



# Air Force Research Laboratory

## Airbase Technologies Division

Tyndall Air Force Base, Florida

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# AFRL Research Sites

# Force Protection Technology

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LEAD | DISCOVER | DEVELOP | DELIVER

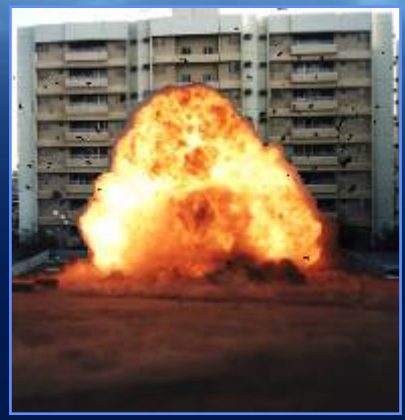
## Research Areas

**Engineering Mechanics**
- Blast Resistant Materials
- Structural Survivability

**Robotics**
- Explosive Ordnance Disposal
- Base Defense & Security

**Security Technologies**
- Agent Detection & Characterization
- IED Detection

**Reactive Chemical Systems**
- Development/Demo/Testing
- Explosive Operations






## Benefits to Warfighter

- Enhanced Blast/Fragmentation Weapon Protection
- Reduced Manpower/Time/Cost for Range Clearance Ops
- Increased Safety of Deployed Personnel
- Increased Protection from Chemical / Biological Threats

# Robotic Technologies

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## Research Areas

- Advanced Technologies Development
- Integrated Base Defense Technologies
- Robotic EOD Technologies
- Automated UXO Response Technologies
- Robotics for Airbase Operations and Support

## Benefits to Warfighter

- Reduced manpower/time/cost for Range Clearance Ops
- Increased safety of deployed personnel
- Technical expertise
- Reduction of development time with existing systems and new capabilities

MACE

RMAX

Airborne ARTS In theater

DEFENDER

BOMBOT

# Capabilities

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## Test Ranges Approved for Large Scale Robotic Vehicles



# Technologies

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## Developed & Transitioned Technology

Bombot

MACE

Robo-Trencher

REDCAR

ARTS

Robotic ATV Carrier


6

# Advanced Technologies Development

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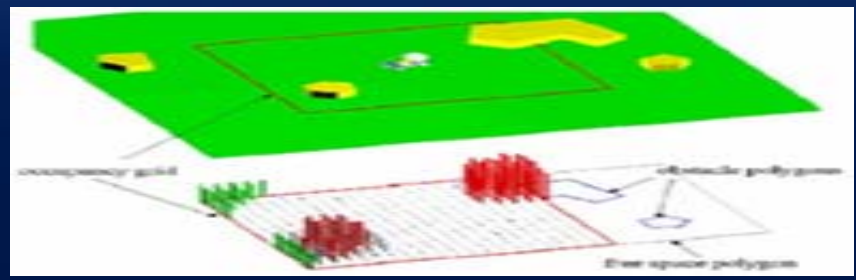
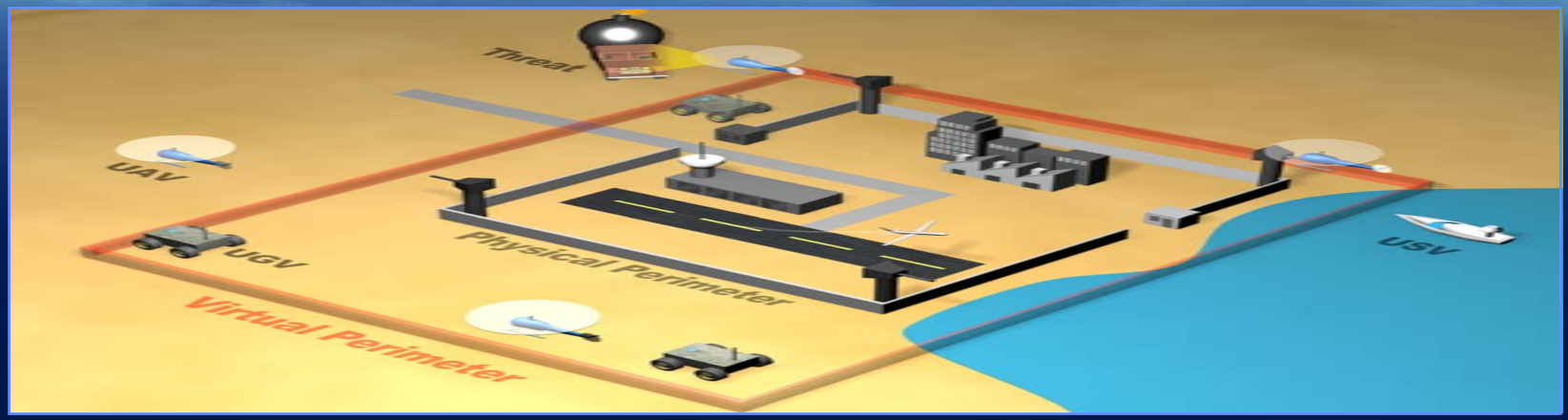
$$\frac{a_y}{g} = \frac{t/2 + \varphi h}{h}$$



- Advanced Technology Development expands technology required for unmanned systems to operate autonomously
- Focus is on technology considered necessary for an autonomous system
- New technology developed or current technology improved in a modular fashion
- Develop enabling robotics technology in the areas of Autonomous mobility control, tactical behaviors, world modeling, mission planning, sensor fusion, and robotic perception
- Transition technology modules into applied projects focusing on specific applications

# Integrated Base Defense

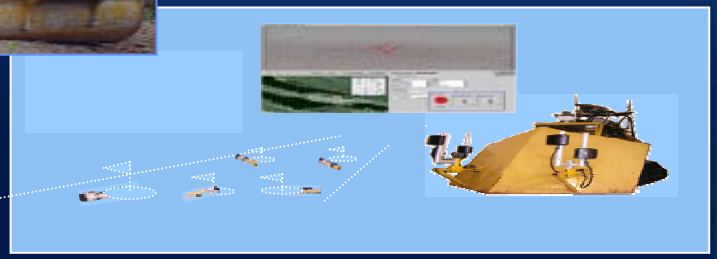



- Develop automated technology to augment the security force mission
- Provide perimeter security to protect installations from emerging threats
- Integrate robotic ground, air, and sea systems into a seamless network with existing USAF security system architectures – Integrated Base Defense Security System (IBDSS)
- Develop object classification capability to determine ground traversability
- Develop target interdiction model/planner
- Develop technology to support intruder detection on the move
- Conduct warfighter airfield security experiment

# Robotic EOD Technologies

- Increase EOD operations conducted mostly by robotic systems under the supervision of EOD personnel
- Detection and neutralization of conventional unexploded military munitions using experience based and adaptive artificial intelligence
- Employ state of the art sensors on robotic systems for detection of non-standard explosive threats and neutralization of conventional explosive devices
- Increase the operational capability of the EOD mission personnel by providing technology solutions to decrease mission time and increase stand-off to save lives putting unmanned systems in harm's way

# Automated UXO Response



- Validate UXO detection methods using an unmanned air vehicle
- Unmanned ground vehicle autonomously travel to these targets for verification and elimination utilizing a multi-shot SMUD platform
- Technology will enhance collaborative engagement technology development between UAVs and UGVs
- Includes multiple autonomous solutions to the range clearance issue
- Develop technology to support UXO range clearance operations
- Integrate UXO detection techniques between a UAV and UGV platform
- Demonstrate automated detection and clearance of unexploded items

# Robotics for Airbase Operations and Support

- **Develop robotic technology to allow for unmanned firefighting operations in hazardous locations**
- **Increase the efficiency of ground support operations through automation of the ground refueling process for the planned F-35 JSF training mission at Eglin AFB**
- **Protect personnel during transport and handling of remains and prevent the spread of contamination during recovery and delivery**

# Points of Contact

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**Points of Contact:**


**Strategic Research Manager**
**Mr. Al Nease**
**850-283-3705  DSN 523-3705**
**Al.Nease@tyndall.af.mil**

**Robotics Group Lead**
**Mr. Walter Waltz**
**850-283-3725  DSN 523-3725**
**Walt.Waltz@tyndall.af.mil**


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