

The Use of GNSS in DubaiSat Programme

By: Omran Sharaf

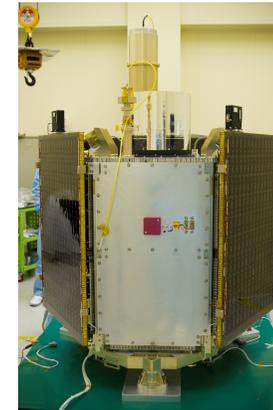




- EIAST Overview
- DubaiSat Programme
- Challenges and Future Projects
- UAE activities in the ICG



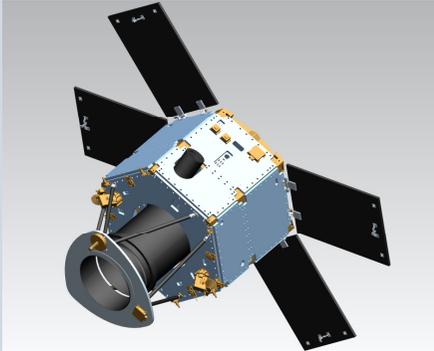
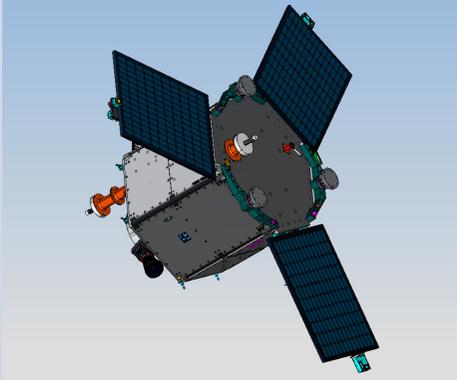
- Dubai Government Initiative established in 2006.
- With a vision to be a world class leading organisation in advanced science and technology.
- A mission to boost prosperity and enhance sustainable development by fostering technological advancement and inspiring scientific innovation.





- DubaiSat Programme
 - DubaiSat-1:
 - Technology Transfer Program Satrec Initiative of South Korea.
 - Launched on 29th July 2009.
 - DubaiSat-2:
 - Joint Development with Satrec Initiative of South Korea
 - To be Launched End of 2012.
- Ground Segment
 - Satellite Command & Control.
 - Image Processing and Product Generation.



Item	DubaiSat-2	DubaiSat-1
Shape		
GSD	1 m Pan and 4 m MS	2.5 m Pan and 5.0 m MS
Swath Width	12.2 Km	20 Km
Image Storage	256 Gbit SSR	64 Gbit
Image Transmission	160 Mbps	30 Mbps
Weight & Dimensions	Hexagonal shape, < 300 Kg mass 2 m height, 1.5 (3.3) m diameter	Hexagonal shape, < 200 Kg mass 1.4 m height, 1.2 (3) m diameter
Orbit	600 ~ 700 Km Sun Synchronous Orbit	682 Km Sun Synchronous Orbit



- Function:
 - Technology Demonstrator.
 - Provide Pulse Per Second (PPS) signal to Modules.
 - Ephemeris Data for Images.

- Technologies Used:
 - Based on ARM60 RISC microprocessor.
 - GP2021 Correlator: Receives up to 12 channels of L1 C/A code.
 - GP2015 RF Front-End Chip : Frequency down conversion and outputs GPS signal (C/A code) as a 2-bit digital data.



- Function:
 - Provides coordinates for satellite Attitude and Orbit Determination and Control (ADC).
 - Provide Pulse Per Second (PPS) signal to modules.
 - Ephemeris data for images.
- Technologies Used:
 - Based on an SMJ320C6701 Digital Signal Processor.
 - GP2021 Correlator: Receives up to 12 channels of L1 C/A code.
 - GP2015 RF Front-End Chip : Frequency down conversion and outputs GPS signal (C/A code) as a 2-bit digital data.

Comparison Table



	DubaiSat-1 GPS Receiver	DubaiSat-2 GPS Receiver
Number of Receivers	1 Receiver	2 Receivers
Processor	ARM60	DSP SMC320C6701
Task Architecture	0.1sec - Acquisition of Observation Data 1.0sec – Assignment of channel 1.0sec – Decoding Navigation Message 1.0sec – Calculation of Navigation Solution	0.1sec – Acquisition of Observation Data 1.0sec – From Assignment to Calculation of Navigation Solution
Communication I/F	RS422	CAN bus
EMIF(External Memory Interface)	N/A	DSP EMIF(External Memory Interface) - (SRAM/EEPROM/Correlator)
Signal Tracking	10 GPS satellites (signal C/A, L1)	12 GPS satellites (signal C/A, L1)
Orbital Navigator	N/A	Includes the orbital navigator which performs the propagation of the orbit and the update of the orbit with GPS navigation solution.
Precision of Navigation Outputs(PVT)	1Hz	1Hz
Navigation Solution	Position: 10 m	Position: 3 m



- Challenges:
 - Technologies becoming obsolete.
 - Higher accuracy.
 - Develop the right skills to continue technology development.
- Future Projects:
 - Develop GPS/GLONAS/GALILEO Receiver
 - Develop FPGA based correlators.



- The UAE hosted a regional GNSS workshop entitled United Nations/United Arab Emirates/United States of America Workshop on the Applications of Global Navigation Satellite Systems from the 16th -20th of January 2011 in the city of Dubai.
- Some of the highlights of the workshop:
 - Over 100 attendees from 30 countries.
 - Concentration on regional activities.
 - Raising the profile of GNSS applications in the region.
 - After successful implementation, future plans for bigger events.





Thank You