Precision Urban Mortar Attack (PUMA)

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Operational Overview

- Precise, Low Collateral Damage Weapons for Combat in Urban Terrain:

  - Enable attacks on the enemy currently masked from indirect fires.
  - Overcome limits imposed by Global Positioning System (GPS) multi-path and signal masking.
  - Reduce risk of collateral damage.
  - Provide an organic attack capability.
  - Provide precision attack; mortars are inherently inaccurate.

Urban Scenario

MPLD System Major Design Specs

UAS LST
- Detect and track Class 1M Designator
- Fit in Tier 2 Payload

- Future Manned Aircraft LST
  - Modify existing LITENING pod
  - Permit LST of both MPLD and traditional designation

3000 ft AGL

UAS Designator
- MPLD designation from Tier 2 altitudes
- Covert
- Fit in Tier 2 Payload

Future Manned Aircraft Designator
- Permit both MPLD and traditional designation

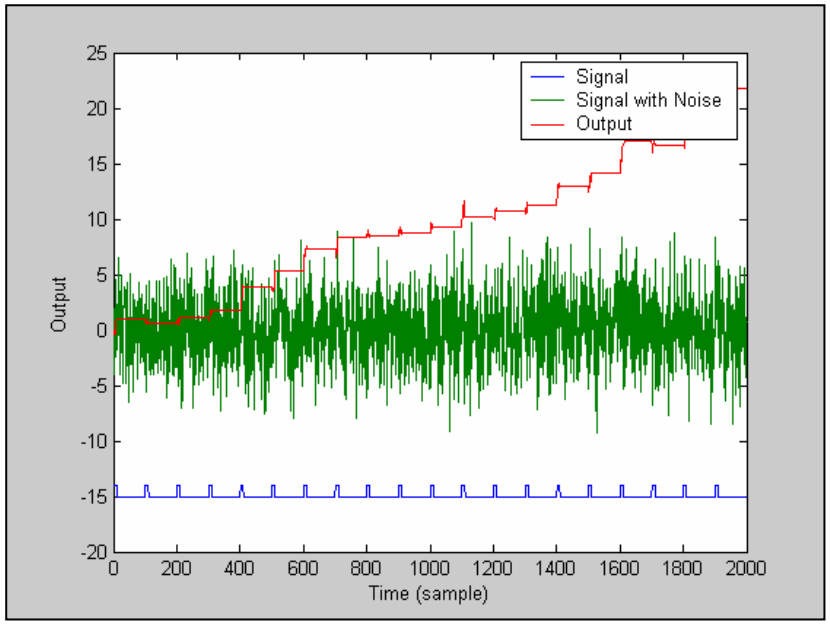
Ground Designator
- <5 lbs Total System Weight
- Eyesafe (unaided eye)
- Match designator engagement ranges
- Covert

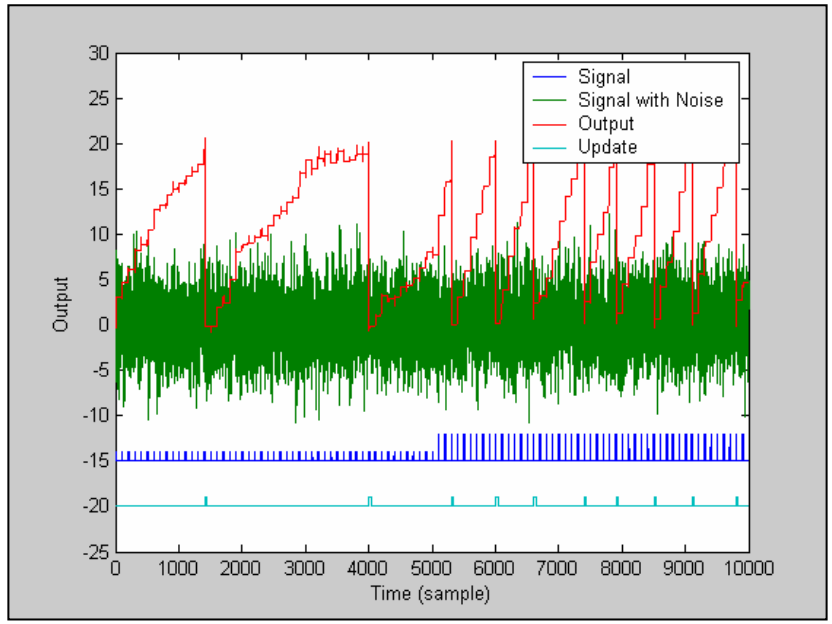
Weapon Seeker
- Work with GPS guided 81mm/120mm mortars, 155mm artillery shells
- Stand alone (GPS denied) desired

MPLD Core Technology

- MPLD is very different from current laser designator/marker technologies
  - Traditional designators
    - 50-120mJ+ per pulse, 10-20 Hz pulse rate, instantaneous power in MW range
    - Single pulse detectable
    - Class 4 non-eyesafe
  - MPLD Designation
    - 1-5uJ per pulse, 3-20 KHz pulse rate, instantaneous power in hundreds of watts
    - Requires many pulses to detect (covert)
    - Class 1M unaided eye safe

MPLD Core Technology





Like GPS, integration of the signal+noise using the proper code (PRF) allows us to pull the signal out of the noise.

With a constant signal to noise, the data rate will increase as we close on the target. This is needed to reduce miss distance and occurs naturally!

MPLD Ground Designator

- Design Goals
  - **Lightweight!**
    - Must be much lighter than current 28 lb PLDR designator
    - Integration into existing and near-future rangefinders a major plus
    - Integration into UAS targeting ball for UAS based designation
  - Eye Safety
    - Class 1M sufficient for MPLD and PUMA goals
    - May need to increase to provide marking under all weather for fast movers
  - Covert
    - Inability to see spot or designator source without knowing proper laser code

MPLD Laser Spot Tracker

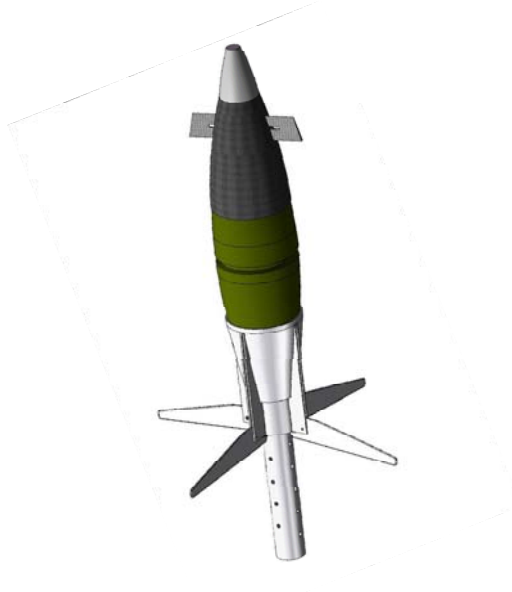
- Design Goals
  - UAS
    - Must fit within targeting ball
    - Must have sufficient detection range to lock onto spot at a range of 1.5 Km
  - Manned Aircraft (Not part of MPLD or PUMA)
    - Desire that the existing LITENING G4 be capable of seeing ground MPLD designator spot

BRITE STAR II

LITENING G4 POD

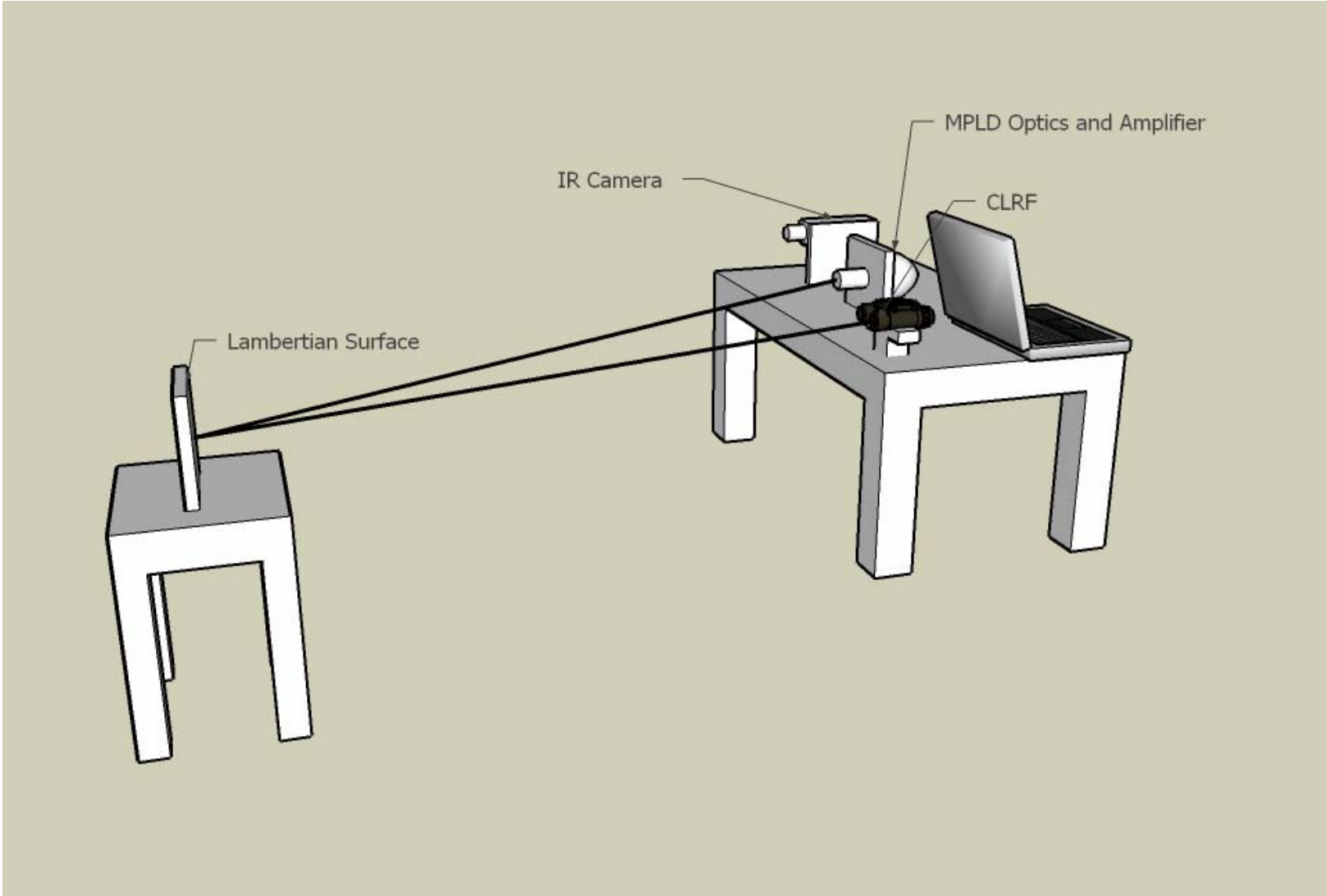
MPLD Weapon Seeker

- Design Goals
  - Mortars/Artillery
    - Must have sufficient FOV and processing power to handle body dynamic motion
    - Must fit within small space claim
    - Must be inexpensive (AUR < $5000)
  - Air Delivered Weapons
    - “Dual Mode” traditional designation and MPLD designation highly desirable



FCMortar/SMortar 81mm Conceptual Drawing

Designator/Seeker Prototype Test Setup



Micro Pulse Laser Designation (MPLD) System

Technical Status

- FY09
  - 1540nm prototype completed and demonstrated
    - Preamp issues solved
    - Optical issues solved
    - Real-time lock-on and track (two channels)
    - Approaches modeled prediction of performance
  - Analysis of 1540nm vs. 1064nm in process
    - 1064nm wavelength looks more promising at this time, final decision April 2009

Technical Status

- FY09
  - Weapon guidance requirements studied
    - Pulse processing model developed
    - Detection and guidance performance range determined
    - Preliminary FOV requirements determined
  - Working to complete 1064nm seeker design (will reuse all 1540nm processing and algorithms)
  - UAS LST requirements and algorithm development to begin

Technical Plans

- FY10
  - UAS Targeting/Designation System Selection
    - Vendor selection via BAA launched early FY10
    - Down-select completed and Contract preparation by end of FY10
    - Contract Award early FY11
  - UAS LST Prototype
    - Breadboard proof-of-concept system
    - Demonstration of system on a range
    - Delivery of system design to UAS Targeting Designation System vendor
  - HWIL Seeker FCMortar (81mm)
    - Integration with FCMortar hardware
    - HWIL testing and demonstration

MPLD/PUMA Solicitations

- Key Solicitations
  - FY09/10 S&T
    - Seeker producibility study for laser guided munitions
    - MPLD integration into existing laser range finder
    - BAA: N00178-08-Q-1904 on NSWCDD web site
  - FY10 Announcement (Pending)
    - EO/IR/LST integration into a Tier 2 UAS targeting ball
    - Solicitation FY10, award at beginning of FY11

Questions?