Confined Space Monitoring System (CSMS)

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Problem Statement

• Confined space monitoring is an important practice mandated by OSHA to protect worker health & safety
  – Adds workload & manpower demands – requires manual oversight, often 1:1 ratio, & frequent radio communication
  – Estimated 50,000 man hrs/year to monitor confined space work at an Air Logistics Complex (ALC)
  – While effective overall, improvement opportunities exist to better protect workers in confined spaces
Technical Approach

• **Unobtrusive sensor suite** to remotely monitor maintainer health signals, hydration, location, & atmospheric hazards in confined spaces

• **Integrated decision support** for alerting & intervention
  – Single person can monitor many confined spaces concurrently
  – Continuously assess dehydration & overall health status
  – Preventative action & accelerated emergency response
Technical Approach
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Portable Sensors → Data Networks → Monitoring Station → Alerting & Intervention

- Location
- Vital Signs
- Atmospheric Hazards
- GeoView
- Roster Status
- Drill-down
- Alarm
Overall Benefits

• Greater Reliability to Ensure Worker Safety
  – Early warnings of degrading health or atmospheric hazards
  – Awareness of worker locations across all confined spaces

• Improved Work Efficiency and Cost Savings
  – Reallocate standby attendants to maintenance work
  – Reduce radio exchanges when entering/exiting spaces
Technology Deployment

• **Baseline system** implemented by Lockheed Martin Aeronautics collaborators for remote monitoring of C-5 confined spaces
  – Monitors breathing & atmospheric hazards to improve worker safety
  – Improves safety, saves thousands of man hours per year

• **R&D efforts** are to develop system improvements
  – Post R&D system rollout planned for Warner Robins Air Logistics Complex (WR-ALC) initially
  – Pending success at WR-ALC, proceed to Tinker & Hill ALCs
Project Team Participants

• Aptima, Inc. (SBIR Prime)
• Air Force Sustainment Center (AFSC) – SBIR sponsoring agency
• Air Force Research Laboratory (AFRL) – Technical collaborator
• Lockheed Martin Aeronautics (LM-Aero)
• The Design Knowledge Company (TDKC)
• The University of Toledo, Dept of Bioengineering