



Iron Shield:

Real-Time Defence System

Team Members

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SUBJECT : 24MAT112 & 24AIM113

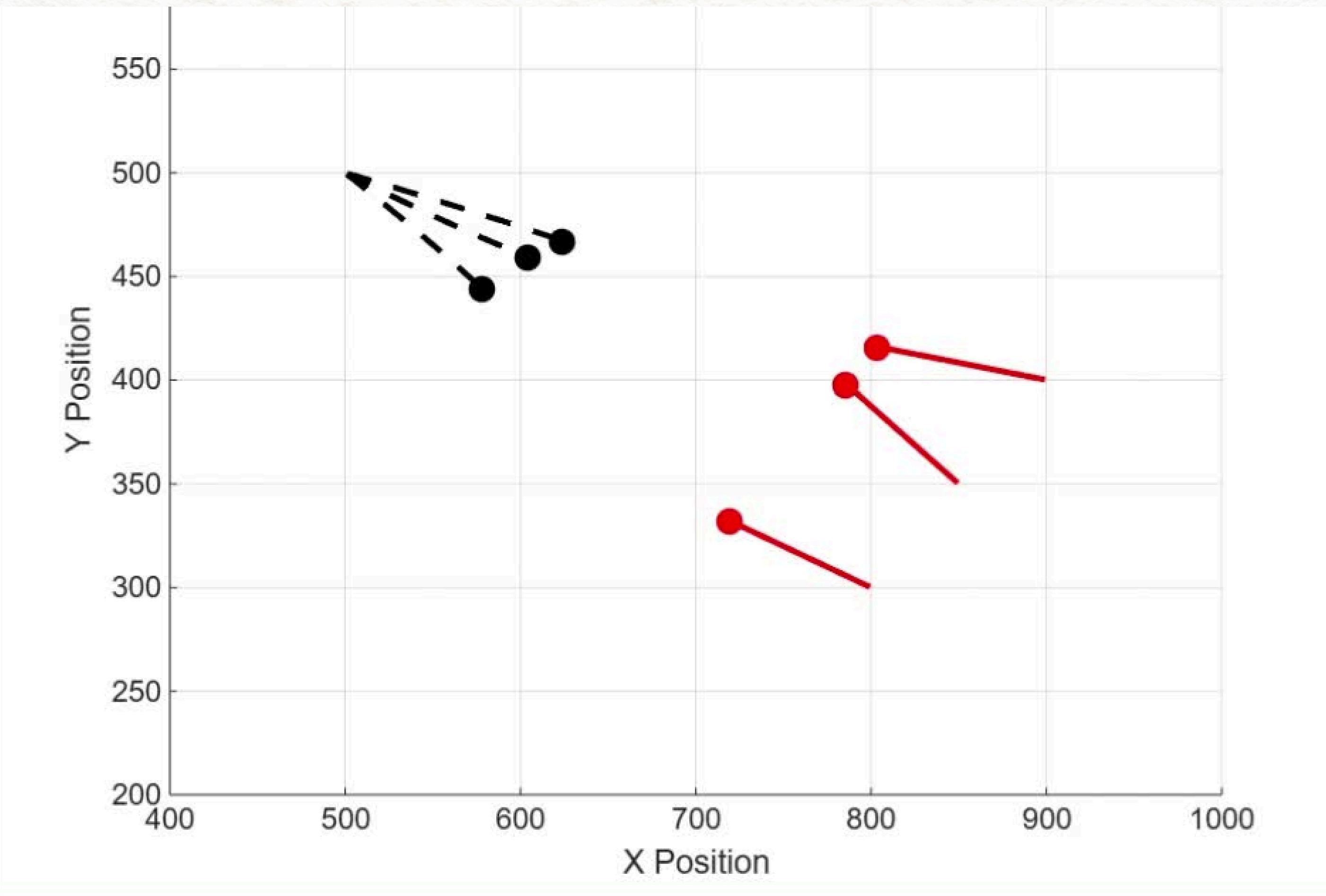
INTRODUCTION:

The Iron Dome is an advanced missile defense system developed by Israel to intercept and destroy short-range rockets and artillery shells. Its operation involves a combination of trajectory prediction, and interceptor missile guidance with the avoidance and collision theory, all of which rely heavily on mathematical principles.

OBJECTIVE:

Design and implement a 3D simulation of a missile defense system, inspired by Israel's Iron Dome, enhanced with AI-driven decision-making.

PREVIOUS REVIEW



AVOIDANCE AND COLLISION

Avoidance:

- Avoidance refers to altering the path or trajectory of a moving object to prevent a collision.
- In missile defense, the interceptor missile changes its course to avoid friendly objects or other missiles.
- Predictive algorithms calculate potential collision courses and adjust the missile's trajectory in real-time.
- The system ensures safe distances are maintained from other objects, such as planes or additional missiles.
- The primary goal of avoidance is to protect friendly assets while still targeting the incoming missile.

Collision:

- Collision occurs when two objects physically intersect or come into contact.
- In missile defense, the objective is to intentionally collide the interceptor missile with the incoming target missile to destroy it.
- The system uses distance calculations and impact point predictions to determine the optimal interception time.
- Upon collision, the interceptor missile typically detonates, neutralizing the target missile.
- Successful collisions lead to the destruction of the incoming missile, preventing harm to the target.

WORK FLOW

Communication Verification

- AI checks encryption validity.
- Spoofed or unverified signals get flagged.

Flight Behavior Analysis

- AI monitors speed, acceleration & unusual movements.
- High-speed, fast-accelerating objects get flagged.

Doppler & Heat Signature Authentication

- AI checks radar for rotational motion (Friend) vs. linear motion (Foe).
- Infrared sensors detect stable heat (Friend) vs. heat bursts (Missile).

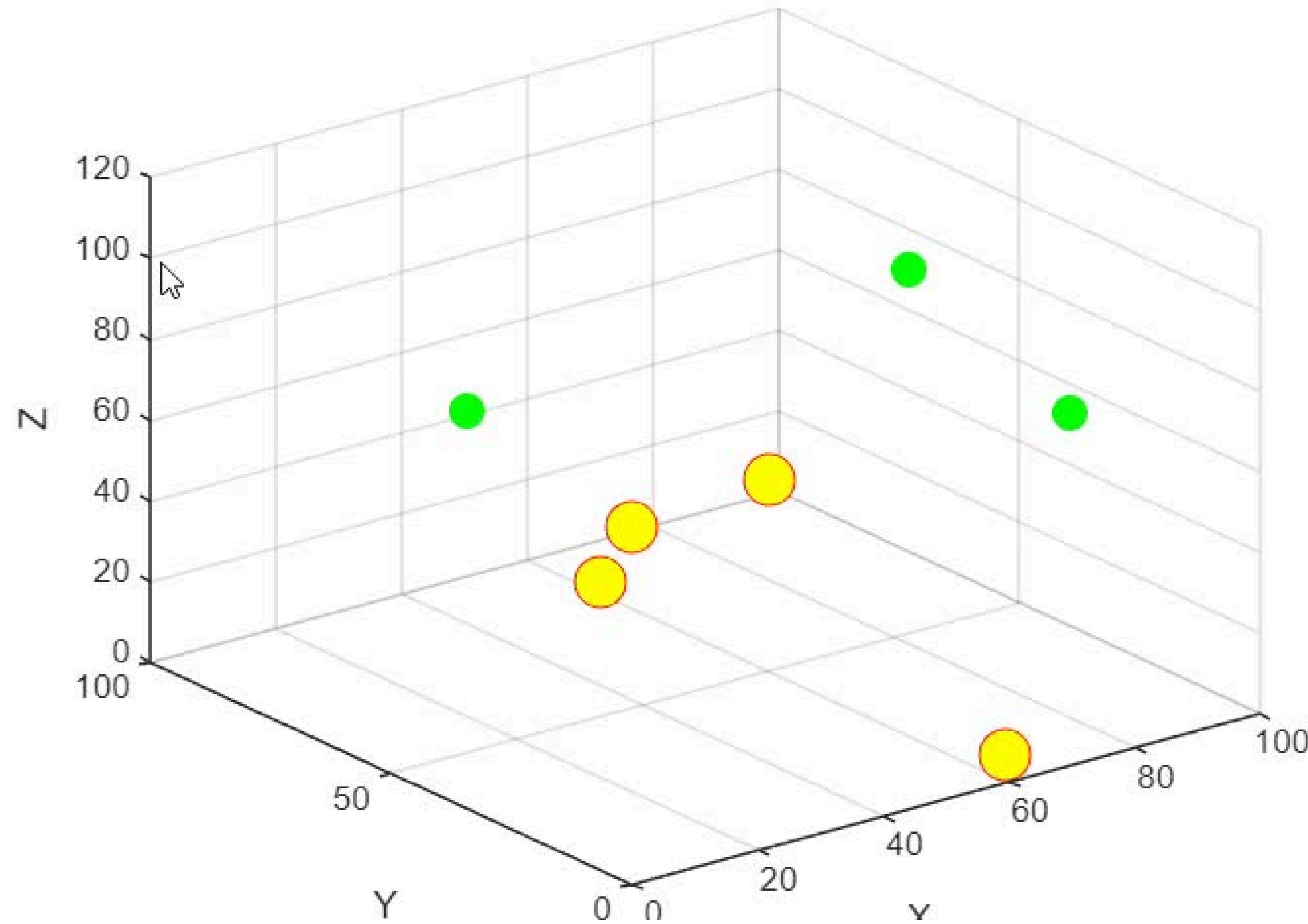
Time-to-Impact Calculation

- AI calculates if the object is on a collision course.
- If TTI < 60 sec, the system confirms an enemy missile.

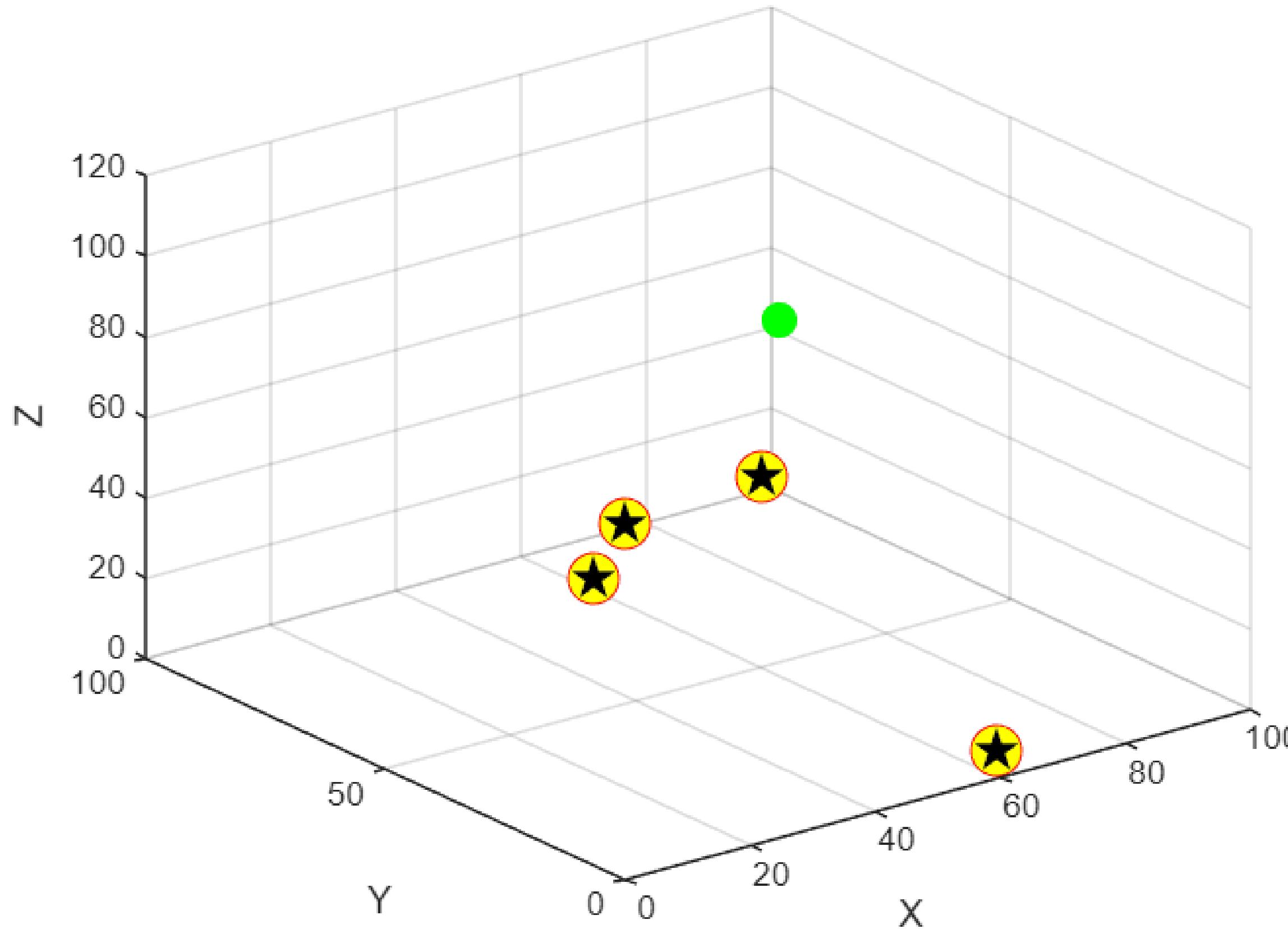
AI-Based Final Decision

- AI combines all data for final verification.
- If any system confirms a threat → Interceptors Activated!

Iron Dome 3D Simulation with ML Classification



Iron Dome 3D Simulation with ML Classification



THANK YOU