REMOTE MUNITIONS DEPLOYMENT FROM AN UNMANNED GROUND VEHICLE

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GVSETS

Report Documentation Page

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Introduction/Problem Statement

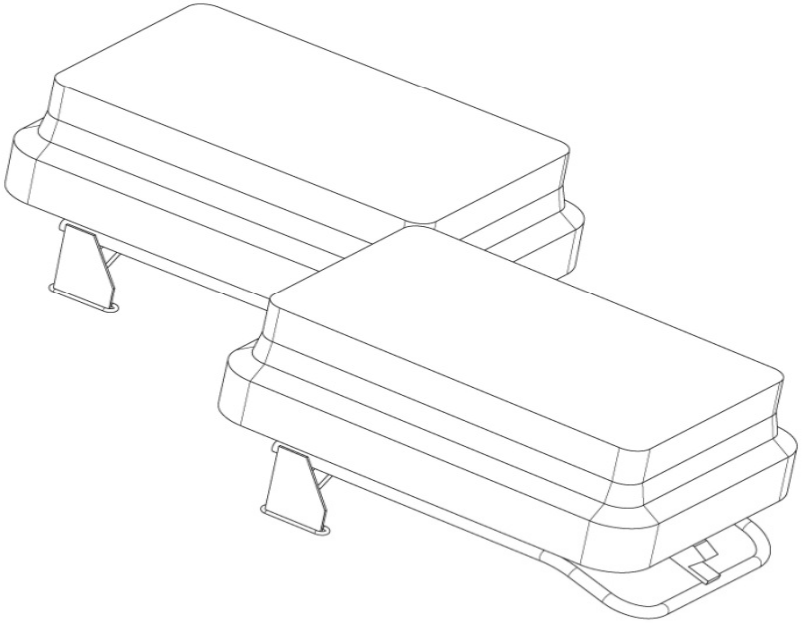
- High-risk missions often entail ground forces being required to manually emplace and deploy obstacle breaching munitions to generate a footpath through anti-personnel obstacles.
- A safer method for obstacle breaching is highly desired.
- Implementation of UGVs with live munitions has been demonstrated to mitigate risk by generating an increased stand-off distance while operating the system from a concealed position.
- This paper presents the research, development, and testing results of the integration of live munitions with UGV platforms.

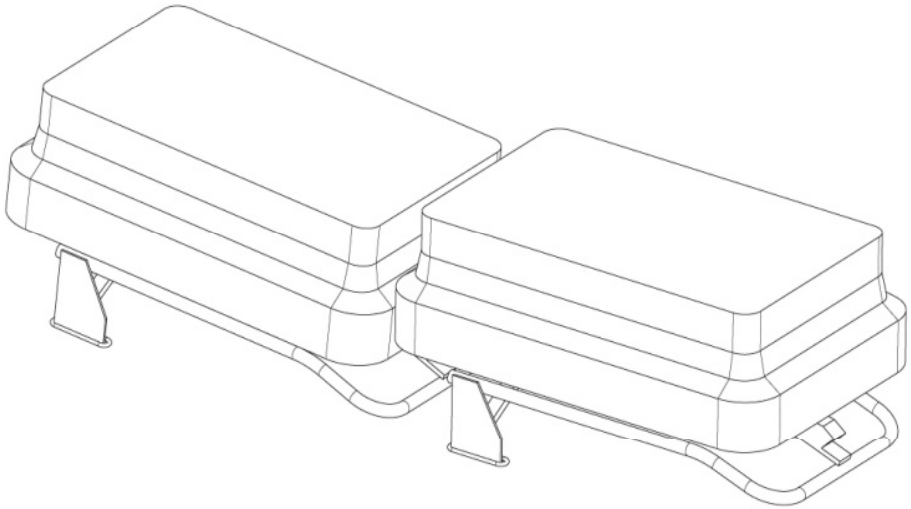
UGV Mounted Deployment

- Previous development and testing overview
  - Integration on mid-size UGV platform
  - Munitions mounted directly to platform payload deck
  - Did not develop integrated firing mechanism
    - Encompassed commercial off the shelf remote firing system
  - UGV not field ready, nor existing equivalent fielded
  - Unknown munitions configuration
    - Platform mobility was limited depending on configuration
    - Needed to test out munitions alignment configuration
      - Offset alignment per the training manual
      - In-line alignment for optimal UGV deployment

UGV Mounted Deployment – APOBS configuration

- Offset versus in-line configuration, both approaches were experimented with





UGV Mounted Deployment – Experimentation

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UGV Mounted Deployment – User feedback

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- Overall
  - Users indicated a UGV deployment system for APOBS effectively supports breaching missions.
  - Users indicated it is a great desire to have a system that has munitions deployment functionality.
- Mid-size UGV Platform
  - Difficult to transport a platform of its size
  - Pre-set poses for firing positions would be preferred
  - Attachment of munitions directly on UGV causes vibrations and bouncing, which may cause damage to munitions
- Firing system
  - Recommended integrated firing system and increased stand-off distance.
- Configuration
  - In-line configuration increased UGV mobility.
  - Users were concerned with difficulty and time required to load/attach munitions set

Trailer-Mounted Deployment

- Key system features and improvements
  - Towability by small UGV
  - Quickly assembled munitions trailer
  - “Snap-in” munitions system
  - Rear target aiming camera
  - Inexpensive appliqué kit for current fielded systems
  - Break-away capability
  - Ability to reuse or stow trailer after breaching mission completion

Trailer-Mounted Deployment – Trailer Design

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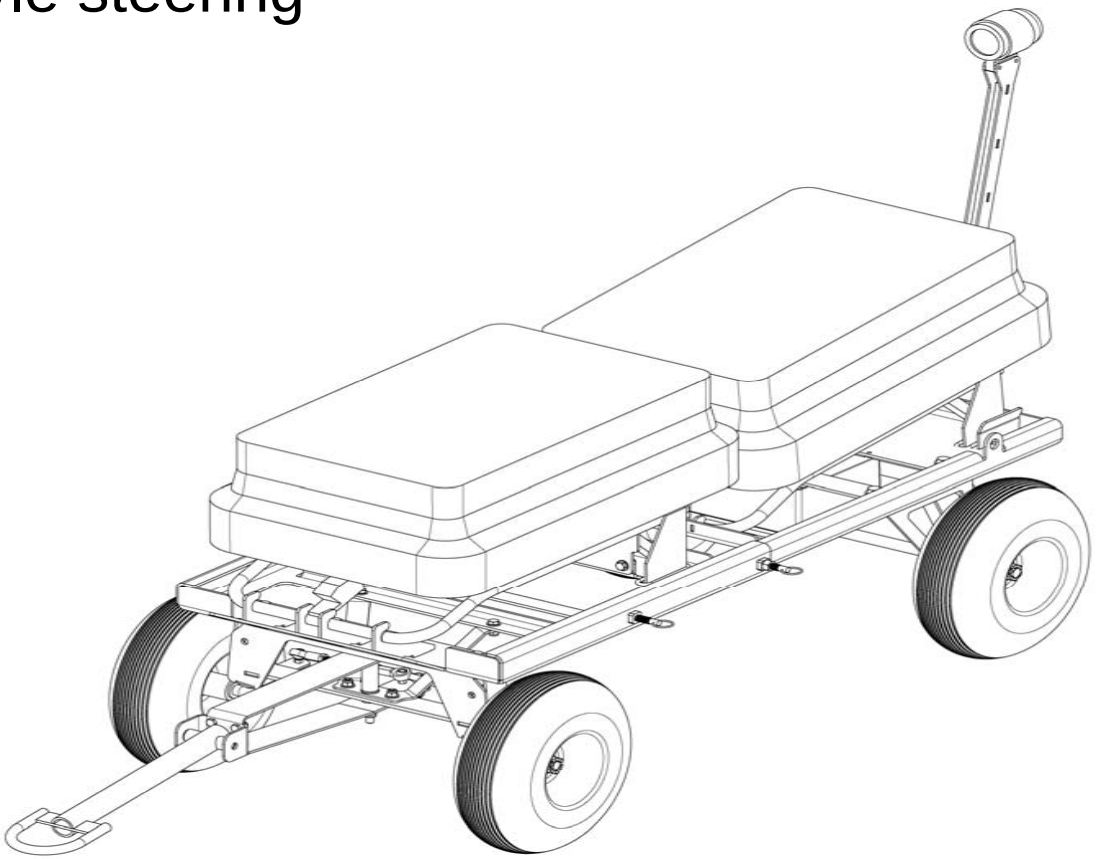
- Independent four wheel C-channel steel frame with Ackerman style steering



Trailer-Mounted Deployment – Trailer Design

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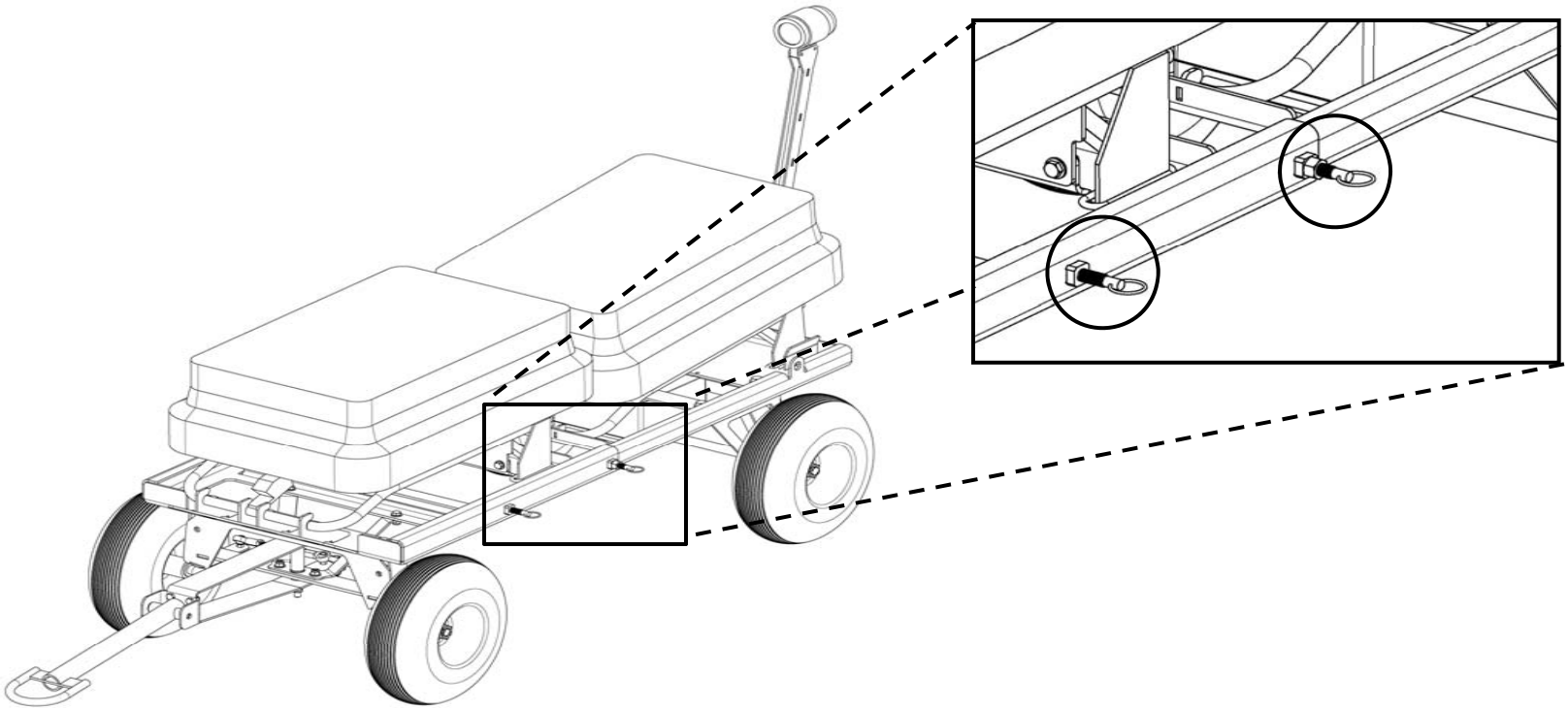
- Quick release pins for assembling trailer sections



Trailer-Mounted Deployment – Trailer Design

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- Storage/Shipping
  - Designed to be collapsed to fit in existing fielded small UGV shipping container

Trailer-Mounted Deployment – "Snap-in" Munitions

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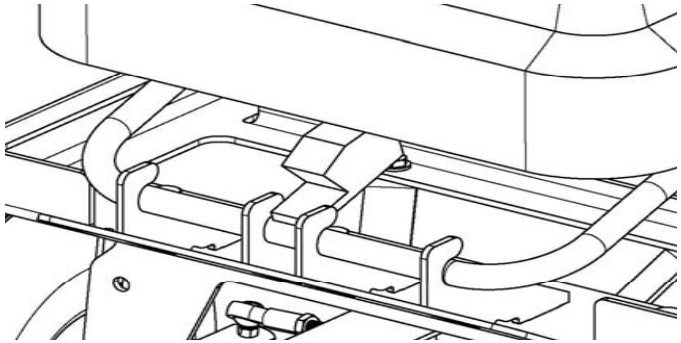
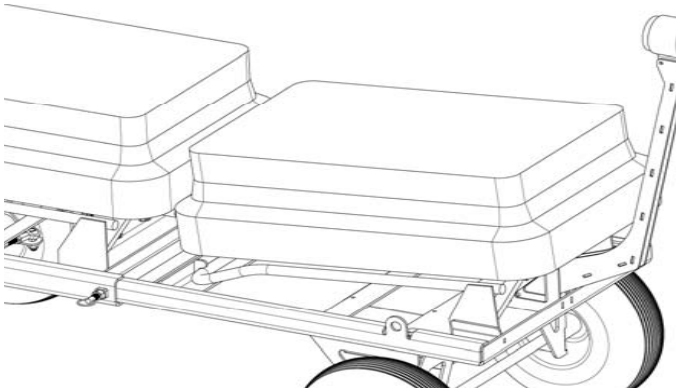
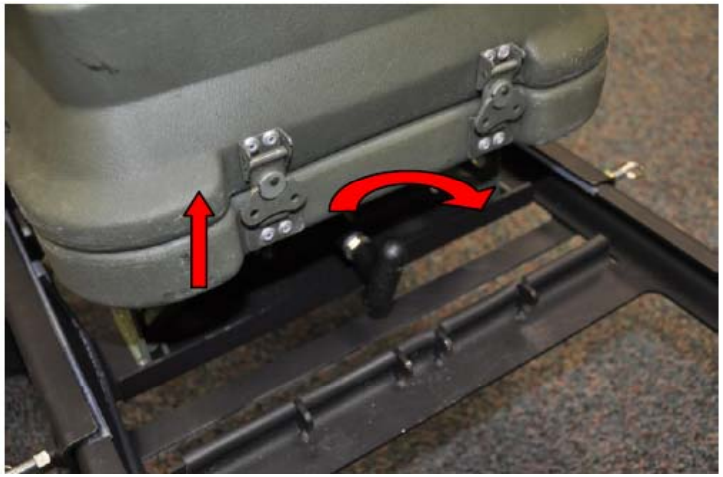
- Utilizing "in-line" configuration, ALICE packs are located into place by toe lugs and locked into place.





Munitions are located by toe lugs

Front – spring loaded latch/release mechanism
Rear – wedged into place by flange at the back trailer deck



Trailer-Mounted Deployment – Rear Target Aiming Camera

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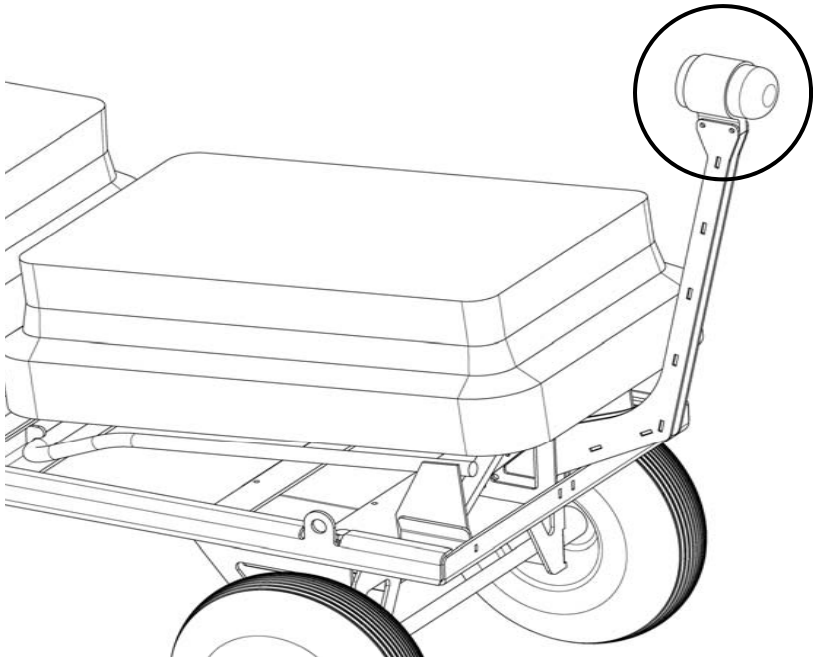
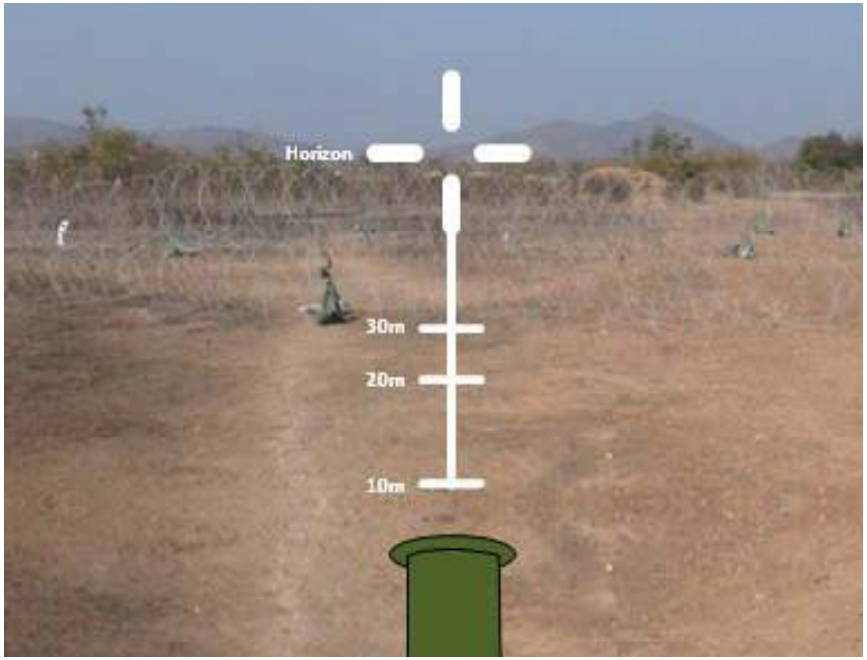
- Forward-facing camera to facilitate aiming, range estimation, and local situational awareness with image overlay.





Trailer-Mounted Deployment – Appliqué & Break-Away Capability

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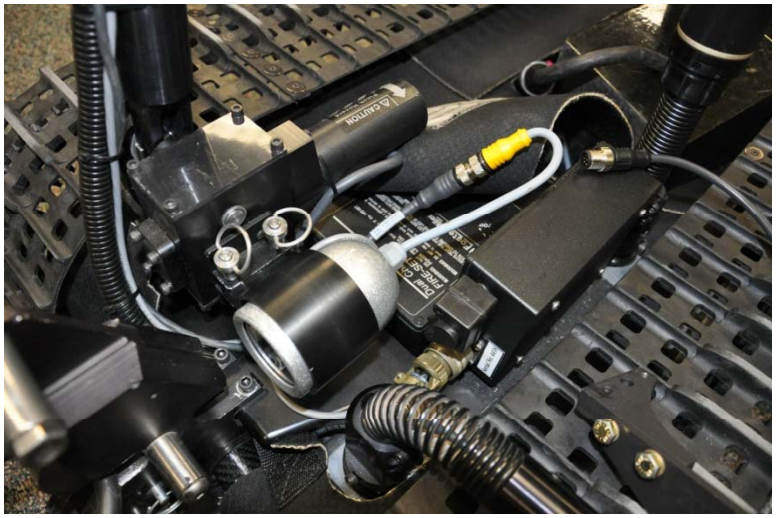
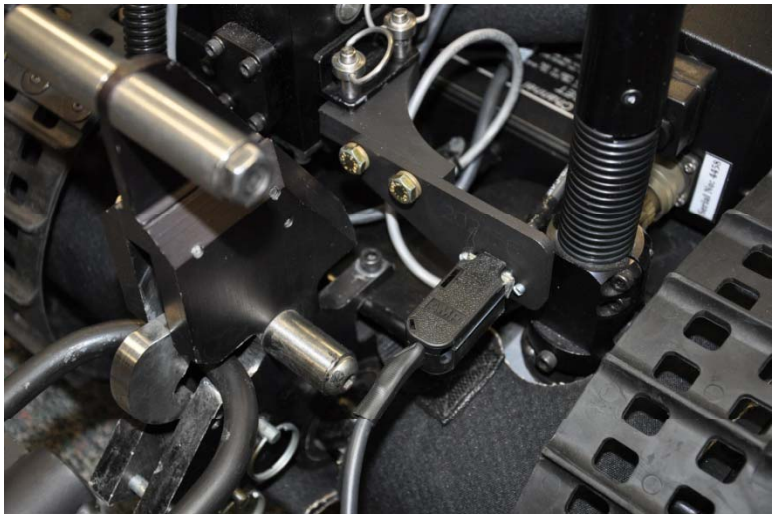
- Appliqué kit for small unmanned ground vehicles
  - "Plug-in-play" design for fielded systems.
    - Rear camera relocation, installation of trailer hitch and USTI kit.
  - Does not require platform or software modifications.
  - Only requires integrated OCU fire control and fire set box on platform
- Break-away capability from munitions





Trailer-Mounted Deployment – Completed System

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Thank You

Future work

Questions?