PolyU LSGI STEAM Talk Series For Secondary Schools 2024

Descriptions for the STEAM Talk Topics:

1. **Smart City and 3D Mapping in HK 智慧城市及三維地圖的應用**

What is a map? Traditionally, maps were paper representations with schematics, annotations, and legends. Today, maps have evolved to 3D space and even 4D (space and time) representations, especially in the context of smart cities and geospatial technologies. This talk will introduce geospatial technologies like total stations, laser scanning, photogrammetry, remote sensing, geophysics, hydrography, and geographic information systems. Let's explore the development and impact of these technologies, revealing their transformative role in the world of mapping.

2. **Global Navigation Satellite System (GNSS) and Smart City Applications 全球導航衛星系統與智慧城市應用**

GPS is well-known for positioning and navigation, such as vehicle navigation and positioning for hiking. Together with the Russian GLONASS, European Galileo and the Chinese BeiDou, they are called the Global Navigation Satellite System (GNSS). This talk will briefly introduce the background and concepts of GNSS and smart cities. The state-of-the-art and potential contributions of GNSS to smart-city development are described. The presentation will be interactive, engaging with students in STEM/scientific thinking.

3. **Unfolding HK Lost WWII Heritage with Geo-spatial Science 尋找隱世二戰遺跡：地理空間科學篇**

How much do we know about the ruins of war and the numerous stories that are hidden in the forests and buried beneath the ground in our Hong Kong countryside? To unfold the long-lost heritages in the Battle of Hong Kong during WWII, LSGI utilizes innovative geospatial and geophysical technologies for imaging the buried war heritage in Hong Kong which is then displayed in a 3D VR/AR CAVE for an immersive WWII heritage experience. It is supported by a two-year Innovation Technology Fund project (2023-2024) by the HKSAR government. (Video promo)

4. **Problem Solving by Digital Maps and Geographic Information System (GIS)**
以數字地圖和地理訊息系統解難

Let's explore the power of spatial data in identifying and analyzing recreation sites! This talk will introduce a wide range of spatial data sources, including environmental, transportation, land use, and recreation data. Participants will learn how to access, evaluate and integrate this data into Geographic Information System (GIS) software for mapping, analysis, and decision-making. For instance, we will examine the popular BBQ locations, site amenities, and user reviews, showcasing some basic data analyzing skills and introducing open-source spatial data to enhance outdoor recreation experiences for participants.

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Descriptions for the STEAM Talk Topics:

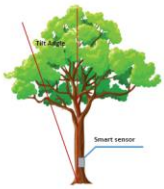
5. **Seeing and Unseen Underground Utilities in 3D 三維地下管線測量**

   How much do we know about the underground world? The invisible city's vessels supply us with clean water, electricity, gas, and telecommunication, helping our city not flooded during heavy rainstorm, conveying our toilet water to treatment. This talk will unfold some mysteries by geo-spatial and geophysical technologies, including laser scanning, electromagnetics, ground penetrating radar, acoustic and infrared thermography. After the talk, participants are able to explain how underground utilities are important to our city and have basic understanding on the technologies for monitoring underground utilities.

6. **Observing and Measuring the Earth from Space 從太空觀測地球**

   The Earth is a deformable body. Land uses and cities change/develop rapidly. What are the most accurate methods to measure the dynamic Earth? What are the most efficient methods with reasonable accuracy to measure the dynamic Earth? This talk will describe a variety of space-based technologies for Earth observations. The technologies include the Global Navigation Satellite System (GNSS), Remote Sensing, Synthetic Aperture Radar (SAR), and Earth Observation satellite missions. The presentation will be interactive, engaging with students in STEM/scientific thinking.

7. **IoT and Remote Sensing for Tree Monitoring 如何利用 IoT 及遙感技術監測城市樹木**



   To help trees thrive in urban areas for a longer time, it's important to have an effective system for managing green spaces in our city. In this session, we will introduce the Smart City Tree Management Project, which utilizes technologies such as Smart Sensing Technology (SST), Internet of Things (IoT), Geographic Information System (GIS), and remote sensing to monitor the health of trees in real-time. A system has been developed for the safety inspection of trees in various locations, utilizing big data analysis to predict leaning trends. This project, supported by The Hong Kong Jockey Club Charities Trust and led by PolyU, aims to contribute to the development of a smart city. The related technologies and research findings have been shared with various HKSAR Bureaus and Departments. This talk will explain how these advanced technologies can facilitate tree monitoring, thereby enhancing conservation efforts and ensuring the safety of human lives in our city.