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.
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 Aug 15 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:

1. Separation from launcher
2. Detumbling mode
3. Reorientation mode
4. Standby mode
5. Imaging mode
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
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

Contacts:
akramabdelazizabdelaziz@gmail.com
mohameddonia2222@yahoo.com