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FINAL REPORT
CA DAMD17-97-2-7020
25 AUGUST 1997 THROUGH 30 SEPT 2000
PERFORMED BY UNCONVENTIONAL CONCEPTS®, INC. (UCI®)

SUMMARY

This cooperative agreement covered a variety of tasks designed to enhance the economic and national security of the United States through identification and exploitation of technology maturation and transition opportunities. Due to its somewhat unusual and eclectic nature, it is not amenable to the traditional and conventional final report normally associated with a CA but instead will consist of a summary of the various major tasks performed under it.

There were three principal customers for these efforts:

1. US Army Medical Research and Materiel Command-Combat Casualty Care Program (RAD-II)
2. US Army Medical Research and Materiel Command Telemedicine and Advanced Technology Research Center (TATRC)
3. Defense Advanced Research Programs Agency (DARPA) Consequence Management Program

Combined, these three agencies funded a variety of synergistic and compatible efforts that resulted in a wide array of opportunities and improvements in several key program areas for both DARPA and MRMC as a whole.

Key tasks under this CA included:

- ⇒ Management and support of a development and maturation of integrated scanning/robotics technologies with application to maxilo-facial measurements and reconstruction as well as area surveillance and modeling for robotics and situational awareness
- ⇒ On-site technical consulting and support to the Combat Casualty Care program for the maturation and implementation of the strategic goals and plans of the RAD-II
- ⇒ Operation and enhancement of the Defense Alliance for Advanced Medical Technology (DAAMT) and continued growth and support of the associated MOUs.
- ⇒ Implementation and review of a variety of technology interchanges including
 - NASA/Joint Staff medical technology collaboration
 - Initiation of the low dosage exposure medical monitoring technology effort
 - Various advanced imaging technology interchanges
 - Joint NOAA/ODDRE sensor application meeting
 - Chairing, attendance and presentation at IEEE International Conference on bio-medical technology

- Evaluation of counter-terrorism/tactical medicine needs for combat casualty care
- ⇒ Design and deployment of several technologies in support of classified DARPA missions and needs
- ⇒ Review and refinement of TATRC program strategies and maturation

Taken in total, these efforts had a significant impact on the MRMC technology strategy and DARPA program goals.

PROGRAM DETAILS

DEVELOPMENT AND MATURATION OF AREA/VOLUME SENSING TECHNOLOGIES

This effort (undertaken in conjunction with Cobalt Research, Dr. Bruce Altschuler) was a continuation of research first begun at WRAIR and later moved to the National Security Agency facility at Ft. Meade. The focus was on application of raster scanning laser technology to create and integrate three-dimensional volumetric renderings of a scanned environment. The original intent was to use it for measurement and reconstruction of maxilo-facial injuries but it was later expanded to also include "situational awareness" for remote sensors and systems, integrated with mobile robotic platforms. The effort demonstrated a clear application of these technologies for both medical and tactical use. They have been absorbed by FBI and carried on under their direction.

ON-SITE TECHNICAL CONSULTING

During the period of performance, UCI maintained a full time, on site technical consultant to provide advice, technical review and various types of support to the RAD-II. The consultant (Dr. Tom McKenna) was significantly instrumental in ensuring continuity and technical consistency in the overall Combat Casualty Care program.

DEFENSE ALLIANCE FOR ADVANCED MEDICAL TECHNOLOGY (DAAMT)

DAAMT was a collaborative effort between the MRMC, NASA-Ames, USAF Air Force Research Laboratory and the FDA-CDRH. It was deigned to enhance communication and exchange of ideas and technologies among these various disparate agencies. Some of the many successes that resulted form this collaboration included:

- ⇒ Application of USARIEM temperature pills for space flight
- ⇒ Research into synthetic aperture RADAR for identification and analysis of sub-dural hematomas
- ⇒ Application of NIR and LWIR for tactical medical environments
- ⇒ Continuing and expanding collaboration between NASA and MRMC in several areas, including bio-monitoring and bio-telemetry
- ⇒ Application of micro-impulse RADAR for monitoring physiology

These specific issues do not begin to address the true impact of the enhanced communication, but are merely representative of concrete results

TECHNICAL INTERCHANGE/EXCHANGE MEETINGS

Numerous meetings and technical interchanges occurred covering a wide array of topics. Each meeting was summarized for the individual participants in a variety of ways resulting in information provided in an optimal manner. The focus of all of these efforts was to enhance the communication between the MRMC and its various agencies and a variety of unconventional sources of technology, insight and ideas, all designed to ensure that the very best technologies and concepts possible were employed to support the ultimate customer, the warfighter.

DARPA

A variety of efforts were performed in support of DARPA most focusing around the identification, analysis and assessment, and solution to several operational problems. By far, the bulk of the effort was expended in supporting the consequence management missions of both civilian and military agencies. Specific details are available through the Defense Sciences Office, DARPA.

TATRC

In its evolving and ever changing role within the Command, TATRC was tasked with identifying and applying several technologies, and technology areas, in new and novel ways. These efforts required a broad based knowledge of a plethora of technical and scientific fields, and UCI provided this knowledge. Support in a variety of ways including generation of program strategy and plans, technology application roadmaps and creation and implementation of technical exchanges was provided over the period of the effort.