

# GAIN, a Machine Learning approach for Airborne, Maritime, and Submarine Gravimeter Systems

Dr. Lorenzo Iafolla



Dr. Massimo Chiappini

Principal Investigator, INGV



Dr. Francesco Santoli

Co-Principal Investigator, INAF

Funding agency



REGIONE  
LAZIO

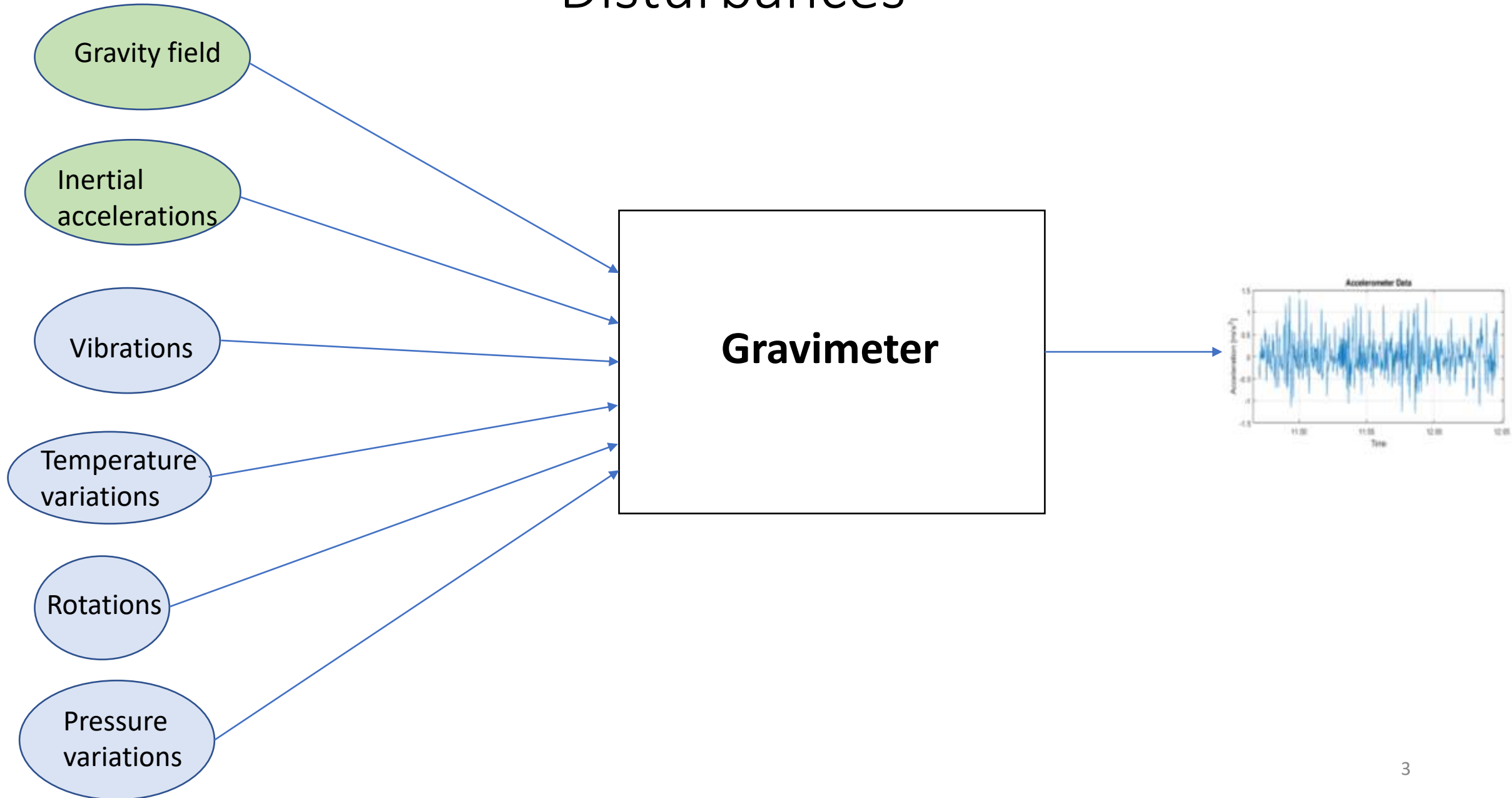


# Measuring accelerations from moving platforms

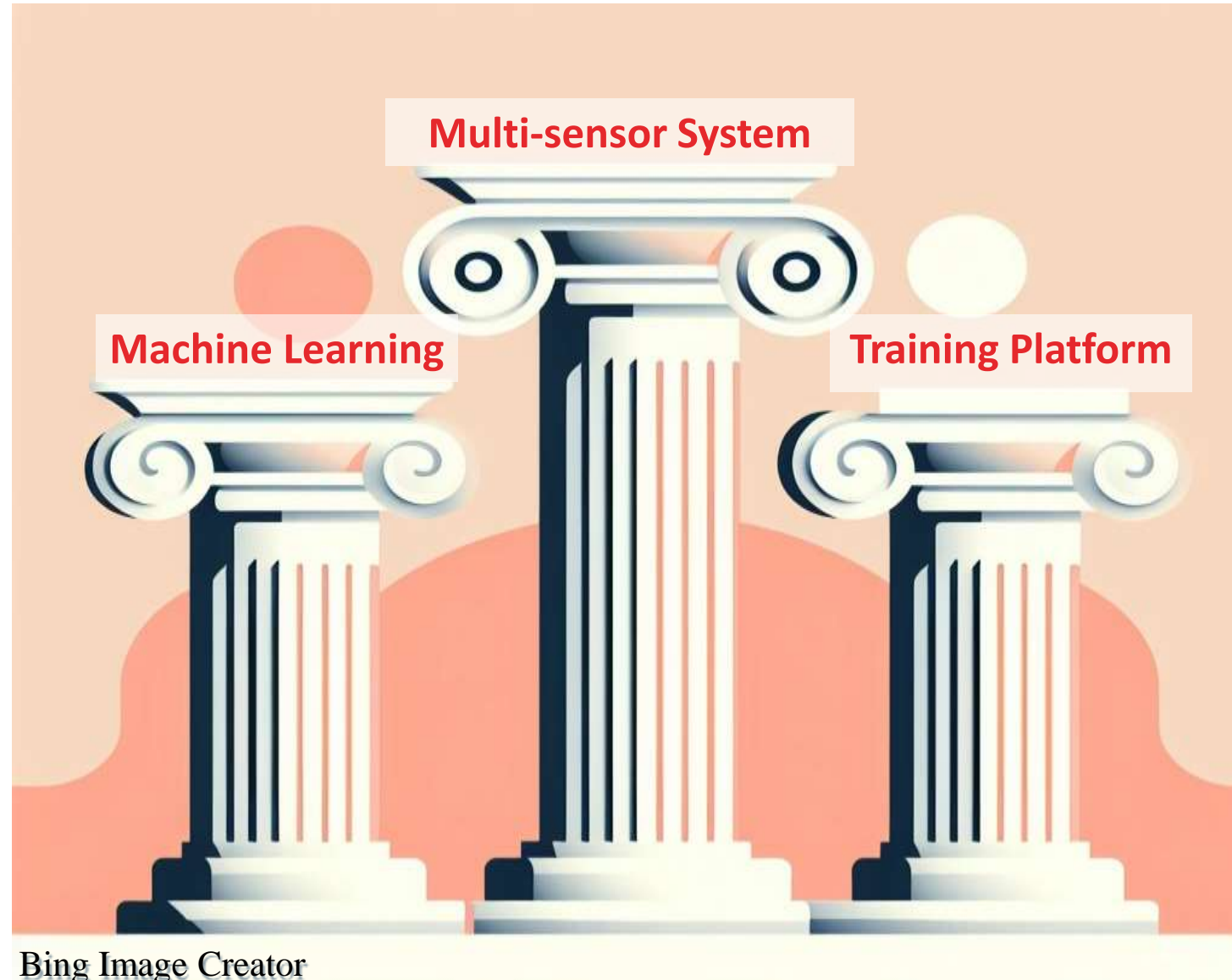


Pexel.com

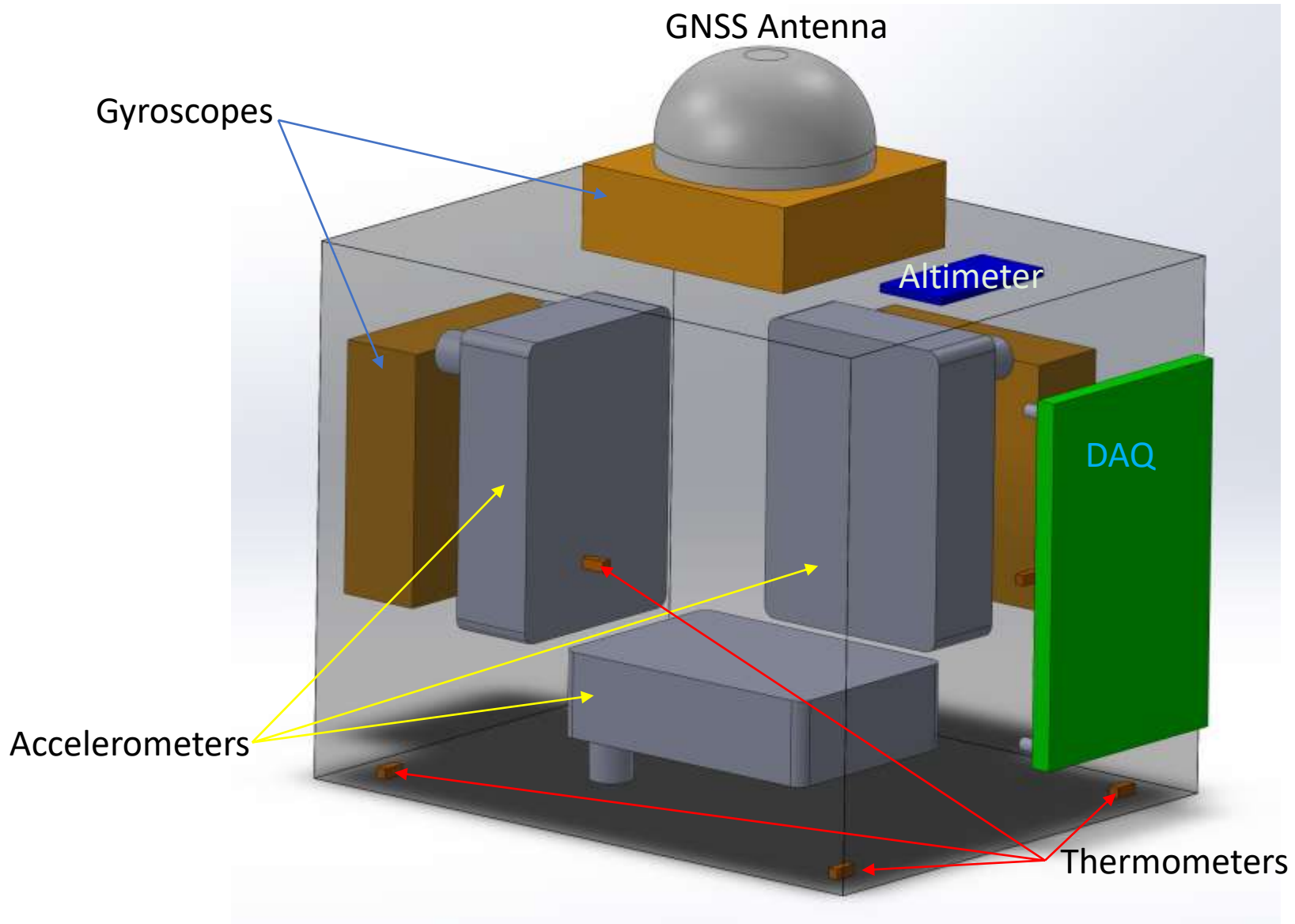
# Disturbances

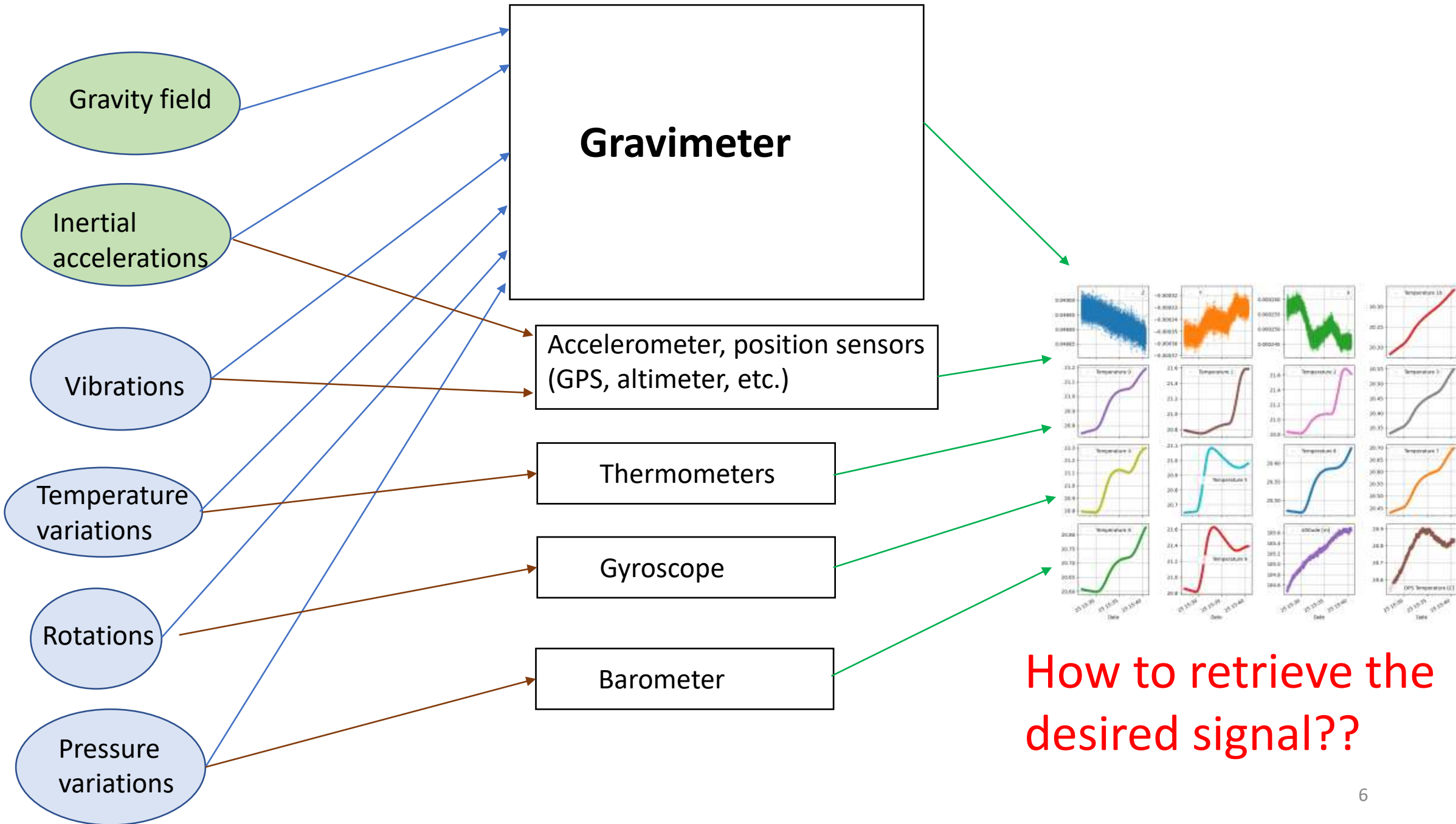


# GAIN Method in 3 Pillars



# 1<sup>st</sup> pillar - Multi-sensor system







# 2<sup>nd</sup> Pillar - Machine Learning

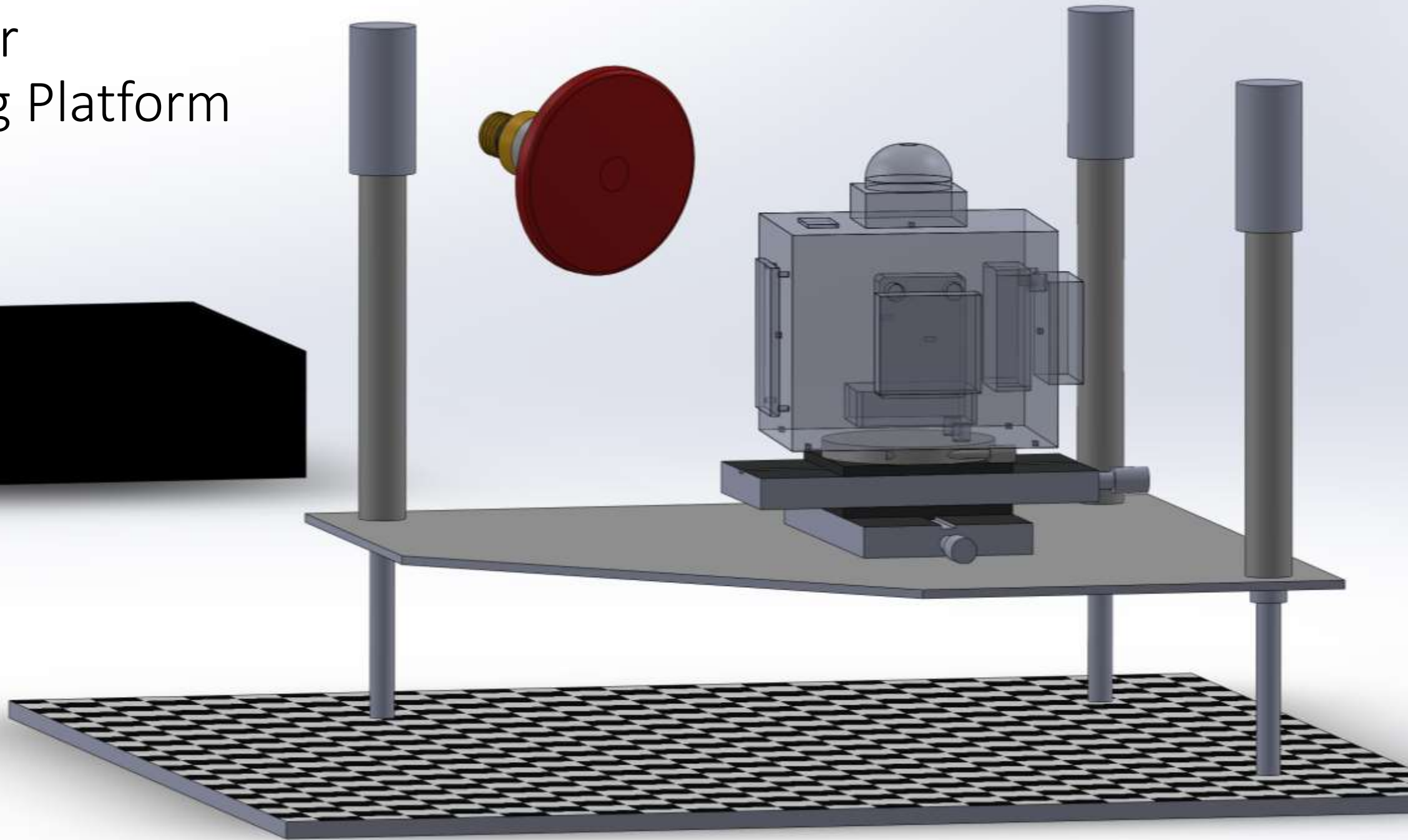
- Type of Artificial Intelligence.
- Algorithms able to learn from data.
- By analyzing training data, algorithms recognize patterns and make predictions.

Need for training data!



Bing Image Creator powered by OpenAI - DALL-E

# 3<sup>rd</sup> Pillar Training Platform

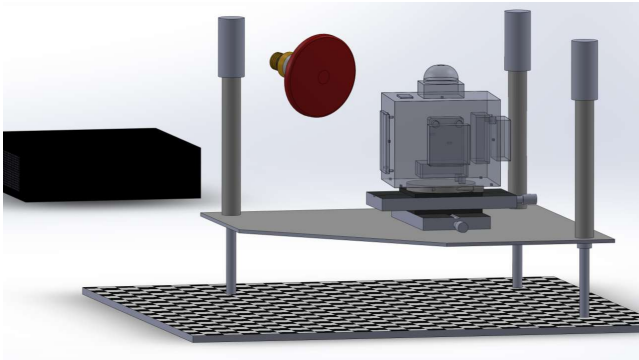




# Three Operational Phases

## Phase 1

Training data acquisition



## Phase 2

ML training

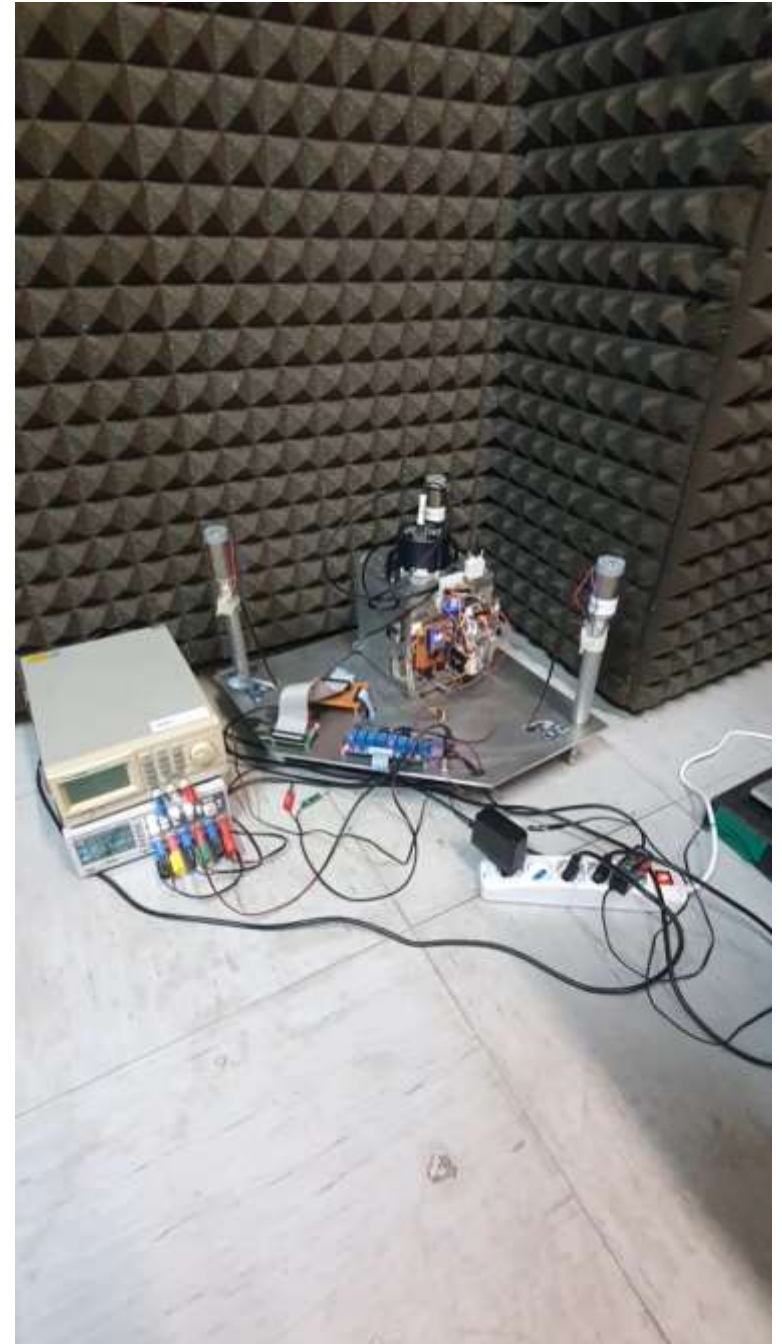


## Phase 3

Data acquisition on the field



# Experimental setups



# Contributions

- **Challenge:** Disturbances in high accuracy measurement
- **GAIN solution:** Pivoting ML to tackle the aforementioned challenge
- **Results:** Experimental results for temperature rejection
- **Future Projects:** New experiments for other types of disturbances