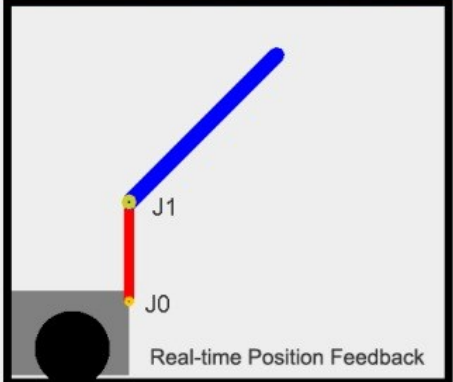
Hardware and Control



Graphical User Interface

Bomb Disposal Robot - Control Panel





Real-time Position Feedback

Port: 5020 Width Between Big Gripper: 3.2" (27%)

System is Enabled

Gripper Pressure:

Inner Gripper Extension: 6.0" (55%)

Amount the Inner Gripper is Closed: 100%

Arm/Gripper Mode Big Gripper

Camera Mode Inner Claw

Distance Sensors

Distance to nearest large object in front of robot = 7.2 feet

Distance between Disruptor & Target (goal - 18 inches) = 21 inches

Wheel Driving Velocity (% of max)

Left:


Right:

Connection Status

Connected to network: BDRMQP

Signal Strength:

Battery Levels

 12V = 11.90V OK

24V = 23.88V OK





SPEAKER VOLUME

MICROPHONE VOLUME

MICROPHONE

I-CABLE

ON

POWER

Remotec ANDROS HD-17

Address: 0b.0c

Version: 2.1.20

BDR 12V BATT: 11.90V OK

24V BATT: 23.88V OK

REMOTEC ANDROS

Our Controller

Talon Controller

Text color indicates button functionality for different modes
 Black - Works in all modes
 Blue - Camera mode for PTZ-capable devices only
 Red - Arm/Gripper mode only



Andros Controller

The Robot in Action



Thank You!

