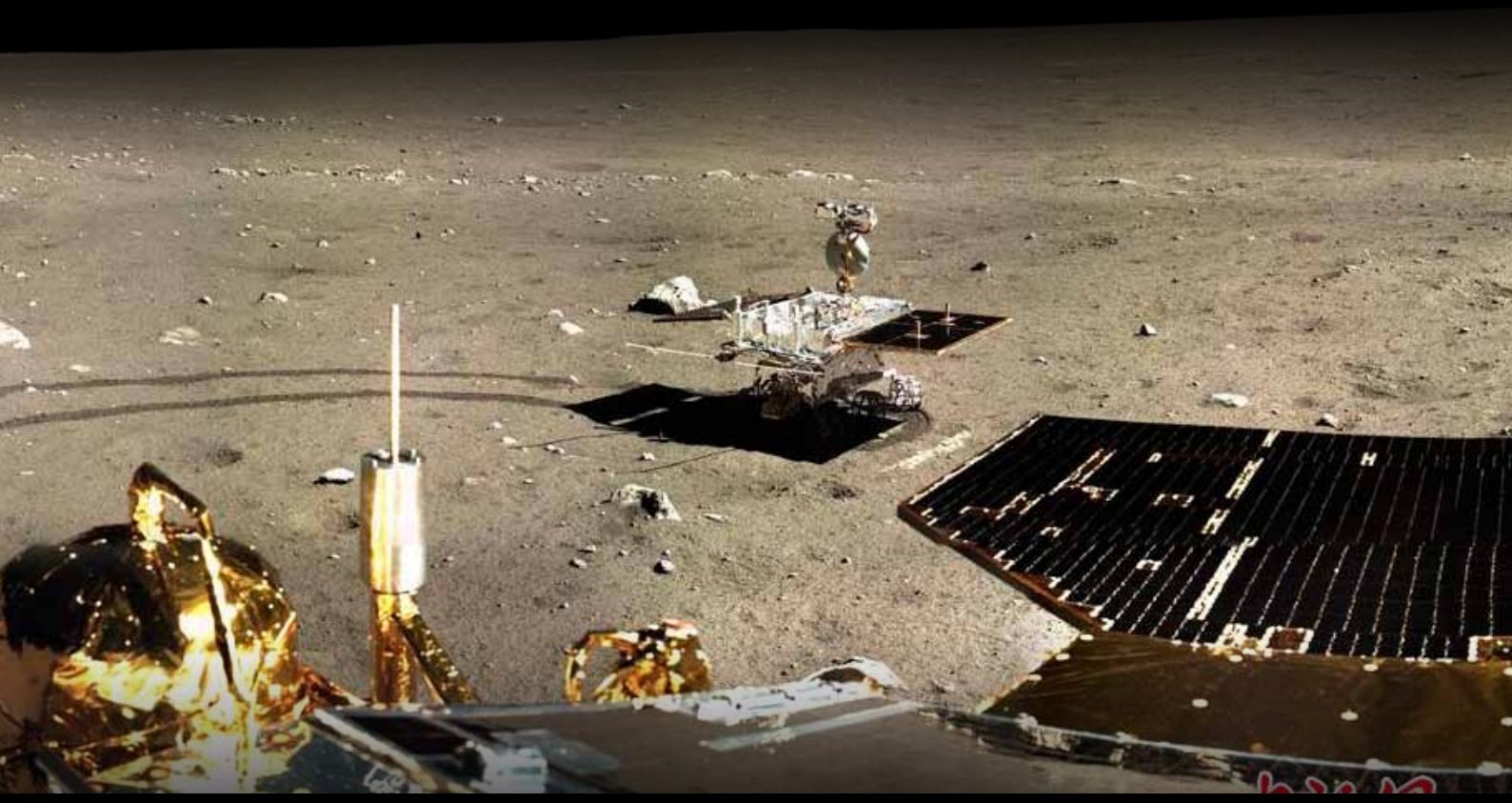
En Route for the Moon

Chinese Academy of Space Technology launched YUTU moon rover



iGPS helps "Jade Rabbit" jump higher

The Chinese lunar mission

17:30 UTC on December 2nd. Following the successful launch of the Long March 3B rocket carrying the Chang'e-3 probe and Yutu lunar rover, China has begun their most ambitious space mission to date. The launch was on schedule and took place from the LC2 Launch Complex at the Xichang Satellite Launch Center.

1:11pm UTC on December 14th. The Chang'e-3 moon lander successfully touched down on the moon. Only a few thrilling hours later, Yutu separated from the lander and started its mission.

The Lunar Rover

The lunar rover, named Yutu or Jade Rabbit), will explore the lunar surface on a three month mission. Equipped with a solar panel to power the vehicle during the lunar day, Yutu will survey a three square kilometer area, travelling a maximum distance of 10 km from the landing point.

Yutu is capable of real time video transmission, and can dig into the moon's surface and perform simple analysis of soil samples.

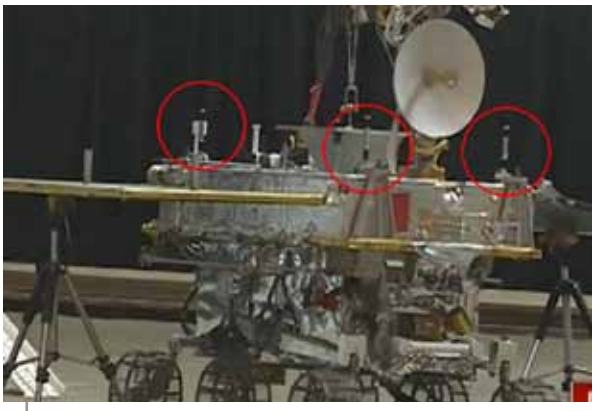
Yutu also carries a ground penetrating radar unit on its belly that will perform the first direct measurement of the structure of the lunar soil, down to a depth of 30 meters. The unit can also investigate the lunar crust structure down to depth of several hundred meters. The most advanced moon rover ever also sports an alpha particle X-ray spectrometer and an infrared spectrometer.

iGPS used for trajectory control during testing

The CAST (Chinese Academy of Space Technology) started cooperation with Nikon Metrology in 2009 when they were convinced that iGPS was the perfect technology for their R&D development on the Yutu moon rover.

CAST has invested in four iGPS systems for different test zones, for both indoor and outdoor measurement. Convinced of the performance of iGPS system, Mr. Ma, one of the managers from CAST, commented: "When we turned on the wall of lights to simulate the sun, iGPS was the only metrology equipment that survived and performed under such a harsh environment. It is truly amazing."

China's lunar lander snaps a color photo of Yutu- the six-wheeled rover exploring the moon - one day after it touched down. Credit: CNSA / CCTV



Nikon's iGPS equipment (iGPS sensors are encircled) are used during laboratory tests for e.g. trajectory verification

The iGPS systems have been used to perform trajectory verification, guidance system benchmarking, driving system performance verification and various different research and development tasks. The system has been extensively tested during outdoor experiments in inner-Mongolia to simulate the harsh surface conditions on the moon.

With a seamless cooperation between CAST, Daiichi (local integrator), Nikon Instrument Shanghai and Nikon Metrology, CAST has been able to get timely support and has been able to meet their critical schedule.

iGPS for Tracking

Until recently, many applications requiring dynamic measurements of objects locations were forced to make compromises in accuracy, working volume, and with the number of simultaneousness objects that could be tracked.

iGPS offers a solution to these problems by providing full 6DOF multi-sensor tracking capability with metrology grade accuracy that is scalable, flexible and easy to deploy.

iGPS sensor and transmitter

Benefits at a glance

- Large volumes: transmitter range of 55m, covering volumes larger than 100m x 100m
- High accuracy: <0.3mm dynamic uncertainty
- 6 Degree of Freedom tracking
- Track multiple objects (parts, vehicles, robots, etc) simultaneously
- Track objects relative to each other or referenced to a common coordinate system

System overview

- iGPS Transmitters establish the measurement volume – Create a measurement zone of any size by surrounding it with transmitters. Measurement zones can be expanded by adding additional transmitters, now or in the future
- Setup is quick and easy – Simply walk a bundle tool around the volume or install permanent reference sensors for automatic calibration & continuous system monitoring
- Measure anywhere that 3 transmitters are visible to the sensor
- Dynamic Tracking Kits provide 6 DOF feedback for live positioning, dynamic referencing, logging or control of automation systems
- Perform feature inspection with a variety of probe options
- Directly interface with popular metrology & analysis software or collect data using the SDK