Nicolò Romandini

Nationality: Italian | **Gender:** Male | |

WORK EXPERIENCE

2021 – CURRENT – Bologna, Italy
PHD STUDENT IN COMPUTER SCIENCE AND ENGINEERING – ALMA MATER STUDIORUM ·
UNIVERSITY OF BOLOGNA

My PhD research focuses on the study of the integration between Federated Learning and blockchain technology, mainly in the Industrial Internet of Things (IIoT) and Internet of Medical Things (IoMT) fields.

2021 – Bologna, Italy
RESEARCH FELLOW – ALMA MATER STUDIORUM · UNIVERSITY OF BOLOGNA

Holder of a research grant titled "Blockchain-based infrastructures for Decision Support in Smart Tourism" financed on the POLIS-EYE project (CUP:E21F18000200007), for the needs of the Interdepartmental Centre for ICT Industrial Research of the Alma Mater Studiorum University of Bologna, under the supervision of the scientific responsible Prof. Rebecca Montanari. The project was developed in collaboration with the University of Bologna, Modis Consulting srl, Decentra Academy, Digital Innovation Hub Emilia-Romagna and Consorzio Nazionale Servizi.

EDUCATION AND TRAINING

2021 – CURRENT – Bologna, Italy
PHD IN COMPUTER SCIENCE AND ENGINEERING – Alma Mater Studiorum · University of Bologna

2018 – 2021 – Bologna, Italy
MASTER'S DEGREE IN COMPUTER ENGINEERING – Alma Mater Studiorum · University of Bologna

110 cum Laude | EQF level 7

2015 – 2018 – Bologna, Italy
BACHELOR'S DEGREE IN COMPUTER ENGINEERING – Alma Mater Studiorum · University of Bologna

110 cum Laude | EQF level 6

PROJECTS

2021 – 2022
FlowChain: the playground for Federated Learning in Industrial Internet of Things Environments

- Development of a framework to perform Federated Learning by exploiting blockchain technology
- Automated aggregation of partial models using a Smart Contract
- Access control through the use of the DID standard for identities
- Integration with the Flower framework

2021

CHIMERA: a general purpose platform to connect physical objects, products and services to their digital representations on blockchain in an unalterable way - Research Grant Project

- The project aims to create a 'general purpose' platform to be offered as a service to businesses in all areas of the economic ecosystem to connect physical objects, products and services to their digital representations on blockchain in an unalterable way
- Blockchain representation based on the emerging DID (Decentralised Identifiers) standard
- The availability of a blockchain-based data sharing system would allow companies to develop their own solutions or rely on those of other players to create and extract value from data hitherto confined to the production process

2020 – 2021

Evaluation and implementation of reinforcement learning and pattern recognition algorithms for task automation on web interfaces – Master's Degree Thesis

- Development of an AI agent capable of performing tasks (e.g., login) on any web page it executes
- Various reinforcement learning and pattern recognition techniques implemented and evaluated
- The agent based on pattern recognition (comparison of word embeddings) was able to replicate the login task and the purchase of a product task in all environments where it was tested

2020

Implementation of reinforcement learning algorithms in a cyber security simulation – Project Work for the Autonomous and Adaptive Systems course

- Development of various AI agents, based on different reinforcement learning algorithms, capable of playing a simple cybersecurity game
- In a network, an attacker tries to make his way through the nodes to reach the one in which sensitive data are stored. Meanwhile, a defender tries to raise the security level of the network to prevent breaches

2019

Implementation of ring signature to perform anonymous transactions on permissioned blockchain – Project Work for the Information Security course

- Blockchain used as a notary service that maintains the contracts stipulated between the registered companies
- The goal was to allow authorized companies to execute transactions on the blockchain without the system nor the other participants being able to trace their identity
- Solution based on ring signature algorithm based on elliptic-curve cryptography and hash function
- Obtained a linear trend in signing and verification time, based on the number of keys used

2019

Development of an AI agent capable of playing the game of Tablut – Board Game Students Challenge of the Foundations of Artificial Intelligence course

- Player based on alpha-beta pruning algorithm with a heuristic function to search for the best move
- Use of multi-threading and hash-maps to optimise performance and avoid multiple unnecessary visits to the same state, incrementing the number of visited states reaching up to six levels of depth

2018

Development of a framework for analysing and managing packet flows through the ONOS SDN controller – Bachelor's Degree Thesis

- ○ Development of a framework for the ONOS SDN controller that allows the installation of modules (e.g., Intrusion Detection Systems) for the evaluation of incoming packets in the router
- ○ Each module evaluates the packet and returns a value related to the reliability of the packet. The evaluations are then aggregated by a judge module
- ○ The final evaluation is shown via a web interface to the user who has the final decision whether or not to route the flow
- ○ All information about the packet and the user's decision are stored in an external database

EXPERIENCES

2020 – 2021

Erasmus at CISPA Helmholtz Center for Information Security, Germany

I took part in the Erasmus project to carry out my master's thesis in collaboration with Giancarlo Pellegrino, tenure-track faculty at CISPA Helmholtz Center for Information Security

SKILLS

Languages

Italian (mother tongue), English (C1), Spanish (A2)

Programming Languages

Proficient in Java, C, Python and JavaScript; familiar with Go, Kotlin, Bash, Ada, SQL and C#