Sabancı Üniversitesi

FACULTY OF ENGINEERING AND NATURAL SCIENCES

enCRYPTON

CRYPTOGRAPHIC SOLUTIONS FOR PRIVACY ENHANCING TECHNOLOGIES

SUMMER SCHOOL 28 AUGUST - 01 SEPTEMBER 2023

Homomorphic encryption (HE) is one of the most powerful privacy enhancing technologies to ensure data privacy while deriving value from data, which has been growing at an unprecedent speed. Lattice-based cryptographic schemes, with their superior security, scalability and functionality properties, stand the most promising family of HE algorithms to achieve data capitalization in a privacy-preserving way.

enCRYPTON consortium (https://www.encrypt-on.com/) organizes a summer school for early stage researchers to learn not only the theoretical foundations of lattice-based HE but also its applications in machine learning. The implementation challenges of HE will also be covered in the summer school by internationally renowned scientists. In the last day of the summer school, there will be a hackathon, where students can work on homomorphic application project.

The summer school will take place on August 28 - September 1 in Sabancı University campus, Istanbul. There is on-campus accommodation available for students.
Please send all your inquiries to Erkay Savaş (erkays@sabanciuniv.edu) or Tuğçe Akkaş (tugce.akkas@sabanciuniv.edu)

SABANCI ÜNİVERSİTESİ

TOPICS

Day 1 | 28.08.2023
Mathematical Background

Day 2 | 29.08.2023
Lattice Based Cryptography and Homomorphic Encryption Schemes - I

Day 3 | 30.08.2023
Lattice Based Cryptography and Homomorphic Encryption Schemes - II

Day 4 | 31.08.2023
Software libraries and Implementation Issues

Day 5 | 01.09.2023
Privacy-Preserving Machine Learning/Data Mining

Via Zoom

INSTRUCTORS

AHMAD AL BADAWI
AHMET CAN MERT
ARSALAN JAVEED
BENEDIKT GIERLICHS
DIMITAR JETCHEV
ERCHAN APTOULA
ERDİNÇ ÖZTÜRK
ERKAY SAVAŞ
FERRUH ÖZBUDAK
TOLUN TOSUN
YÜCEL SAYGIN
WOUTER CASTRYCK

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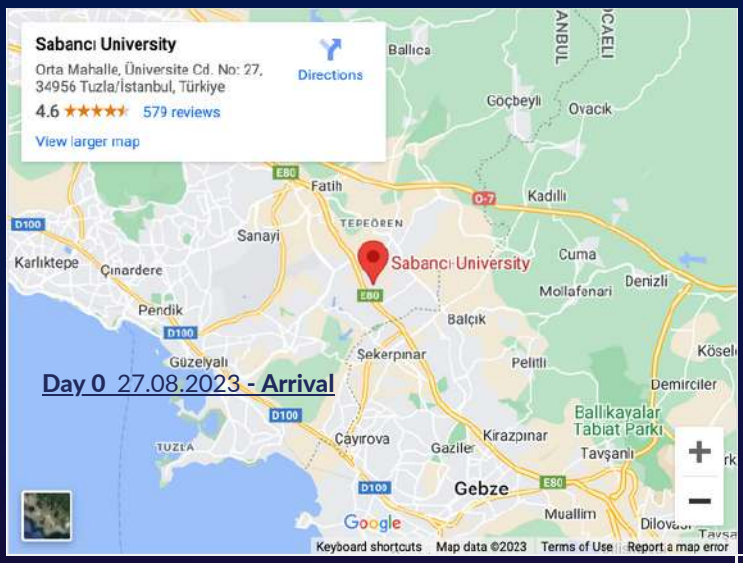
SUMMER SCHOOL 28 AUGUST - 01 SEPTEMBER 2023

DATES & TOPICS



Day 1 28.08.2023
Mathematical Background

Classroom EDU 2137

08:30 - 08:45	Registration
08:45 - 09:00	Openning remarks
Before Noon 09:00 - 11:45	Modular and Finite Field Arithmetic - I Modular and Finite Field Arithmetic - II **Coffee Break** Modular and Finite Field Arithmetic - III **Lunch**
After Noon 13:00 -19:30	Cyclotomic Polynomials and Polynomial Rings Arithmetic in Polynomial Rings **Coffee Break** Number Theoretic Transform (NTT) Polynomial Multiplication with NTT Social Activities - FMAN 1092

Day 2 29.08.2023
Lattice Based Cryptography and Homomorphic Encryption Schemes - I

Before Noon 08.30 - 09:00	Tea - Coffee - Snacks
09:00 - 11:45	Lattices and Hard Problems over Lattices - I Lattices and Hard Problems over Lattices - II **Coffee Break** Lattices and Hard Problems over Lattices - III **Lunch**
After Noon 13:00 -19:30	Introduction to Homomorphic Encryption - I Introduction to Homomorphic Encryption - II **Coffee Break** The BFV Scheme - I The BFV Scheme - II Social Activities - FMAN 1092

Day 3 30.08.2023
Lattice Based Cryptography and Homomorphic Encryption Schemes - II

Before Noon 08.30 - 09:00	Tea - Coffee - Snacks
09:00 - 11:45	The CKKS Scheme - I The CKKS Scheme - II **Coffee Break** The TFHE Scheme **Lunch**
After Noon 13:00 -19:30	Social Activity (Excursion in Istanbul)

Day 4 31.08.2023
Software libraries and Implementation Issues

Before Noon 08.30 - 09:00	Tea - Coffee - Snacks
09:00 - 11:45	General Introduction to a Homomorphic Encryption Library - I General Introduction to a Homomorphic Encryption Library - II **Coffee Break** Applied Study - Developing a Simple Homomorphic Application **Lunch**
After Noon 13:00 -19:30	Implementation Issues I: Hardware Acceleration Implementation Issues II: Hardware Acceleration **Coffee Break** Implementation Issues III: A Side-Channel Attack Overview Implementation Issues IV: Side-Channel Protection for Lattice-Based Cryptography BBQ FMAN courtyard

Day 5 01.09.2023
Privacy-Preserving Machine Learning/Data Mining

Before Noon 08.30 - 09:00	Tea - Coffee - Snacks
09:00 - 11:45	A Brief Introduction to Machine Learning: Basics (SVM, Tree-Based Techniques (Decision tree, Random Forest, XGBoost) Privacy-Preserving Machine Learning with HE **Coffee Break** Privacy-Preserving Machine Learning and Data Mining **Lunch**
After Noon 13:00 -19:30	A project/hackathon: Project definition Design & Implementation Closing