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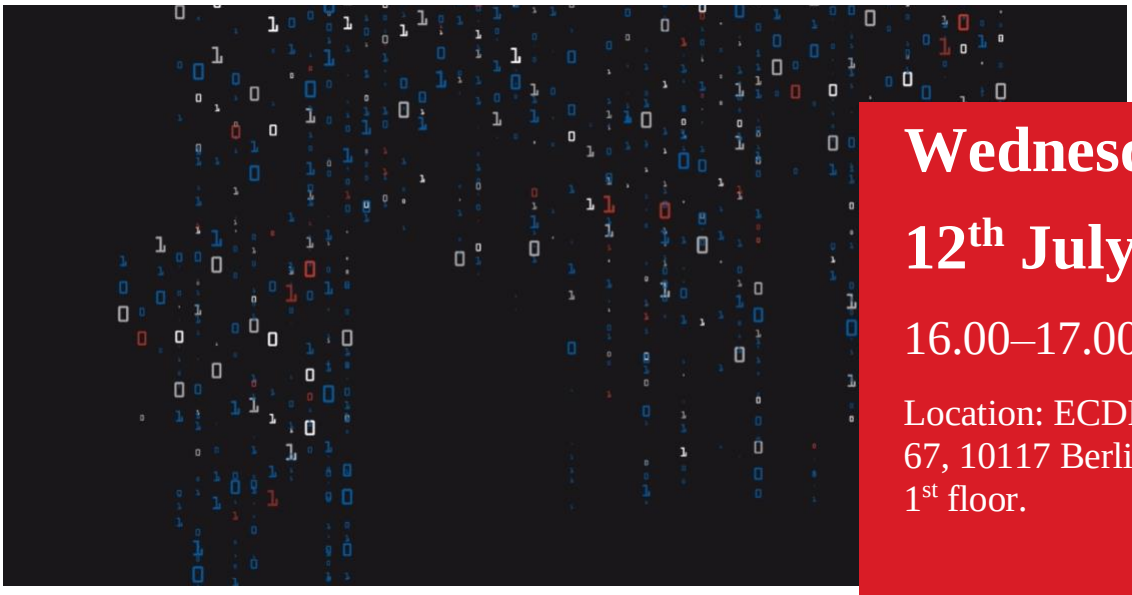
LECTURE SERIES



Wednesday

12th July 2023

16.00–17.00

Location: ECDF, Wilhelmstraße 67, 10117 Berlin, conference room, 1st floor.

Citizen-based Monitoring for Peace & Security in the Era of Synthetic Media and Deepfakes

Speakers: Alexander Glaser and Vy Nguyen

Abstract

Satellites have been used since the 1950s for Earth observation, first by governments for reconnaissance missions shrouded in secrecy, but increasingly also by a community of open-source analysts, researchers, and non-governmental organizations, enabled by a rapidly growing fleet of satellites operated by commercial providers. These collection efforts are creating an immense archive of digital data, and there is a widely shared expectation---or hope---that broad and open access to such imagery will enable the timely detection of non-compliance with relevant international agreements. Here, we are particularly interested in monitoring compliance with nuclear nonproliferation and arms-control agreements, but similar opportunities are also emerging in the context of environmental and carbon-emission monitoring, emergency response and human-rights monitoring, and archaeological-site monitoring. Working with real satellite imagery has strong limitations, especially when used for research purposes. Access to high-resolution imagery can be extremely expensive when required at scale, and training change-detection algorithms is difficult when based on rather limited datasets.

As part of this project funded by the German Foundation for Peace Research, we seek to assess the long-term potential of satellite imagery for monitoring and verification purposes, leveraging

synthetic satellite imagery generated with advanced machine-learning techniques. We show that large text-to-image models like DALL-E 2 or Stable Diffusion can achieve remarkable results in generating realistic high-resolution imagery with tunable characteristics. A major part of this effort also examines the growing risks and challenges that synthetic media pose for society and policy and seeks to help assess the viability of efforts aimed at confirming the authenticity of digital media and, in particular, the provenance and authenticity of satellite imagery.

Bios

Alex Glaser is an associate professor in the School of Public and International Affairs and in the Department of Mechanical and Aerospace Engineering at Princeton University. Glaser is an Associated Member of the Einstein Center Digital Future, where he spent the year 2020/2021. At Princeton, Glaser co-directs the Program on Science and Global Security. Glaser is a Fellow of the American Physical Society and a member of the Science and Security Board of the Bulletin of the Atomic Scientists, which sets the Doomsday Clock. Glaser holds a PhD in Physics from Technische Universität Darmstadt.

Vy Nguyen is a student assistant at the Data Science +X Research Center at the Berliner Hochschule für Technik. Nguyen completed the Master's Thesis on "Machine Learning for Synthetic Satellite Images: Conditional Image Generation using a Vision-Language Model" in May 2023 and will continue research in Data Science and Machine Learning at BHT.