



Vetronics Technology Testbed

Brian Novak
Crew Aiding & Robotics Technology Team

Email: novakb@tacom.army.mil
(810) 574-5913 / DSN 786-5913
Fax (810) 574-8684

U.S. Army Tank-Automotive RD&E Center (TARDEC)
 Veteronics Technology Area
 (AMSTA-TR-R, Mailstop 264)
 Warren, MI 48397-5000
www.tacom.army.mil/tardec/vetronics

30 May 2001

UNCLASSIFIED

Tank-automotive & Armaments COMmand



Vetronics Technology Testbed (VTT) Program Overview



GOAL

Improve war fighting capability of ground combat vehicle systems

APPROACH

Develop advanced Vetronics technology for ground combat vehicles

Integrate into actual vehicle and demonstrate functionality

Conduct technology field tests and scout mission scenario experiments

Document results and use for future work





Vetronics Technology Testbed (VTT) Technologies



3D AUDIO

Improve soldier situational awareness by spatializing radio/intercom/WCA in three dimensions

SPEECH RECOGNITION

Improve soldier efficiency by reducing time to input commands

INDIRECT VISION DISPLAYS / DRIVE BY WIRE

Improve survivability by seating driver under armor
Improve driving ability with displays rather than vision blocks

ADVANCED ELECTRONICS ARCHITECTURE

Improve development/re-use using reference architecture, open standards, APIs

EMBEDDED SIMULATION

Improve war fighting ability through simulated training and mission rehearsal

ADVANCED CREW STATION SOLDIER MACHINE INTERFACE

Improve soldier effectiveness with multi-function displays



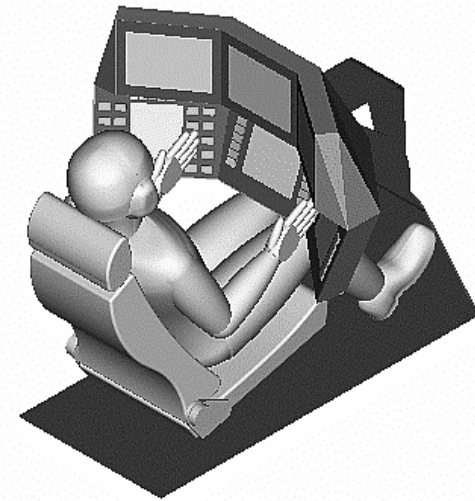
Vetronics Technology Testbed (VTT) Crew Station SMI



Crew Station SMI adapted from Crewman's Associate (CA) Advanced Technology Demonstrator (ATD)

SMI provides crew interface for:

- Command and Control (C2)
- Target Acquisition and Engagement
- Mobility
- System Control and Status
- Digital Map and Routing Planning
- Survivability
- Battlefield Visualization
- Embedded Training and Mission Rehearsal



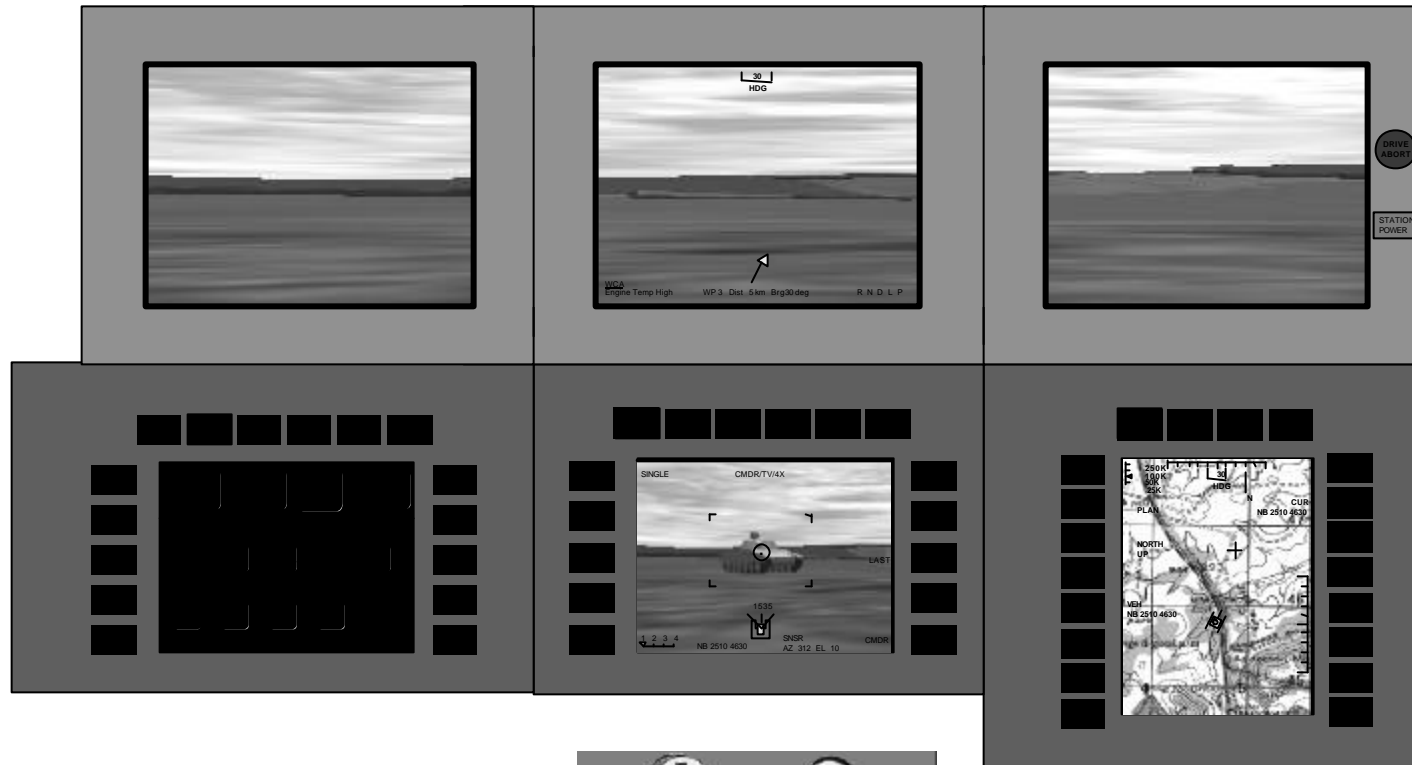
Key Features

- Multi-Function Displays (MFDs) provides efficient use of hardware
- MFD Touch Screens for easy menu operation
- Bump Cursor allows hands-off menu operation
- Graphics overlay on driving video allows heads up driving
- Adaptable Graphics Interface Library (AGIL) Toolkit for commonality



Vetronics Technology Testbed (VTT)

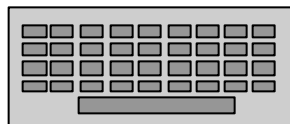
Crew Station SMI (cont)



IVDs

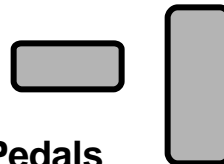
MFDs

Handle



Keyboard

Foot Pedals

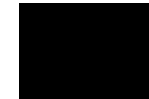
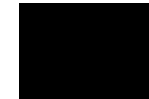
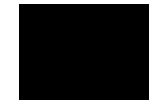
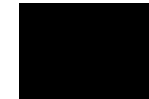
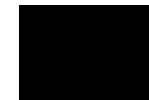
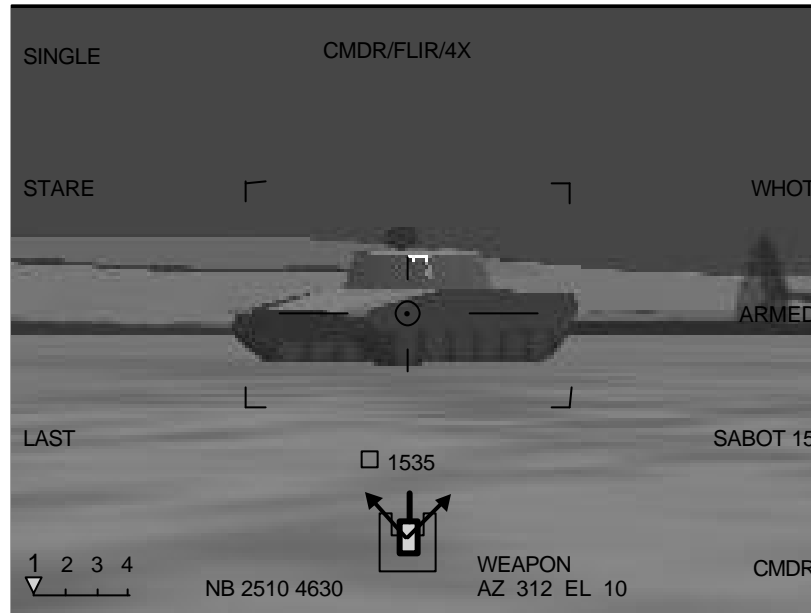
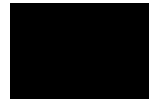
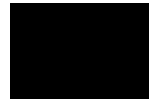
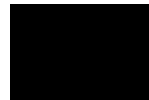
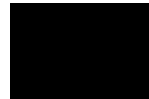
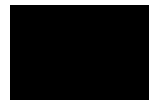


Headset



Vetronics Technology Testbed (VTT)

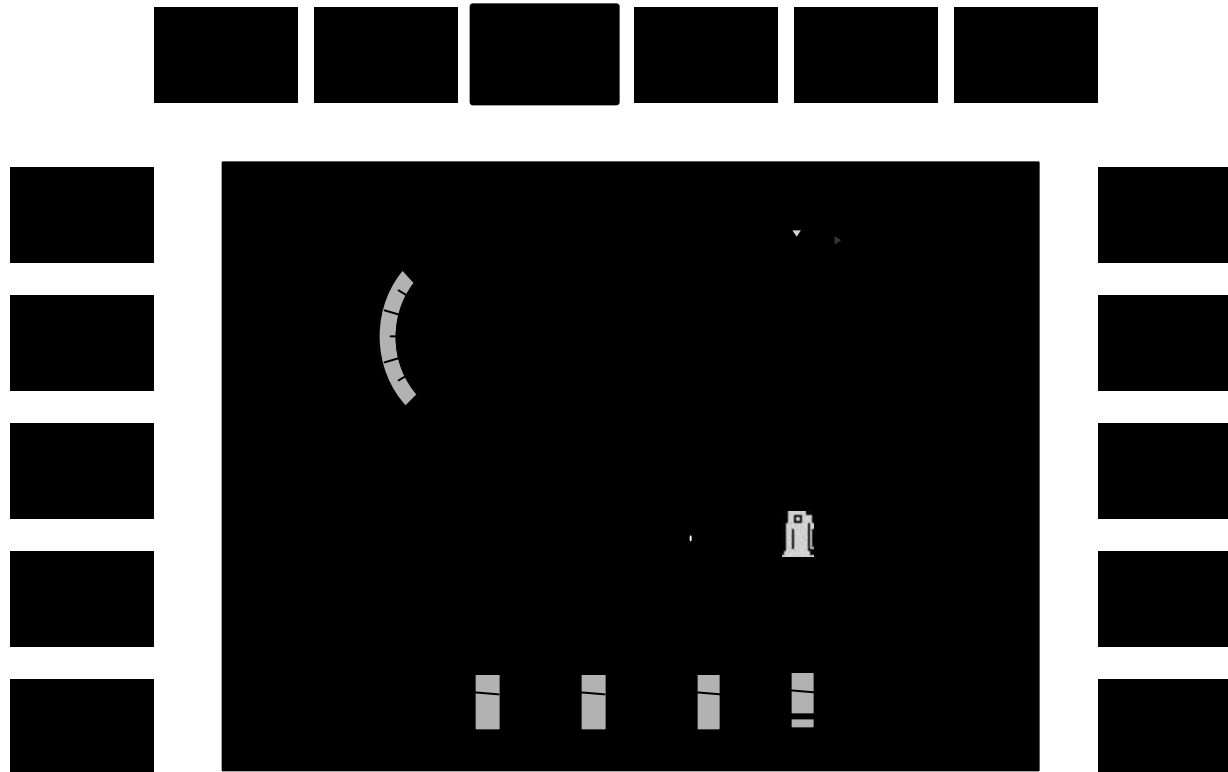
Target Acquisition Function





Vetronics Technology Testbed (VTT)

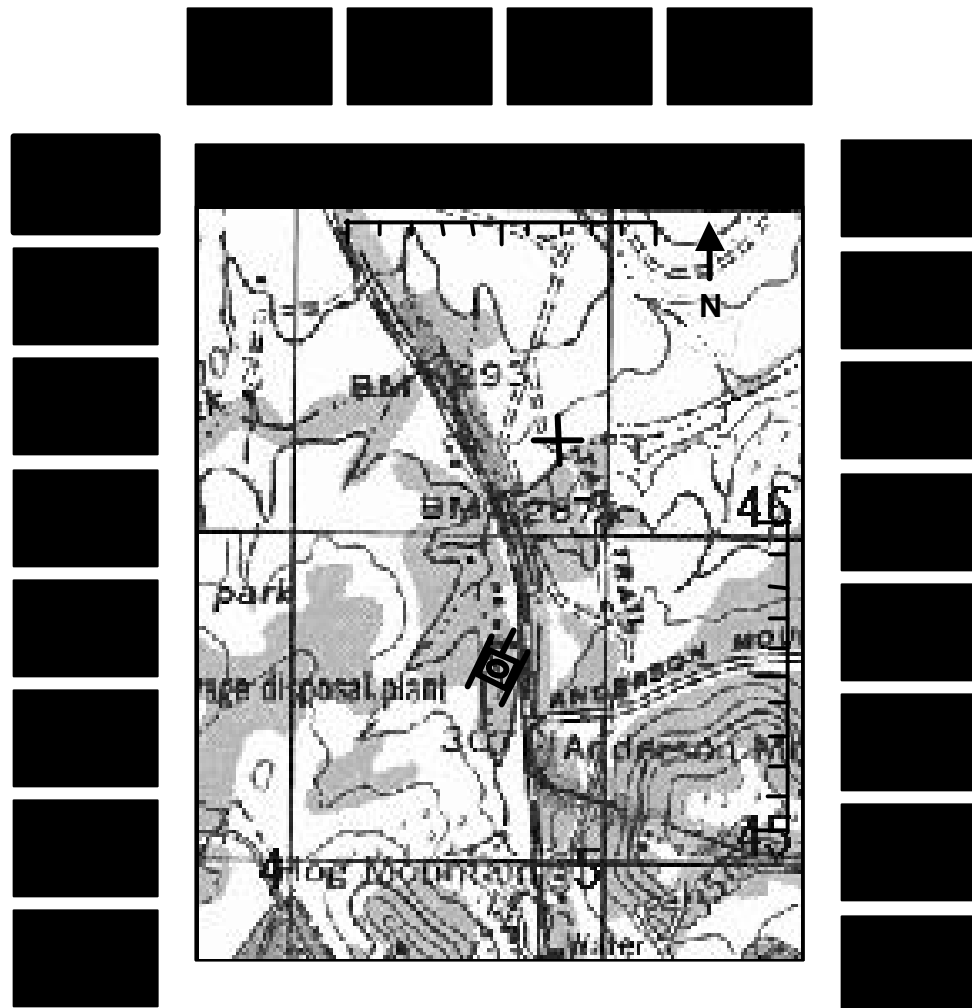
Mobility Function





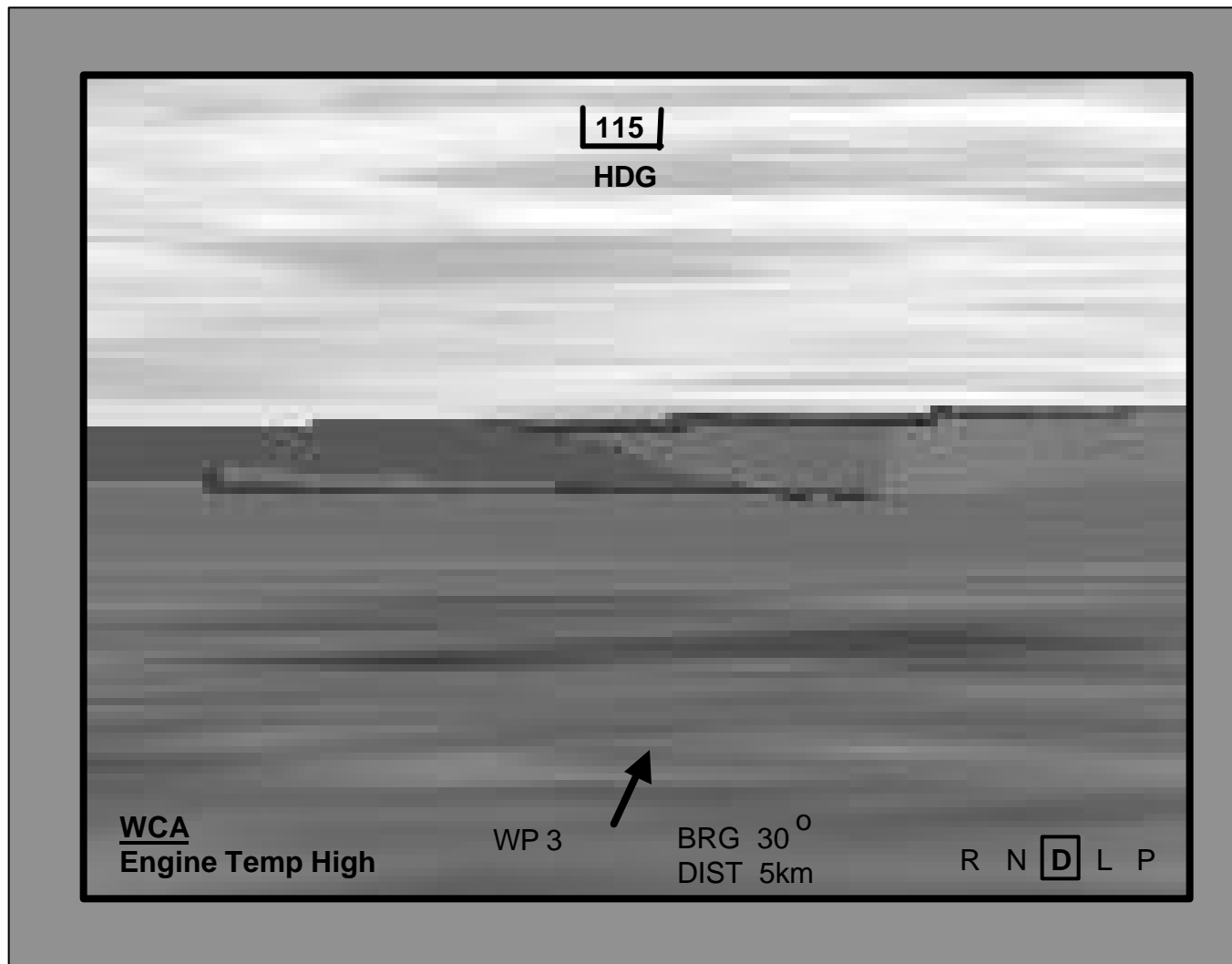
Vetronics Technology Testbed (VTT)

Map Function





Vetronics Technology Testbed (VTT) Center Driving IVD with Overlay





Vetronics Technology Testbed (VTT) Integration



System Integration Lab (SIL)

Laboratory version of entire VTT system using commercial/industrial/mil hardware

Provides hardware integration and software development platform

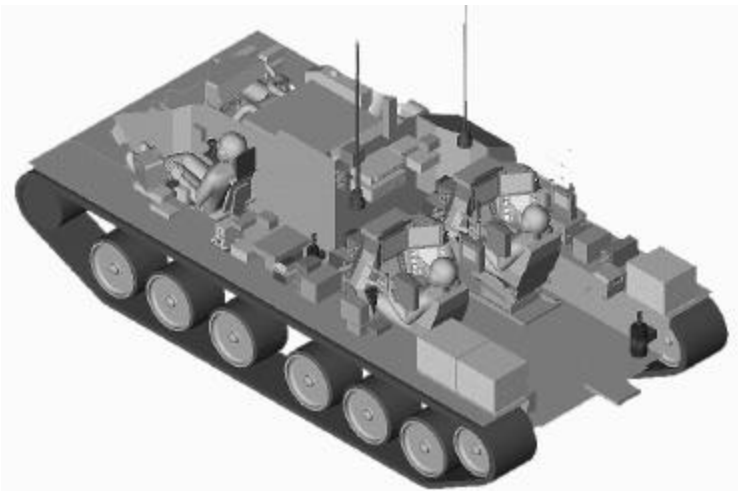
Able to checkout ruggedized hardware before integrating into vehicle

VTT Vehicle

Ruggedized version of VTT system using commercial/industrial/mil hardware

Bradley M2A0 platform (less turret)

Manned by a crew of three (one soldier at each station plus safety driver)





Vetronics Technology Testbed (VTT) Tests and Experiments



Indirect Vision and Drive By Wire Technology Tests June 4-15 2001

Determine the effects of indirect vision and drive by wire technology while performing various driving tasks:

- Motor Pool Ops
- Tactical Assembly
- Road March
- Vehicle Following
- Tactical Night Driving

Measure visual acuity, time to completion, distance from obstacles, etc.

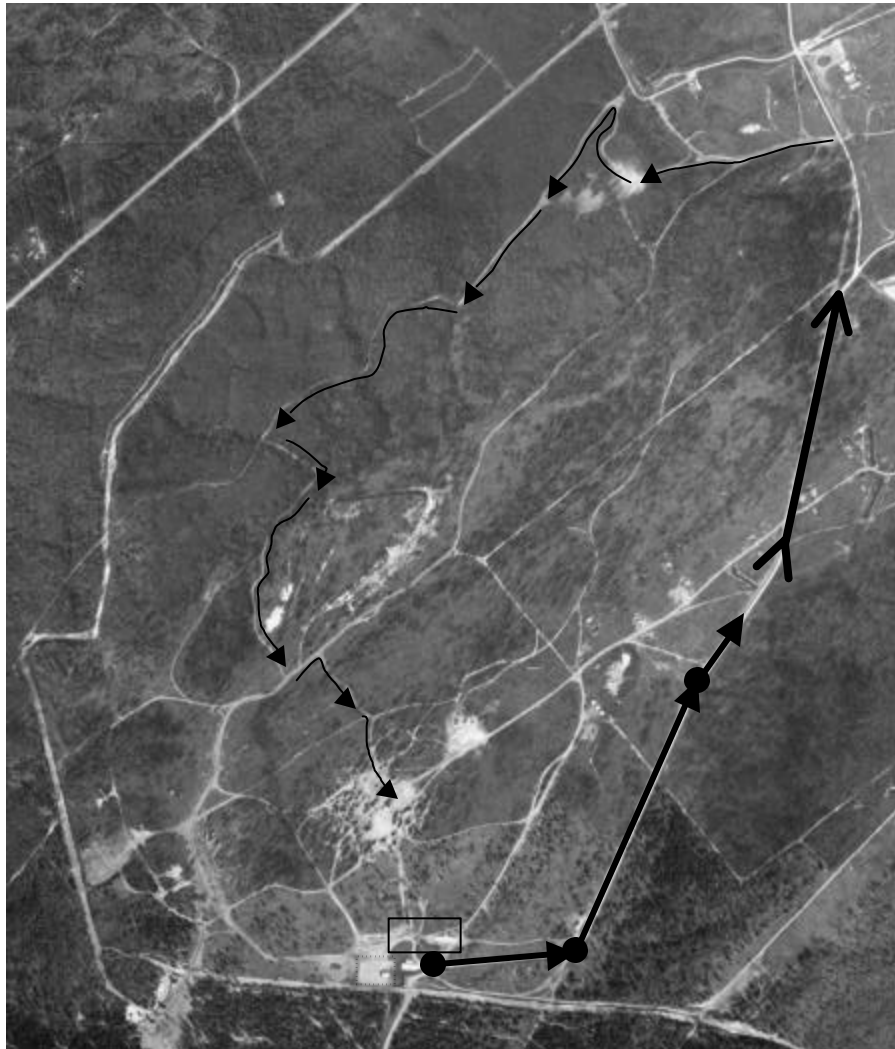
Bradley Fighting Vehicle (BFV) will be used as a baseline



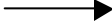


Designed and conducted by US Army Human Research and Engineering Directorate (HRED), Aberdeen Proving Ground, Maryland

Test site is Camp Grayling Military Reservation, Michigan



Vetronics Technology Testbed (VTT) Tests and Experiments (cont)



-  **Grayling MPRC Support Area**
-  **Slow and Close in Maneuver Area**
-  **Cross Country Driving Test**
-  **Vehicle Following Test**
-  **Road Obstacle Negotiation Test**



Vetronics Technology Testbed (VTT)

Tests and Experiments (cont)



Speech Recognition and 3D Audio Technology Tests

Sept-Oct 2001

Determine the effects of speech recognition and 3D audio technology while performing multiple crew tasks

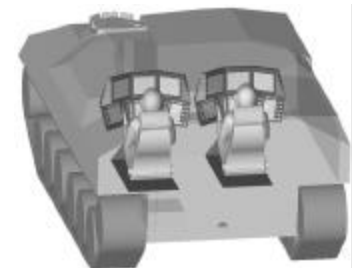
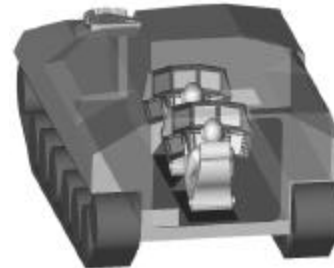
Being designed by US Army Human Research and Engineering Directorate (HRED), Aberdeen Proving Ground, Maryland

Scout Mission Scenarios

Sept-Oct 2001

Two man crew to conduct military actions while stationary and on the move

Supported by the Mounted Maneuver Battle Lab (MMBL), Fort Knox, Kentucky



Measure human work load while crew conducts various day/night operations
Raw data consists of video/audio and software data recording

Test site is Camp Grayling Military Reservation, Michigan



Vetronics Technology Testbed (VTT)

Lessons Learned and Future Work



Lessons Learned

System Integration Lab (SIL) very useful during test and debug (test ruggedized hardware, vehicle cable harnesses, system software, etc.)

SIL uses MIL circular connectors. Need various test harnesses with commercial-mil connectors to test subsystems

Subsystem delivery schedule influenced by a hierarchy of sub-contractors/vendors

Vehicle power distribution system is non-trivial

Future Work

Continue to develop next generation crew station technology

Investigate helmet mounted displays (HMDs), collision warning systems, ...

Support CAT and RF ATDs with end goal to transfer technology to FCS