UNISON-Egypt

A Further Step toward Space Education and Understanding

Akram Abdelaziz

Mohamed Donia

Representatives of UNISON-Egypt

Senior Students At Aerospace

Engineering Department,

Cairo University ,Egypt.

UNISON Egypt -SSTLab

- Space Systems Technology Laboratory (SSTLab) is a student based organization at Aerospace Engineering Department, Cairo University, which was established in August 2011.
- SSTLab has become the main contact point of UNISON Egypt.
- UNISON Egypt includes laboratories from different universities: Cairo, Alexandria, MSA and Zewail City.

Cairo University

MSA University
October University for Modern Sciences and Arts

ZEWAIL CITY
ESTABLISHED 2000
INAUGURATED 2011

UNISON Egypt Activities 2017

- CanSat Training Program (CTP7).
- Rover Back Training Program (RTP1).
- Hyperloop.
- Test and Implementation of the ADCS software.
- Visual Slam And Sensor Fusion.

CanSat& Rover Training Program (CTP7)

- Mixed CanSat and Rover training program in 2017.

CanSat& Rover Training Program (CTP7)

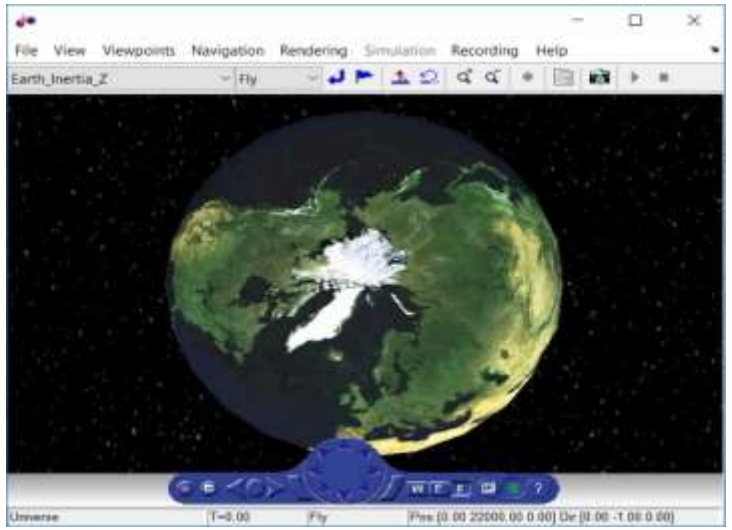
- SSTLab has successfully trained 20 students this year from Cairo University
- The training was held in Summer vacation, from Aug15 to Aug 30, 2017.
- UNISON Egypt has organized a national competition among trainees and nominated the winner to participate in ARLISS 2018 competition.

HyperNova II

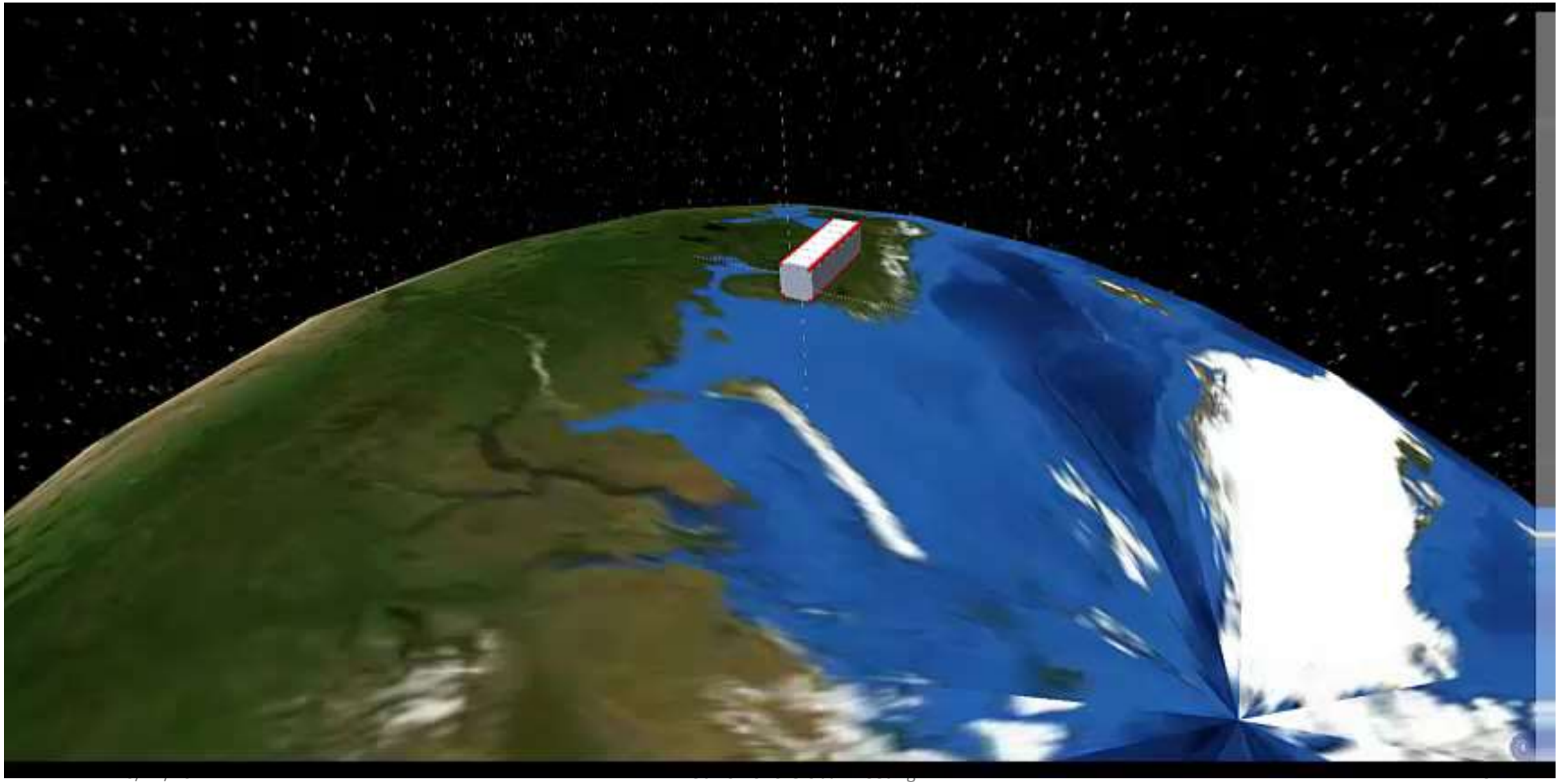
Hyperloop is an idea published by Elon Musk at 2013 which aims that the hyperloop pod reaches a speed of 300 m/s on the ground.
We succeeded to design and manufacture small model that simulates all systems and full size structure model.

We Also participated in Hyperloop Pod Competition Phase II that was held in SpaceX, USA between 25-27 Aug 2017

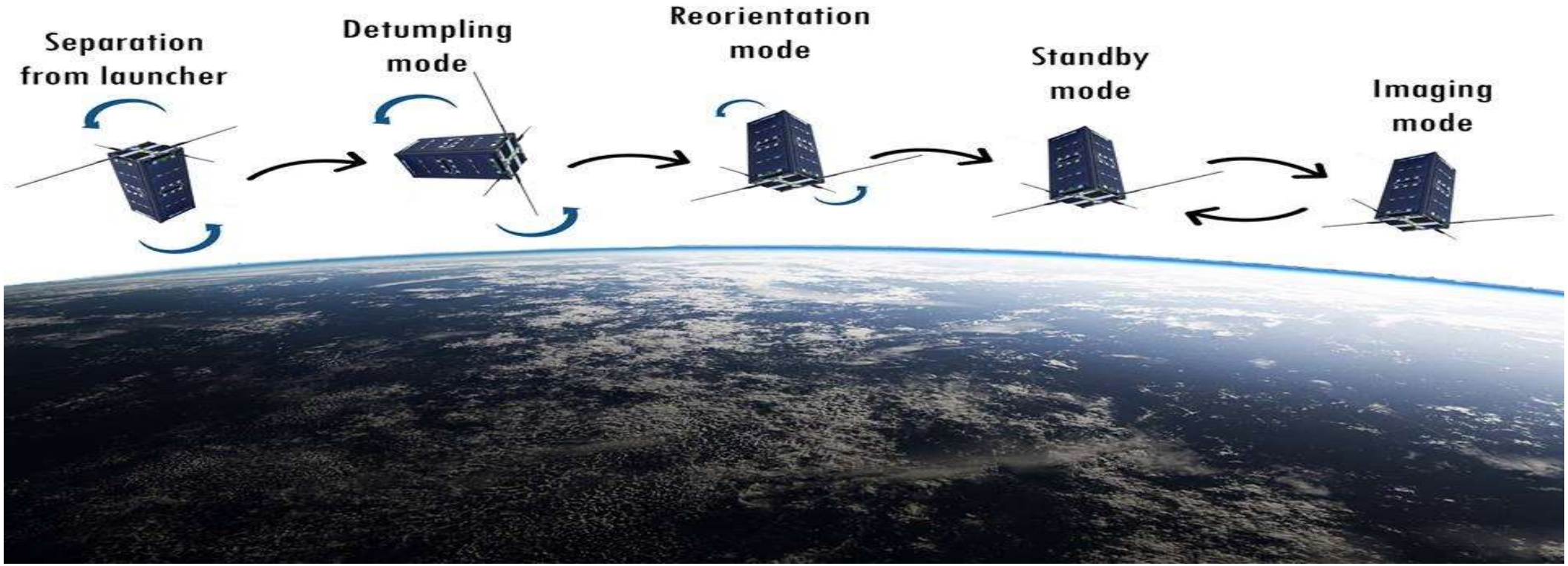
Attitude determination and control subsystem(ADCS)



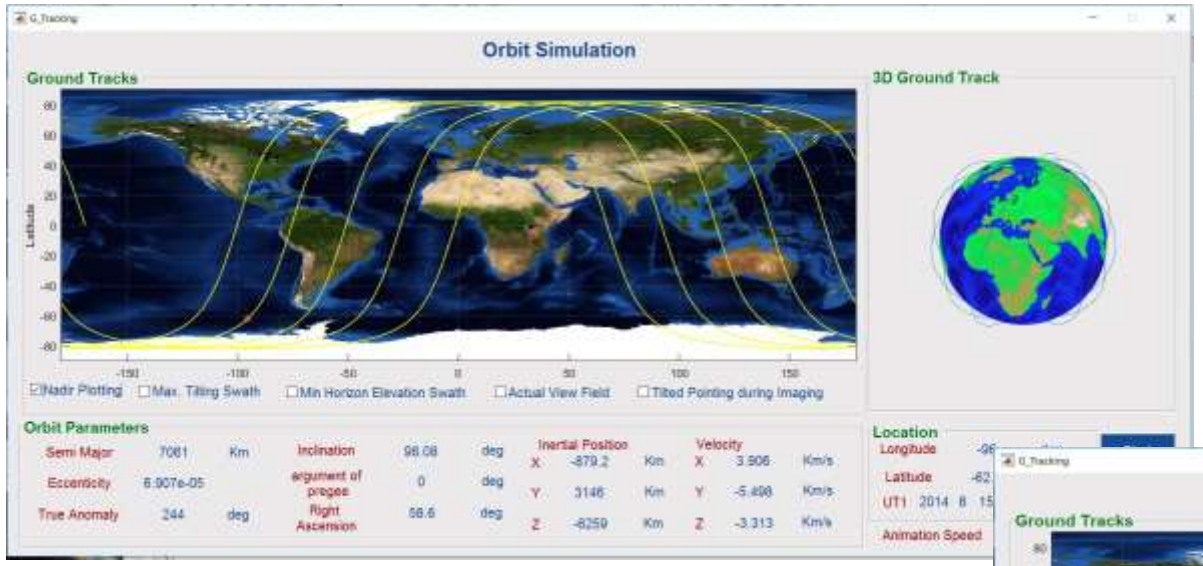
- Satellite Subsystem With Hardware and Software Components
- Responsible for Controlling and Stabilizing the spacecraft's attitude against all attitude disturbing influences resulting from the environment
- Also, to point the payload towards a predetermined point on the earth's surface within a specified margin of error.
- This goal must be achieved regarding a stringently limited mass, power and size



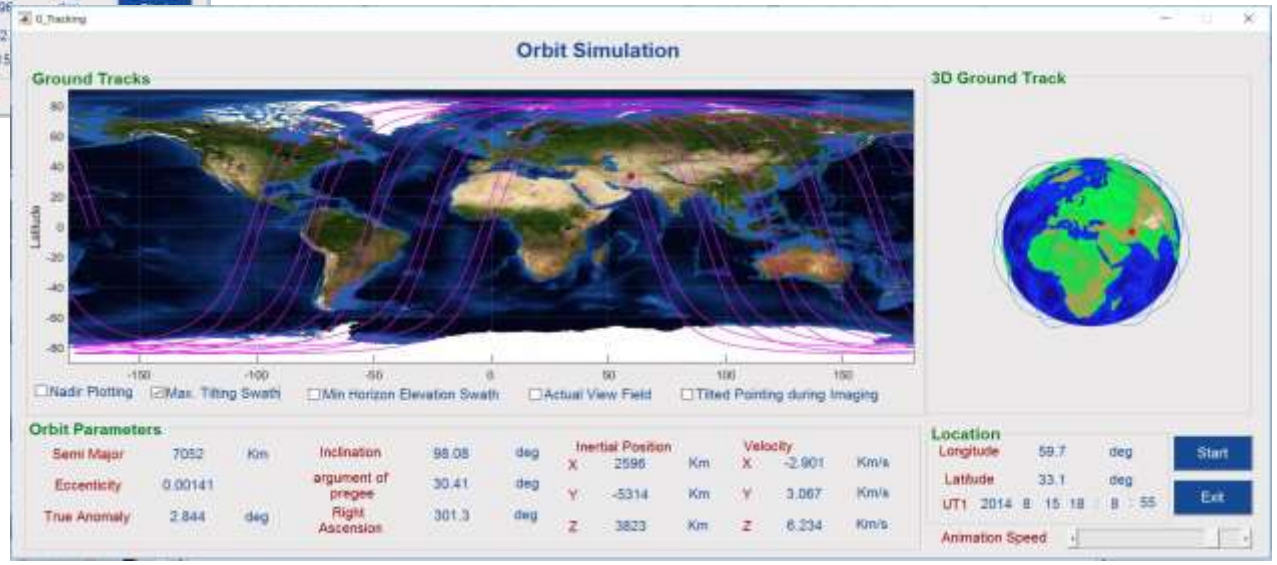
Satellite ADCS Mission:



Nadir Plotting



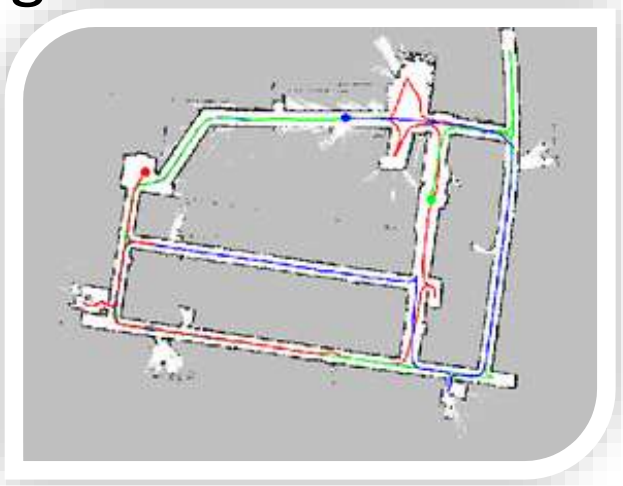
Max. Tilting Swath



Visual SLAM & Sensors Fusion

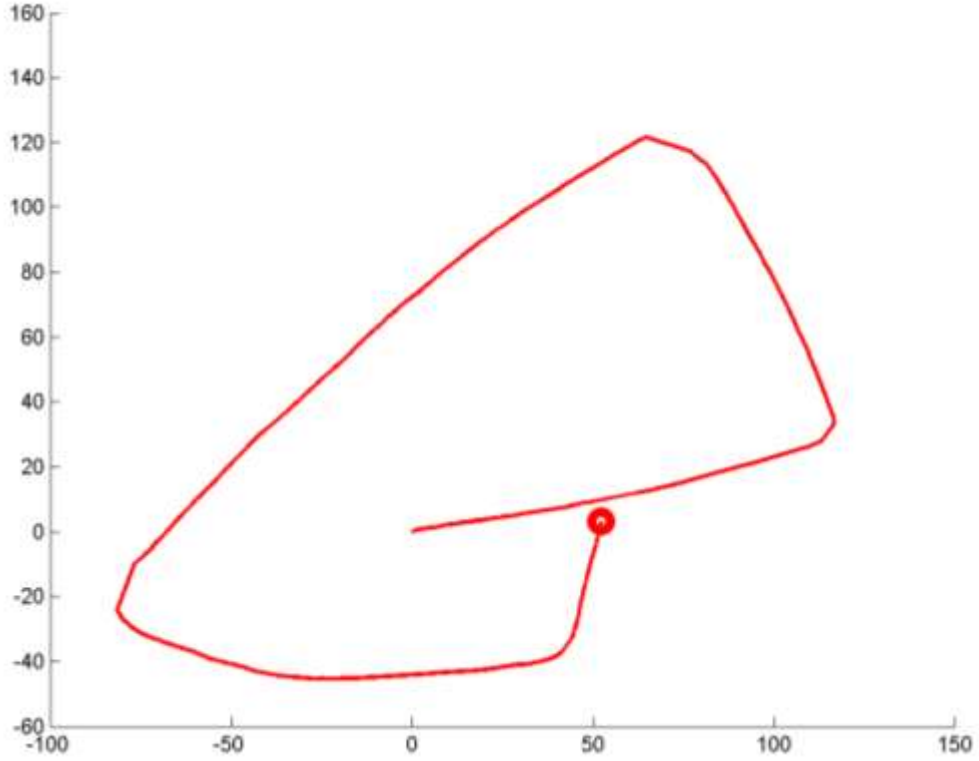
(for Autonomous Driving Vehicles)

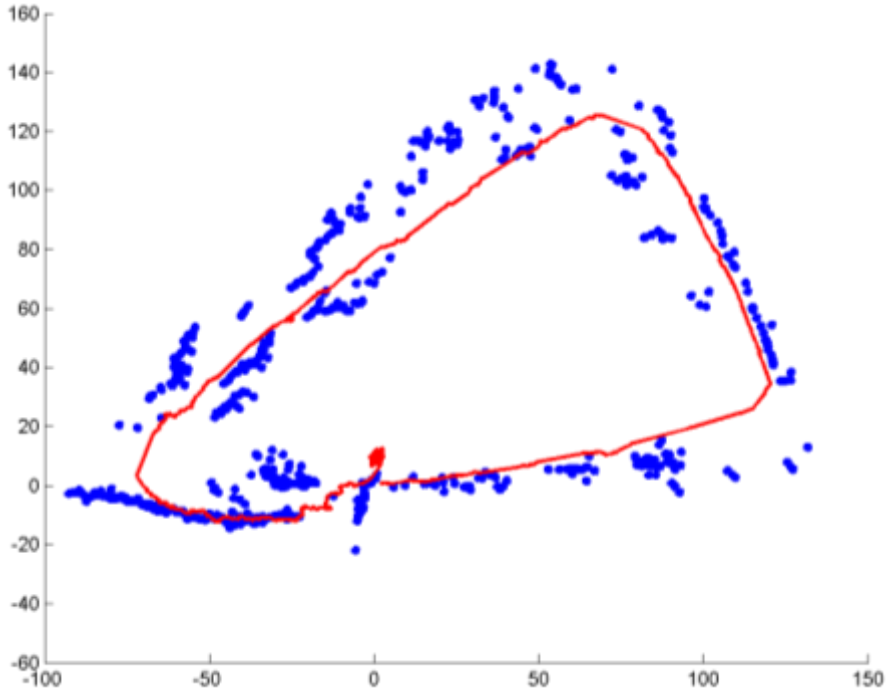
- Simultaneous Localization and Mapping
- Means building a map and locating the unmanned vehicle simultaneously.
- Create a SLAM algorithm and fusion layer to produce a **static 2D map** of the surroundings.



- **Coverage Area:** 20m x 20m
- **Resolution:** 15 cm
- **Vehicle Speed:** up to 30 Km/h

Visual Odometry Vs. SLAM






Green: Valid Depth Points
Red: Not Valid Depth Points
FPS: 7.692307
Outdoor Test Environment
Camera : ZED stereo Cam
Resolution: 672 x 376
Platform: Nvidia Jetson TK1
Car Speed: 30 KM/hr
Area: Helwan, Egypt

Future of UNISON-Egypt

- Making many of students' actions and creative ideas unbounded by traditional ones, which will lead to a breakthrough in space technology.
- Continuing in space applications and projects like CanSat, CubeSat, Rover, Quad-copter and Rocket to get the "Know-how" and practical experience in space technology.
- Starting to make a true space product and trying to launch it in space like our University-Sat 1

Thank You

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