

# Workshop on GNSS and Robotic Applications Towards Sustainable Society (GRASS)

January 8th, 2024

Venue: Lecture hall, 2nd floor, IES Building, Academia Sinica

GNSS application to geodesy for crustal deformation has been one of the key research topics in the international earth science community, and the young Taiwan active orogen is one of the best natural laboratories in the world for this topic. GNSS application is not only in scientific research, but also in basic applications related to the national economy and people's livelihood such as navigation and positioning, environmental monitoring, and nation land surveying. Combined with the recent booming development of robots and artificial intelligence, GNSS can further apply and contribute to the sustainable development of human society. To promote the application and latest development of global navigation satellite systems in other fields that benefit the national economy and people's livelihood and society, as well as the sustainable development of the earth and the environment, several well-known GNSS professors and experts from four East Asian countries, including Japan, South Korea, Singapore, and Thailand, are invited IES, Academia Sinica for this international workshop.

The main topics discussed at this workshop include the GNSS application in (1) seabed geodesy; (2) climate change; (3) precise urban geographical mapping and other topics; as well as (4) the improvement of GNSS signals acquisition and (5) multi-path array antenna technology; and also (6) the application of robots in homeland security issues. There are a total of 6 lectures and discussions. All interested are welcome.

## 以全球導航衛星系統與機器人實現永續社會之應用 論壇

常年來，以全球導航衛星系統所實現的大地測量應用於地殼變形一直是國際地球科學界的重點研究課題之一，而年輕的台灣活動造山帶正是世界上研究此課題的最佳天然實驗室。然而全球導航衛星系統之應用不僅在於科學研究，其於導航定位、環境監測等國計民生相關的基礎應用亦極為廣泛而深刻；結合近期蓬勃發展的機器人與人工智慧的開發，實現地球乃至於人類社會的永續發展將指日可待。

全球導航衛星系統不僅應用於大地測量的地球科學研究，為推廣全球導航衛星系統在其他裨益國計民生相關領域與社會乃至於地球與環境永續發展的應用與最新發展，陳宏宇研究技師特別邀請來自東亞四國，包括日本、韓國、新加坡與馬來西亞的知名全球導航衛星系統教授與專家來台，籌備此次國際學術論壇，以交流、學習、精進有興趣之各研究單位的全球導航衛星系統技術，提供經驗交流和傳承，並促成進一步國際學術合作的可能。

此次會議主要討論議題包括應用全球導航衛星系統於(1)海底大地測量；(2)氣候變遷；(3)精準城市地理測繪等主題；以及全球導航衛星系統訊號的精進、反覆蓋雜訊與多路徑陣列天線技術；並輔以機器人在國土安全課題上的應用。共計有 6 個演講座談。議程如下：

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8:30-9:00 Registration

9:00-9:10 Opening speech by Deputy Director Chan, IES, Academia Sinica

Session I: GNSS applications and positioning improvement (Chair: Dr. Hsin Tung)

9:10-9:40

Dr. Horng-Yue Chen, IES Academia Sinica, Taipei, Taiwan

**A Decade of Global Navigation Satellite System/Acoustic Measurements of Back-Arc Spreading in the Southwestern Okinawa Trough**

9:40-10:10

Prof. Chalermchon Satirapod, Department of Survey Engineering, Chulalongkorn University, Thailand

**Use of GNSS CORS data for Climate Study in Thailand**

10:10-10:40

Prof. Hyung-Keun Lee, School of Electronics, Telecommunication and Computer Engineering, Korea Aerospace University, Republic of Korea

**Position-domain Hatch smoother to obtain accuracy-improved coordinates in the urban area**

10:40-11:00 Coffee/Tea break

Session II: Improvement of GNSS signals acquisition and robot applications (Chair: Dr. Horng-Yue Chen)

11:00-11.30

Prof. Toshiaki Tsujii, Department of Aerospace Engineering, Osaka Prefecture University, Japan

**GNSS array antenna technology for multipath mitigation and anti-spoofing**

11:30-12:00

Prof. Hung-Kyu Lee, School of Civil, Environmental, and Chemical Engineering, Changwon National University, Republic of Korea

**Test and analysis of GPS L2C signals and measurements**

12:00- 12:30

Dr. Ben Soon, DSO National Laboratories, Singapore

**Robotics Applications for Homeland Security**

12:30- 12:45 Q&A and Closing speech

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