

Landmine Detection

Will Cochran
Grant Garber
Raul Serrano

Fourteenth Annual School of Science, Engineering, and Health Symposium
April 28, 2017



Landmines Around The World

- History

- Used on wide scale in World War II
- Developments

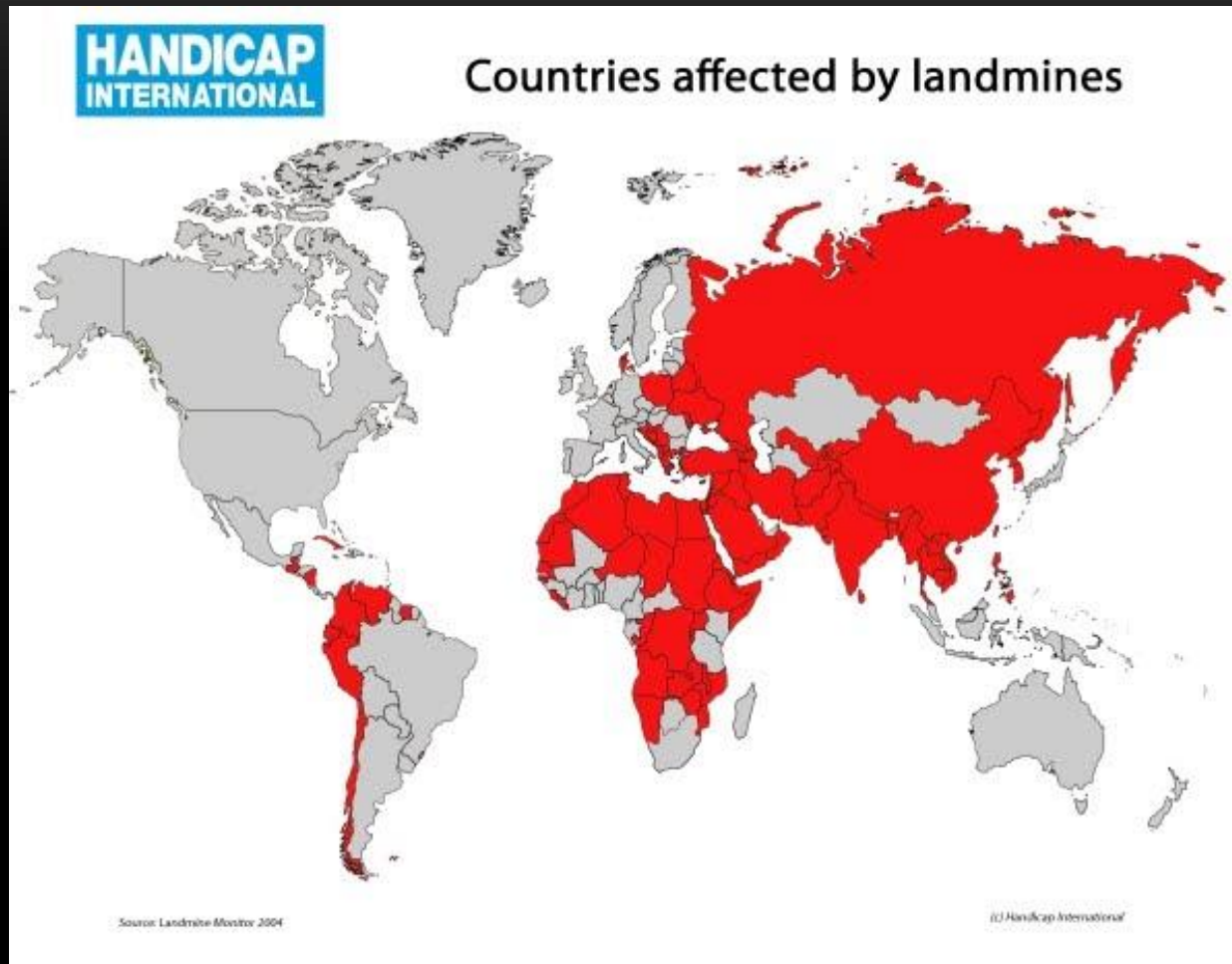
- Today

- Currently 110 million
- 60 contaminated countries
- 5,000 deaths annually
- 1,100 years to clear



LandmineFree.org

Landmines Around The World



LandmineFree.org



DEPARTMENT
OF
ENGINEERING



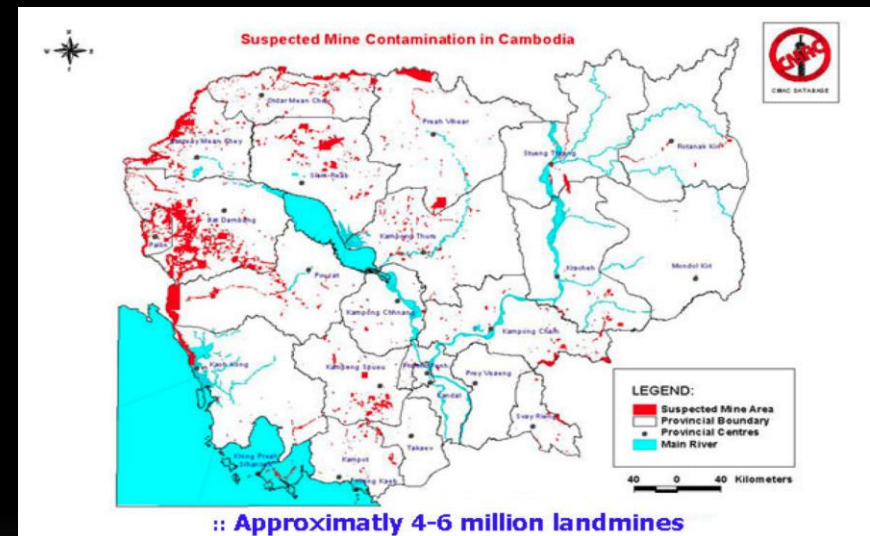
MESSIAH
COLLEGE



the Collaboratory
for strategic partnerships and applied research

Landmines In Cambodia

- Cambodia
 - Previous wars
 - Vietnam, Cambodian Civil War
 - Estimate 4-6 million
 - Many recorded injuries, amputees, and deaths
- Banteay Meanchey Province, Cambodia
 - Rural area
 - Flat Terrain, Farm rich soil, variable vegetation
- Results
 - Land development
 - Economic opportunity
 - Destruction and fear



Cambodian Mine Action Center (CMAC)

Types of Landmines

Two Varieties of Landmines in Cambodia

- Antivehicle (AT) Mine
 - AP Blast Mines
 - AP Fragmentation Mines
 - AP Bounding Fragmentation Mines
 - AP Directional Fragmentation Mines



One Step Beyond



MineAwareness.org

AP Blast Mines

- Pressure Operated
 - 2-12lbs
- Buried at shallow depth (2 in)
- Mechanical fusing system with main charge
 - TNT
- Plastic or Metal
- Intended to cause injury rather than kill
- Difficult to detect

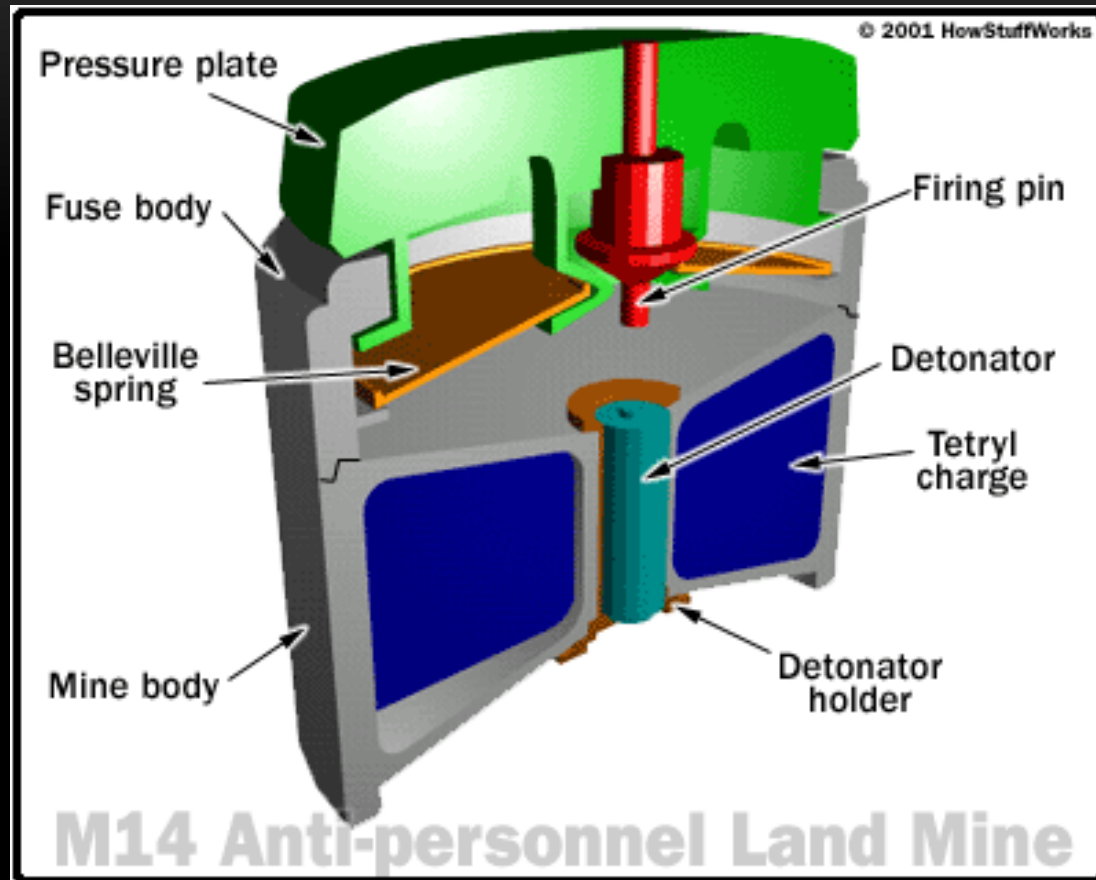
M 14



Diameter	56 mm (2.2 in)
Weight	90 g (.2 lbs)
Safety Distance	100 m (Radius)(330 ft)
Country	USA

Cambodian Mine Action Center (CMAC)

M14



howstuffworks.com



DEPARTMENT
OF
ENGINEERING



MESSIAH
COLLEGE



the Collaboratory
for strategic partnerships and applied research

Detection Technology Today

- Vapor Detection

Dogs

Rats

Ferrets

Bees



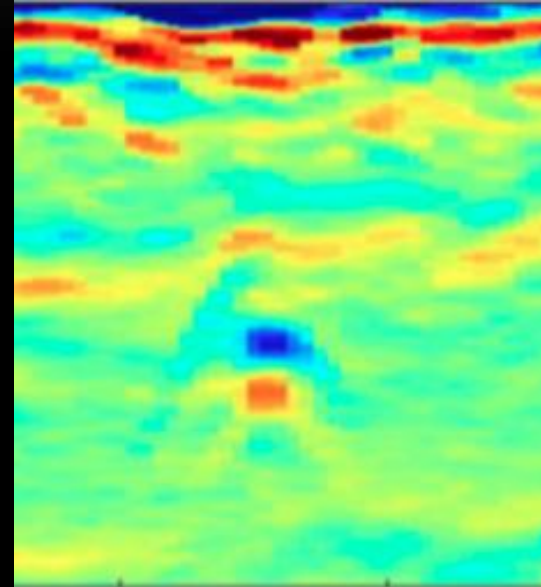
researchgate.net

Detection Technology Today

- Ground Penetrating Radar



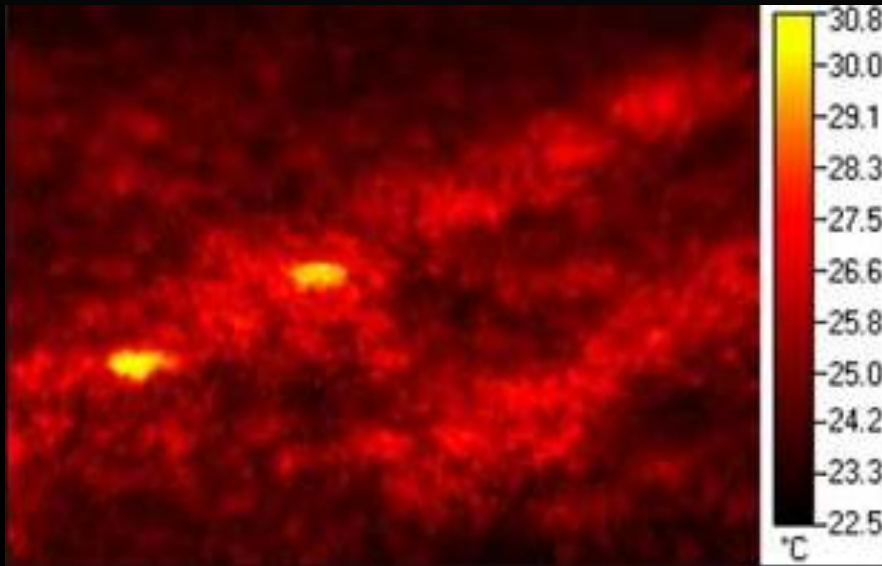
perth-businessdirectory.com



researchgate.net

Detection Technology Today

- Infrared imaging



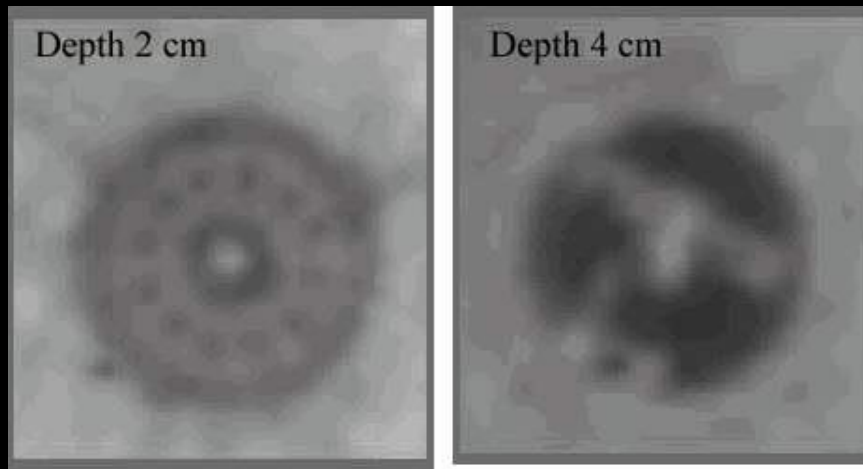
physicscentral.com



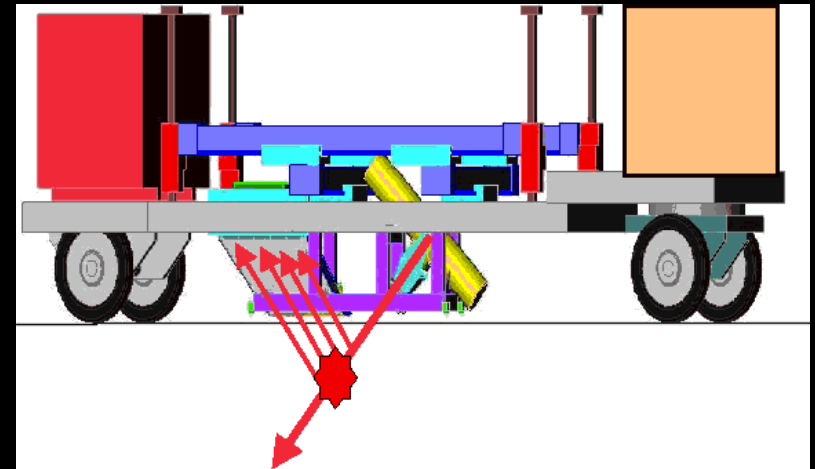
industrytap.com

Detection Technology Today

- X-Ray Backscatter



ndt.net



ndt.net

Detection Technology Today

- Metal detection



metaldetectors.com



DEPARTMENT
OF
ENGINEERING



MESSIAH
COLLEGE



the Collaboratory
for strategic partnerships and applied research

Detection Technology Today

- Detections transporters (UAVs)



hobby-detecting.com



horizon-magazine.eu



DEPARTMENT
OF
ENGINEERING



MESSIAH
COLLEGE



the Collaboratory
for strategic partnerships and applied research

Detection Technology Today

- Detection transporters (driveable)



horizon-magazine.eu



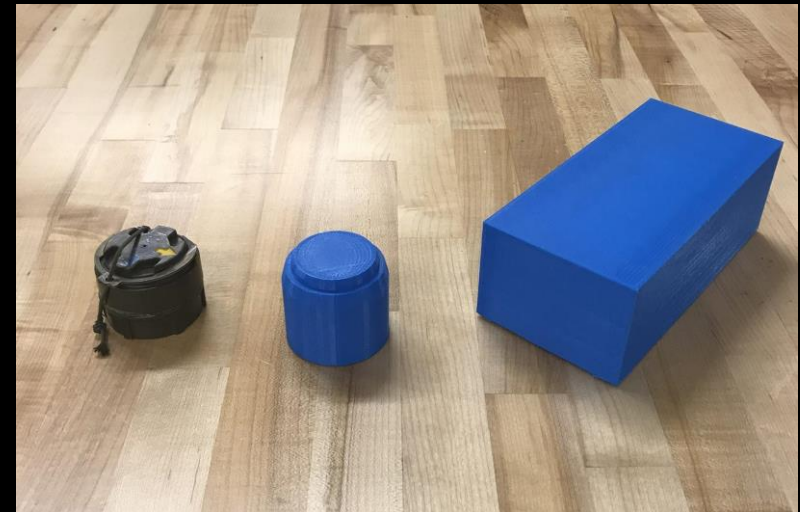
technocrazed.com

Design Parameters

- Vehicle
 - Offroad capabilities
 - Lightweight
 - Simultaneously equipped:
 - Detection system
 - Brush cutters

Future Work

- 3D Print SolidWorks Model
 - Plastic replica
- Benefits
 - Attach different amounts of metal



Inert mine (green) vs 3D-printed mines (blue)

FUTURE WORK

- Detection testing
- Coordinating detection methods
- Vehicle Prototyping

ACKNOWLEDGEMENTS

- Dr. Donald Pratt – Group advisor and technical expert



QUESTIONS



*DEPARTMENT
OF
ENGINEERING*



**MESSIAH
COLLEGE**



the Collaboratory
for strategic partnerships and applied research