

$$\Sigma F = m a = p'(t) = -G \Delta t$$

$$m \Delta v + u \Delta m + \Delta v \Delta m = -G \Delta t$$

$$m \frac{\Delta v}{\Delta t} + u \frac{\Delta m}{\Delta t} + \Delta v \frac{\Delta m}{\Delta t} = -G$$

$$\Delta t \rightarrow 0$$

$$m v'(t) + u m'(t) = -mg$$

$$v'(t) + g = -u \frac{m'(t)}{m} \quad || \int dt$$

$$v(t) + u \ln(m) = -gt + C$$

$$v(0) = 0 \Rightarrow C = u \ln(m_0)$$

$$v(t) = -gt + u \ln \frac{m_0}{m}$$

# KILLING NUCLEAR WEAPON



# WITH AI



# C4dynamics



# MISSILE DEFENSE SYSTEM

Which module to  
replace with AI?

Missile's Autopilot or Target Classifier

C4dynamics



Like



Comment



Repost



Send



# Missile's Autopilot

Converts  
guidance  
commands  
to wing  
angles

# Target Classifier

Decides  
the type  
of the  
ballistic  
target  
carrying  
nuclear  
warhead

C4dynamics



Like



Comment



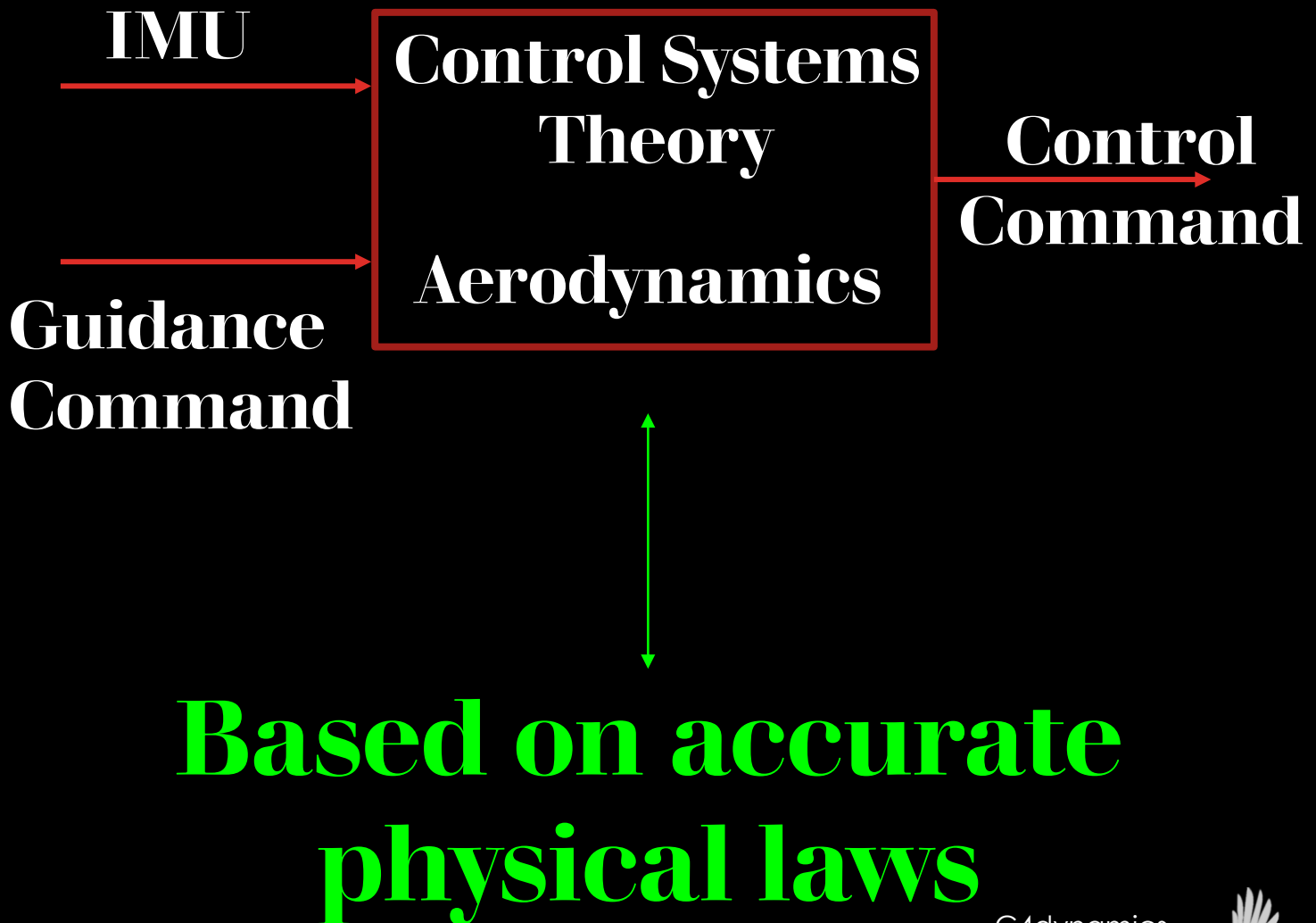
Repost



Send



# AUTOPILOT



C4dynamics



Like



Comment



Repost



Send



# REPLACING AUTOPILOT WITH AI:

- Loss of the accuracy and universality of principles-based commands

C4dynamics



Like



Comment



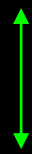
Repost



Send



# TARGET CLASSIFICATION



**Based on matching large set of parameters**

C4dynamics



# REPLACING THE TARGET CLASSIFIER WITH AI:

- Learns complex relations
- Robust to input variations
- Scalable & easy to update for new threats

C4dynamics



Like



Comment



Repost



Send



- Neural Networks are universal functions approximators
- Great for making decisions and extract insights:

C4dynamics



Like



Comment



Repost



Send





## ✓ AI for Target Classification

- identify complex relations

## × AI for Missile's Autopilot

- physics-based principles are most accurate and reliable

C4dynamics



Like



Comment



Repost



Send



**WHAT ARE THE  
COMPARABLE FEATURES  
IN YOUR SYSTEM?**

**- SHARE IN COMMENTS**

C4dynamics



Like



Comment



Repost



Send



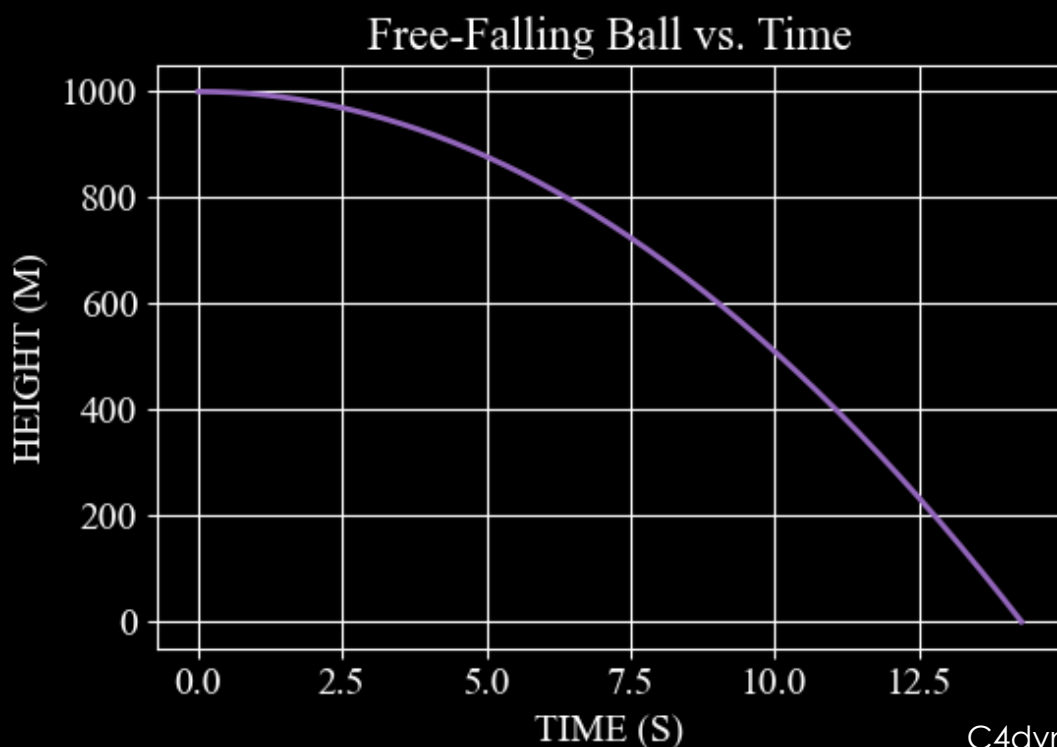
# C4dynamics

## Scary framework for algorithms engineering

Download C4dynamics and run  
freefall.py

Follow the instructions there:

<https://github.com/C4dynamics/C4dynamics/blob/main/examples/freefall.py>



C4dynamics



Like



Comment



Repost



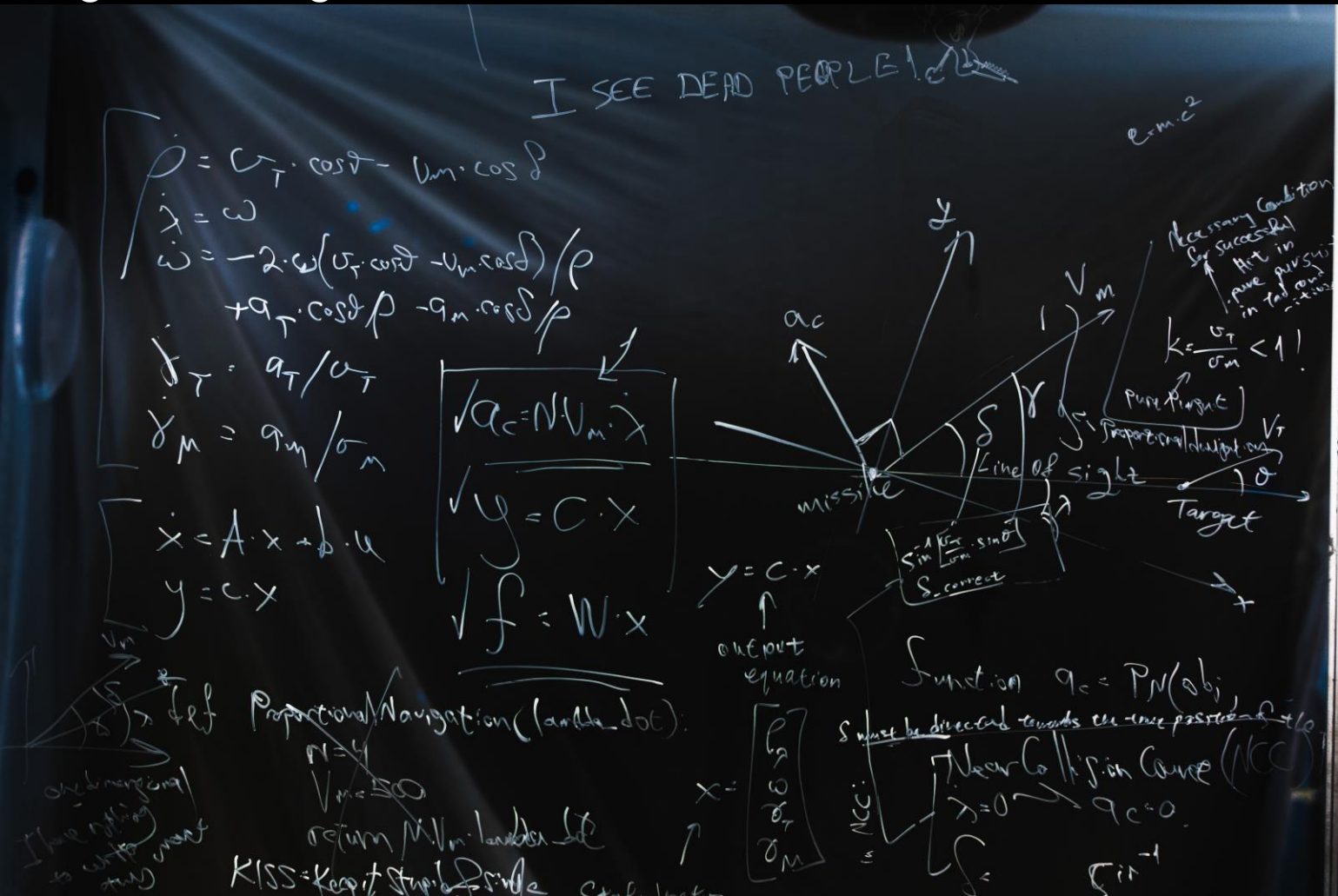
Send





Ziv Meri

Algorithms Engineer



Gavriel Weinberger

Visual Content Creator



C4dynamics