If you can’t get a bigger target...

Low-Cost Visualization for Guided Projectile Trajectory Simulation

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Design Goals

• An easy (and fast) way to generate:
  – Visuals of a 3D projectile model, including cross sections
  – Trajectory visualization to communicate projectile dynamics
  – Demonstration type videos of projectile interaction between gunners and targets

• Minimal User Interaction
  – Trade-off between ease of use and flexibility

• No Special Hardware Required, just a basic PC
Technology Involved

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- VRML – Virtual Reality Modeling Language
- Data Source
  - PRODAS Geometric Model
  - PRODAS Generated Trajectory Data
    - X,Y,Z,Theta, Psi and Phi
  - PRODAS Generated Event Data
    - Rocket On
    - Side Thrusters Firing
- VRML Model Manipulation with Visual Basic
If you can’t get a bigger target...

From This

To This
If you can’t get a bigger target...

M483 fired at high QE illustrating Yaw of Repose and Zero Yaw Dynamic Instability (coning)
(click to View)
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SMAW-D Stable Flight

SMAW-D after fin modifications resulting in Stable Flight (click to View)
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SMAW-D Unstable

SMAW-D in Unstable Flight (click to View)
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SMAW-D Test Video

Actual video of a SMAW-D in Unstable Flight (click to View)
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Guidance & Control Trajectory Simulation

- Combines a Time Based Control System Simulation with a 6DOF Body Fixed Trajectory
- Drag and Drop Editor Visual Editor to input the Control System Block Diagram
- No coding required
- Tabulated and Plot Outputs
- Outputs to the 3D Visualizer
Thruster Control

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2.75” Rocket demonstrating Main Motor and Thruster Firing (click to View)
Scenario Generator

If you can’t get a bigger target...

• Quickly generate complete scenes
  – Set the Stage pick the actors
    • Range Model
    • Gunner
    • Target
  – Scenario generator calculates the Fire Control Solution and Generates the trajectory
  – Go the the Visualizer, everything is ready to go
• Record as an AVI for insertion into presentations
Demonstration of Scenario Generator

If you can’t get a bigger target...

(click to View)
Example Scenes

If you can’t get a bigger target...

2.75” Attack on Tank Column (click to View)
What’s Next

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• Moving Gun Platform (Target can already move)
  – Dog Fight
  – Bomb Drop
• Sub-munitions Dispense
• More Targets, Ranges and Gunners
• GPS based model of actual range