Warfighting Innovation in the Pacific

U.S. Marine Corps Forces Pacific
Experimentation Center (MEC)

What is the MEC?

Introduction:

- *Parent Activity: U.S. Marine Corps Forces Pacific*
- *History: Established in 2001*
- *Purpose: Support MFP and PACOM community Experimentation and Assessment Requirements*
- *Location: Camp Smith, HI with satellite locations at Kanehoe Bay, HI and 29 Palms, CA*

Operating Philosophy:

- *Warfighter pull – Efforts based on MFP and PACOM warfighter requirements*
- *Get advanced technologies in the hands of operators early for operational assessments*
- *Experiment as we exercise and operate*
- *Act as honest broker – no technology bias*
- *Minimal intrusion on operational forces*

Services: *Provide one stop shop for planning and executing operational tests, demonstrations, experiments and Military Utility Assessments*

Product: *Warfighter Assessment and Feedback*

On-Going Experimentation Efforts:

- *Balikitan 09, Talisman Saber 09, Cobra Gold 10*
- *Military Utility Assessments for ACTD/JCTDs and other DoD sponsored technology programs*

We Help the S&T Community Help The Warfighter

Warrior & Chaos Assessment

- Objective
  - Expose deployed ground combat forces to two medium class robots to garner operational feedback for the technological development.
  - Examine potential mission sets for this class of robotic systems.

2 Robots – 8 Marines – 10 Days/Nights

Assessment Team And Equipment

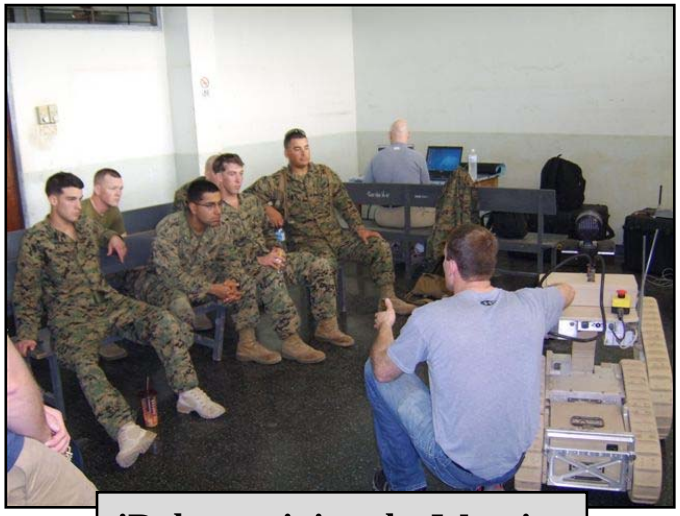
- MEC- (2) personnel
- TARDEC- (2) personnel
- SPAWAR- (2) personnel
- ASI-(3) personnel, (1) system
- iRobot- (4) personnel, (2) Warrior systems, (1) FasTac system.

Majority of Marines had one or more Combat Tours

Robot Training

- Objective: Train the operators in all aspects of operating the robots.
- Result:
  - Trained 6 Marines on Warrior system
  - Chaos unavailable due to repairs needed on robot incurred during baseline tests. Training was accomplished on day #3.

Robot Training



iRobot training the Warrior

ASI Training on the Chaos

Route Security (Day 1)

- Objective: Route Security-UGV functions as a remote standoff point reconnaissance device for a unit tasked with participating in route security (day/night).
- Results:
  - Systems were challenged with larger obstacles to manipulate or maneuver through than current systems could easily accomplish.
    - Move a 200lb log held in place with a 250lb rock and investigate area.
    - Investigate a trash barrel located across a large drainage ditch.
    - Investigate a pile of large (50-75lb) rocks.
    - Investigate a drainage culvert

Both systems demonstrated an excellent ability to execute this mission set.

Route Security

200lb (est.) log and 250lb (est.) rock shoved by Warrior

Marines operate Warrior from inside up armor HUMMV

Route Security (Day 2)

- Objective: 1. Continued Route Security Scenarios
  2. Developers experience Marine equipment while operating their systems.
- Results:
  - Operational range issues were noted with Chaos' 2.4Ghz communication frequencies.
  - Operators were unable to employ the Chaos from inside the up armor HUMMV.
  - Standoff distances were decreased for Chaos to continue the exercise.
  - High power illumination devices (white and IR) are needed to investigate items of interest to properly execute this mission set.

Users report use of the robots in this mission set is desirable to move larger size objects.

Route Security

Chaos investigates possible IED sites

Developers wear Military equipment

Entry and Vehicle Control Points

- Objective: UGV functions as a standoff vehicle inspection tool supporting a unit tasked with conducting Entry Control Point/Vehicle Checkpoint Operations (ECP/VCP)
- Results:
  - Two-way audio critical to employ the system in this mission set.
  - Language Translation ***(Machine or Human)*** ability desirable.
  - Video recording desirable.
  - Long arm payloads are necessary to inspect inside vehicles.
  - Occupants can be used to manipulate compartments for the operator (i.e.... “driver open your hood”).
  - Tinted windows defeated tested optics.

Users report use of the robots in this mission set is highly desirable.

Entry and Vehicle Control Points

Warrior conducting VCP Operations with FasTac in marsupial mode

Chaos searching vehicles

Cordon and Search

- Objective: UGV functions as an initial urban structure entry device, supporting a unit tasked with conducting a cordon and search**.**
- Results:
  - Current communication configurations do not support
    - Prevented operation from a covered location
    - Operator had to expose his position to remain in control of system
  - Size
    - SE/SW Asia doors and staircases are narrow. (29 ½ inches)
  - Need the ability to “get in the door”

Users report a Cordon And Search capability is a highly desirable mission set if the technical aspects can be worked out.

Cordon and Search

Robots executing Urban Cordon and Search scenarios.
-Initial structure entry will require technical payload for breaching.
-Communication ranges need substantial increases.
-Marines desire weapon optimized for urban structures as payload.

Area Security Operations

- Objective: UGV functions as scout platform in close terrain (urban or dense vegetation) supporting a unit conducting area security operations.
- Results:
  - Both systems were severely effected by the jungle foliage.
  - Current sensors had a very poor detection rate for finding personnel on the jungle trail.

Users felt that off trail travel was essentially impractical for the systems given the dense vegetation.

Area Security Operations

Warrior climbing the jungle trail

Chaos executing Area Security Operations

Extremis Casualty Extraction

- Objective: UGV functions as an extremis casualty extraction device in circumstances where the casualty is exposed to direct effective enemy fires.
- Results:
  - Demonstrated to the Marines using Chaos only
  - **Users would not wait for the robot**
  - **Users would rescue the casualty themselves**

Users feel robots would be to slow or geographically unavailable to evacuate the casualty in a timely manner.

Extremis Casualty Extraction

Extremis Casualty Evacuation
-Identified as too slow to execute.
-Reality of robot being in proper place to evacuate casualty improbable

Tactical Resupply

- Objective: UGV functions as a logistical support vehicle, supporting a unit conducting tactical logistical supply .
- Results:
  - Demonstrated utility for tactical resupply
  - Max payload while climbing stairs

Users felt that this class of robot has the potential for supporting this mission set.

Tactical Resupply

Chaos climbing stairs with 64lb payload

Chaos on the jungle trail with 64lb payload

Warrior on the jungle trail with 176lb load

Warrior climbing stairs with 176lb payload

Deliberate Obstacle Breaching

- Objective: 1. UGV functions as a deliberate obstacle breaching tool enabling explosive reduction of an identified complex obstacle system using the Mk7 Antipersonnel Obstacle Breaching System (APOBS).
- Results:
  - Discussion only
  - Viable solution for high risk mission

Users felt that robots were a viable capability to deliver the MK7 APOBS.

Summary

- Developers report numerous user input data points were obtained during the assessment.
- Challenging environmental conditions and assessment objectives provided an abundance of operational data for developers.
- Exposure to users and larger Cobra Gold multi-national audience to include multiple General Officers.
- Technological limitations of non line of sight ranges hamper the robots capabilities in urban and dense vegetation environments.

Questions?

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