Introduction

Applied Research Associates

**Unmanned Systems and Security Products**

Lead Scientist: Dr. Lance Besaw

Prime Qualifications

- Proven ability to build and manage large diverse technical teams performing on long duration competitive R&D programs

- Stable research firm comprised of in-house staff with deep technical capabilities

- Nimble, customer-focused project management and execution

- Proven experience with image/video processing R&DTE and deployment

- Proven deep learning technologies applied to many sensing phenomenologies (EO/IR, radar, EMI, seismic & accoustic)
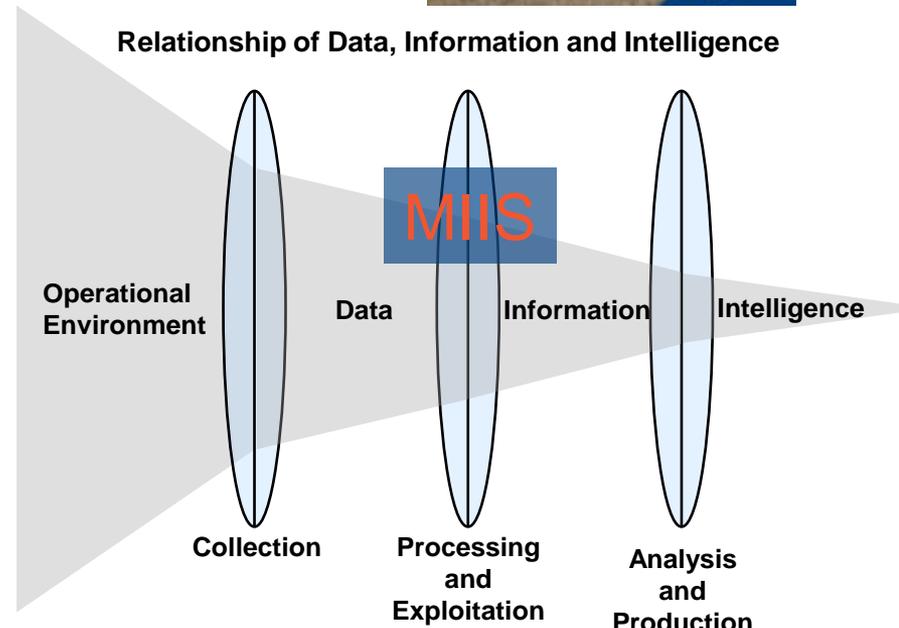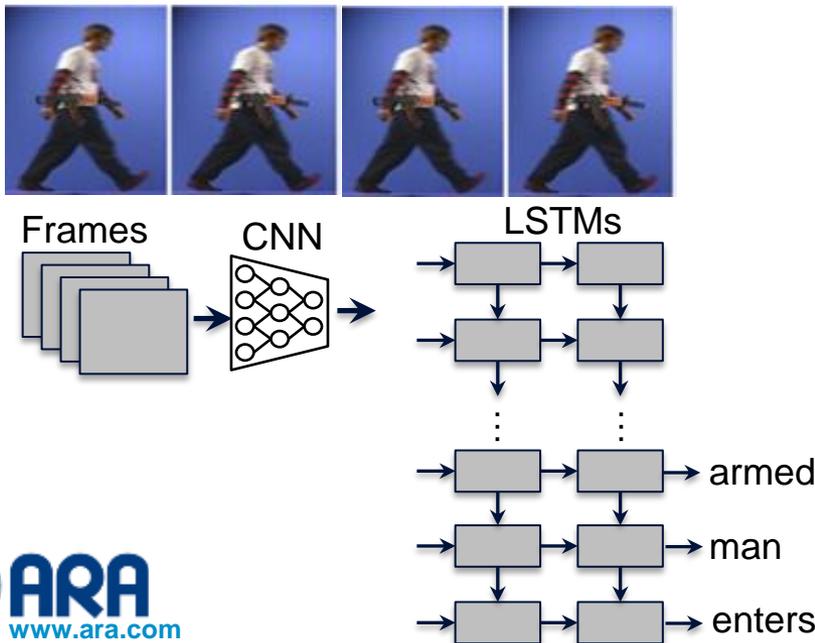
ARA Technical Staff

39%

7%

37%

19%

- Associates
- Bachelors
- Masters
- PhD

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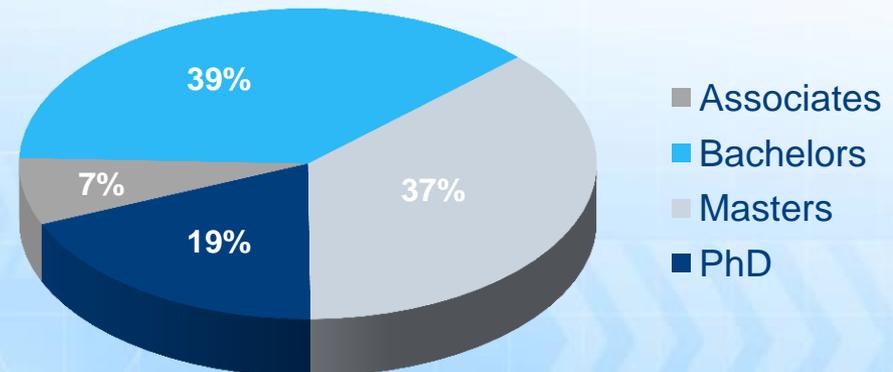
Motion Imagery Intelligence System

Currently developing sequence-to-sequence video recognition technologies for security applications (FMV or < FMV)

- Convert image pixels to textual descriptions of objects and actions of interest

  - Objects: people, vehicles, infrastructure, weapons, digging tools suspicious artifacts, etc.

- Actions: digging, carrying, entering/exiting…

Frames → CNN → LSTMs → armed, man, enters

Relationship of Data, Information and Intelligence

MIIS

Operational Environment — Data — Information — Intelligence

Collection — Processing and Exploitation — Analysis and Production

After 2014 Intelligence Analysis White Paper

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Past Performance

- **IRAPA FINDER**: Current prime in 4th phase of 4+ year program for image/video geolocation

- **US Army Deep Learning**: Prime for 3 yr program using deep neural networks with GPR and EMI sensor modalities

- **DARPA ULTRA-Vis**: Prime for HMD situational awareness soldier system ➔ Net Warrior and immersive training community

- **DTRA IMEA**: current prime for 20+ years of weapons effects modeling and force protection analysis software

- **JIDA Culvert Challenge**: Prime for seismic/video detection and discrimination, object/action/intent recognition

- **NRO Geospatial Metaverse**: Major contributing sub for feature extraction and object reconstruction. End-to-end generation of game environments from source data.

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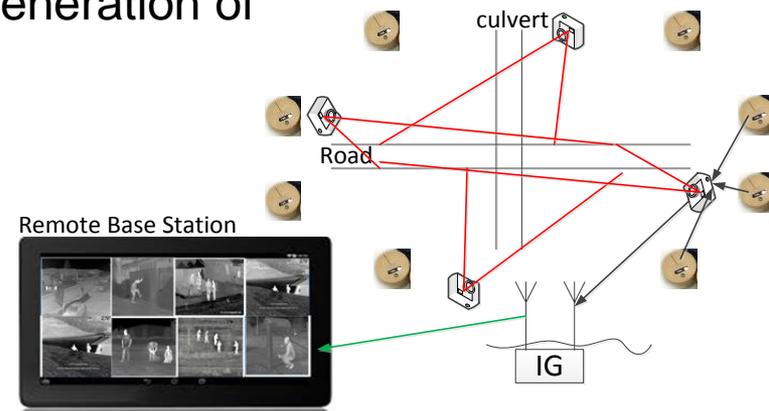
Research Area of Interest

RDT&E security sensors and algorithms

Video analytics: FMV and WAMI processing and exploitation

Machine learning (deep learning)

Desired Complementary Technologies

Person/object re-identification

Tracking across multiple non-overlapping camera viewpoints

Super-resolution video processing

HPC with GPU clusters

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