# Mirko ZICHICHI


Research Scientist at IOTA Foundation

linkedin.com/in/mirko-zichichi-63a803100 mirkozichichi.me

+39 3491936042 mirko.zichichi@proton.me

Palermo, Italy Born in Palermo, Italy, 08/03/1995


Research Scientist at IOTA Foundation. I am currently involved in the research and development of Layer 1 Smart Contract solutions. PhD in Law, Science, and Technology Joint Doctorate - MSCA grant for the project Rights of Internet of Everything. My PhD thesis title is : "Decentralized Systems for the Protection and Portability of Personal Data.''

## Work Experience

**Ongoing – Dec 2022** | **Research Scientist, IOTA Foundation, Berlin**

*Research and Development,* Research Department and Engineering Department

- Research and development for Layer 1 Smart Contracts using the Move language
- Rust and Go developer
- Development of the European Blockchain Pre-Commercial Procurement (Phase 2B) European Blockchain Services Infrastructure (EBSI) IOTA solution

L1SC | Programmability | Move | Rust | Go | Smart Contracts | EBSI | IPR | Scalability

**Ongoing – Apr 2020** | **Expert, International Organization for Standardization (ISO), Madrid**

*Member,* Ad-hoc Group for ISO/IEC 21000-23 Smart Contracts for Media

- Standard for the conversion of Intellectual Property Rights contracts into Smart Contracts
- Encoding of Smart Legal Contracts for music agreements

MPEG-21 | IPR | Distributed Ledger Technologies | Smart Contracts | Media Contract Ontology

**Nov 2022 – Nov 2019** | **EU Horizon 2020 MSCA ITN Early Stage Researcher, Law Science and Technology Joint Doctorate, Bologna, Turin, Madrid**

*Universities :* University of Bologna, University of Turin, Universidad Politécnica de Madrid

- Decentralized Systems for the Protection and Portability of Personal Data
- *Member,* Ontology Engineering Group (OEG), Universidad Politécnica de Madrid
- *Member,* Analysis of Networks and Simulation Research Group (AnaNSi), University of Bologna
- *Member,* Legal Blockchain Lab, University of Bologna

Personal Data | GDPR | Distributed Ledger Technologies | Smart Contracts | Semantic Web | Linked Data

**Apr 2021 – Nov 2020** | **Student PhD Traineeship, BitNomos, Bologna**

*Research and development :* Intelligible Identity and Certificate products

- Development of the Intelligible models for verifying the authenticity of digital certificates and online identity assertions through smart contracts and standards for mark-up of legal documents.

Self-Sovereign Identity | Ethereum | ERC-721 | Non Fungible Tokens | Smart Contracts | Akoma Ntoso

**Apr 2019 – Feb 2019** | **Student Traineeship, University of Bologna, Bologna**

*Department :* Department of Computer Science and Engineering (DISI)

- Research on Blockchain technologies and Smart Contracts for Intelligent Vehicles Network.

Blockchain | Ethereum | Smart Contracts | Solidity | Python | JavaScript | Docker | Truffle | IOTA

**Sep 2017 – Dec 2016** | **Student Traineeship and Thesis, Italian National Council of Research CNR, Palermo**

*Institute :* Istituto di Calcolo e Reti ad Alte Prestazioni (ICAR)

- *200 hours stage* : Development of components in MUSA, a multi-agent system for the self-adaptive composition and orchestration of services in a distributed environment
- *200 hours thesis work* : Research on a new monitor model for Linear Temporal Logic aimed to user-requirements satisfaction

Java | Eclipse | Test Driven Development | JaCaMo

## Education

**Apr 2023 – Nov 2019** | **PhD in Law, Science and Technology, UPM-UNIBO-UNITO,**
*Universities :* Universidad Politécnica de Madrid, University of Bologna and University of Turin
- *Grade* : Cum laude
- *Thesis* : "Decentralized Systems for the Protection and Portability of Personal Data"
- *Supervisors* : prof. Stefano Ferretti, prof. Victor Rodriguez-Doncel

**Jul 2019 – Sep 2017** | **Master's Degree in Computer Science, University of Bologna,**
*Specialization :* Information Science for Management
- *Grade* : 110/110 cum laude
- *Thesis* : "A Distributed Ledger based infrastructure for Intelligent Transportation Systems"
- *Thesis supervisor* : prof. Stefano Ferretti

**Oct 2017 – Sep 2014** | **Bachelor's Degree in Computer Science, Università degli Studi di Palermo,**
- *Grade* : 110/110 cum laude
- *Thesis* : "Tecniche di Monitoring di Servizi Web per la Soddisfazione Parziale dei Requisiti" (Web Services Monitoring Techniques for Partial Satisfaction of Requirements)
- *Thesis supervisor* : Ing. Cossentino Massimo

## Languages

Italian — **Mother tongue**
English — **C1** | **IELTS Academic** held on 07/2018 | **Overall band : 7** (L : 8 ; R : 8.5 ; W : 6 ; S : 6)
Spanish — **B2**

## Scientific Activities

**Chairmanship** | **Chair of :**
- *Digital Media and Human Well-Being Workshop*, Madrid, Spain, November 2021
- *Seminario "Ordine, Caos, Complessità e Sistemica"*, Palermo, Italy, May 2016

**Invited** | **Lectures :**
- *Community Innovation Lecture Series*, MOBI - Mobility Open Blockchain Initiative, April 2022

**Technical Program Committee :**
- *HICSS 56*, 56th Hawaii International Conference on System Sciences, Hawaii, USA, Jan 2023
- *GoodIT 2022*, ACM International Conference on Information Technology for Social Good, Limassol, Cyprus, Sep 2022
- *Blockchain 2022*, International Congress on Blockchain and Applications, L'Aquila, Italy, Jul 2022
- *Networking 2022*, IFIP Networking Conference, Catania, Italy, Jun 2022
- *HICSS 55*, 55th Hawaii International Conference on System Sciences, Hawaii, USA, Jan 2022
- *Blockchain 2021*, International Congress on Blockchain and Applications, Salamanca, Spain, Oct 2021
- *CryBlock 2020*, 3rd Workshop on Cryptocurrencies and Blockchains for Distributed Systems (part of MobiCom 2020), London, United Kingdom, Sep 2020
- *Blockchain 2020*, International Congress on Blockchain and Applications, L'Aquila, Italy, Jul 2020

Reviewer

Reviewed submissions for the following journals :

- *Springer Nature* : Scientific Reports
- *Elsevier* : Journal of Network and Computer Applications, Pervasive and Mobile Computing, Information Processing & Management, Computer Communications, Blockchain : Research and Applications
- *IEEE* : Open Journal of the Computer Society, Access
- *Springer* : Computing
- *Wiley* : Concurrency and Computation : Practice and Experience

Participation

Conferences and Workshops :

- *ACM International Conference on Information Technology for Social Good*, Sep 2022, Limassol, Cyprus
- *31st International Conference on Computer Communications and Networks*, Jul 2022, Virtual Event
- *2022 IEEE International Conference on Blockchain and Cryptocurrency*, May 2022, Virtual event
- *14th International Conference on Agents and Artificial Intelligence, Special Session on Super Distributed and Multi-agent Intelligent Systems*, Feb 2022, Virtual Event
- *33rd Benelux Conference on Artificial Intelligence and the 30th Belgian Dutch Conference on Machine Learning*, Nov 2021, Esch-sur-Alzette, Luxembourg
- *ACM International Conference on Information Technology for Social Good*, Jul 2021, Rome, Italy
- *International Workshop on Social (Media) Sensing, co-located with 30th IEEE International Conference on Computer Communications and Networks*, Jul 2021, Athens, Greece
- *2020 IEEE 19th International Symposium on Network Computing and Applications*, Nov 2020, Virtual Event
- *3rd Workshop on Cryptocurrencies and Blockchains for Distributed Systems, co-located with the 26th Annual International Conference on Mobile Computing and Networking (MobiCom 2020)*, Sep 2020, London, United Kingdom
- *2nd International Workshop on Social (Media) Sensing, co-located with 25th IEEE Symposium on Computers and Communications 2020*, Jul 2020, Rennes, France
- *3nd Distributed Ledger Technologies Workshop, co-located with ITASEC 2020*, Feb 2020, Ancona, Italy
- *32nd International Conference on Legal Knowledge and Information Systems*, Dec 2019, Madrid, Spain

## Academic Activities

A.Y. 2021/2022

University of Bologna

- *Tutor (40h)*, **Legal Computer Science IUS/20**, Bachelor's Degree in Legal Consultant in Business and Public Administration (Ravenna Campus)
- *Lecturer (9h)*, **Seminario Blockchain E Smart Contract : Aspetti Giuridici E Tecnologici**, Single Cycle Degree in Law
- *Lecturer (3h)*, **Trattamento dei dati personali e Data Protection Officer**, Professional Master's Programme 1st Level
- *Lecturer (2h)*, **IT Law and Legal Informatics**, Professional Master's Programme 1st Level
- *Thesis supervisor and teaching assistant*, **Blockchain and Cryptocurrencies**, Master Degree in Computer Science and Master Degree in Artificial Intelligence

Universidad Politécnica de Madrid

- *Teaching assistant (6h)*, **Social/Legal/Ethical Aspects in Data Science**, Master's Degree in Data Science
- *Teaching assistant (6h)*, **Aspectos Sociales, Éticos y Legales de los Datos y la Inteligencia Artificial**, Bachelor's Degree in Artificial Intelligence and Data Science

A.Y. 2020/2021

University of Bologna

- *Lecturer (6h)*, **Seminario Blockchain E Smart Contract : Aspetti Giuridici E Tecnologici**, Single Cycle Degree in Law, University of Bologna
- *Thesis supervisor and teaching assistant*, **Blockchain and Cryptocurrencies**, Master Degree in Computer Science and Master Degree in Artificial Intelligence, University of Bologna

A.Y. 2019/2020 | University of Bologna
› *Thesis supervisor and teaching assistant*, **Peer-to-Peer Systems**, Master Degree in Computer Science, University of Bologna

## Publications

### Journal Articles

[1] **M. Zichichi**, S. Ferretti, and G. D'Angelo, "A framework based on distributed ledger technologies for data management and services in intelligent transportation systems," *IEEE Access*, pp. 100384–100402, 2020.

[2] **M. Zichichi**, L. Serena, S. Ferretti, and G. D'Angelo, "Complex queries over decentralised systems for geodata retrieval," *IET Networks*, pp. 1–16, 2022.

[3] **M. Zichichi**, S. Ferretti, G. D'Angelo, and V. Rodríguez-Doncel, "Data governance through a multi-dlt architecture in view of the gdpr," *Cluster Computing*, pp. 1–28, 2022.

[4] **M. Zichichi**, S. Ferretti, and V. Rodríguez-Doncel, "Decentralized personal data marketplaces : How participation in a dao can support the production of citizen-generated data," *Sensors*, pp. 1–31, 2022.

[5] **M. Zichichi**, L. Serena, S. Ferretti, and G. D'Angelo, "Indamul : Incentivized data mules for opportunistic networking through smart contracts and decentralized systems," *Distributed Ledger Technologies : Research and Practice*, pp. 1–23, 2023.

[6] **M. Zichichi**, G. D'Angelo, S. Ferretti, and M. Marzolla, "Accountable clouds through blockchain," *IEEE Access*, pp. 1–18, 2023.

[7] N. Pocher, **M. Zichichi**, F. Merizzi, M. Z. Shafiq, and S. Ferretti, "Detecting anomalous cryptocurrency transactions : An aml/cft application of machine learning-based forensics," *Electronic Markets*, pp. 1–17, 2023.

[8] **M. Zichichi** and V. Rodriguez-Doncel, "Encoding of media value chain processes through blockchains and mpeg-21 smart contracts for media," *IEEE MultiMedia*, pp. 1–15, 2023.

### Book Chapters

[9] **M. Zichichi**, S. Ferretti, and G. D'Angelo, *Handbook on Blockchain*, ch. Blockchain-based Data Management for Smart Transportation, pp. 1–29. Springer Nature, 2022.

### Conference Proceedings

[10] **M. Zichichi**, M. Contu, S. Ferretti, and G. D'Angelo, "Likestarter : a smart-contract based social DAO for crowdfunding," in *Proc. of the IEEE INFOCOM 2019 - IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)*, pp. 313–318, IEEE, 2019.

[11] **M. Zichichi**, V. Rodríguez-Doncel, and S. Ferretti, "The use of decentralized and semantic web technologies for personal data protection and interoperability," in *AI Approaches to the Complexity of Legal Systems XI-XII*, pp. 328–335, Springer International Publishing, 2021. GDPR Compliance - Theories, Techniques, Tools, co-located with the 32nd International Conference on Legal Knowledge and Information Systems (JURIX), December 2019, Madrid Spain.

[12] **M. Zichichi**, "Location privacy and inference in online social networks," in *Proc. of the Seventh JURIX 2019 Doctoral Consortium, co-located with the 32nd International Conference on Legal Knowledge and Information Systems (JURIX)*, no. 2598 in CEUR Workshop Proceedings, (Aachen), pp. 1–10, 2019.

[13] **M. Zichichi**, S. Ferretti, and G. D'Angelo, "A distributed ledger based infrastructure for smart transportation system and social good," in *Proc. of the 2020 IEEE 17th Annual Consumer Communications & Networking Conference (CCNC)*, pp. 1–6, IEEE, 2020.

[14] **M. Zichichi**, M. Contu, S. Ferretti, and V. Rodríguez-Doncel, "Ensuring personal data anonymity in data marketplaces through sensing-as-a-service and distributed ledger," in *Proc. of the 3rd Distributed Ledger Technology Workshop, co-located with ITASEC 2020*, no. 2580 in CEUR Workshop Proceedings, (Aachen), pp. 1–16, 2020.

[15] **M. Zichichi**, S. Ferretti, and G. D'Angelo, "On the efficiency of decentralized file storage for personal information management systems," in *Proc. of the 25th IEEE Symposium on Computers and Communications (ISCC)*, pp. 1–6, IEEE, 2020.

[16] **M. Zichichi**, S. Ferretti, and G. D'Angelo, "Are Distributed Ledger Technologies Ready for Intelligent Transportation Systems?," in *Proc. of the 3rd Workshop on Cryptocurrencies and Blockchains for Distributed Systems (CryBlock), co-located with the 26th Annual International Conference on Mobile Computing and Networking (MobiCom)*, pp. 1–6, ACM, 2020.

[17] B. Distefano, N. Pocher, and **M. Zichichi**, "MOATcoin : Exploring Challenges and Legal Implications of Smart Contracts Through a Gamelike DApp Experiment," in *Proc. of the 3rd Workshop on Cryptocurrencies and Blockchains for Distributed Systems (CryBlock), co-located with the 26th Annual International Conference on Mobile Computing and Networking (MobiCom)*, pp. 1–6, ACM, 2020.

[18] **M. Zichichi**, S. Ferretti, G. D'Angelo, and V. Rodríguez-Doncel, "Personal data access control through distributed authorization," in *Proc. of the 2020 IEEE 19th International Symposium on Network Computing and Applications (NCA)*, pp. 1–4, IEEE, 2020.

[19] **M. Zichichi**, S. Ferretti, and G. D'Angelo, "Movo : a dapp for dlt-based smart mobility," in *Proc. of the 30th IEEE International Conference on Computer Communications and Networks (ICCCN)*, pp. 1–6, IEEE, 2021.

[20] **M. Zichichi**, L. Serena, S. Ferretti, and G. D'Angelo, "Towards decentralized complex queries over distributed ledgers : a data marketplace use-case," in *Proc. of the 30th IEEE International Conference on Computer Communications and Networks (ICCCN)*, pp. 1–6, IEEE, 2021.

[21] L. Serena, **M. Zichichi**, G. D'Angelo, and S. Ferretti, "Simulation of dissemination strategies on temporal networks," in *Proc. of the 2021 Annual Modeling and Simulation Conference (ANNSIM)*, pp. 1–12, Society for Modeling and Simulation International (SCS), 2021.

[22] **M. Zichichi**, L. Serena, S. Ferretti, and G. D'Angelo, "Governing decentralized complex queries through a DAO," in *Proc. of the Conference on Information Technology for Social Good (GoodIT)*, pp. 1–6, ACM, 2021.

[23] L. Serena, **M. Zichichi**, G. D'Angelo, and S. Ferretti, "Simulation of hybrid edge computing architectures," in *Proc. of the 2021 IEEE/ACM 25th International Symposium on Distributed Simulation and Real Time Applications (DS-RT)*, pp. 1–8, IEEE, 2021.

[24] L. Yu, **M. Zichichi**, R. Markovich, and A. Najjar, "Argumentation in trust services within a blockchain environment," in *Proc. of the 33rd Benelux Conference on Artificial Intelligence (BNAIC) and the 30th Belgian Dutch Conference on Machine Learning (BENELEARN)*, pp. 1–21, 2021.

[25] L. Yu, **M. Zichichi**, R. Markovich, and A. Najjar, "Enhancing Trust in Trust Services : Towards an Intelligent Human-input-based Blockchain Oracle (IHiBO)," in *Proc. of the 55th Hawaii International Conference on System Sciences (HICSS)*, pp. 1–10, 2022.

[26] L. Yu, **M. Zichichi**, R. Markovich, and A. Najjar, "Intelligent Human-input-based Blockchain Oracle (IHiBO)," in *Proc. of the 14th International Conference on Agents and Artificial Intelligence (ICAART)*, pp. 1–12, SCITEPRESS, 2022.

[27] N. Pocher and **M. Zichichi**, "Towards CBDC-based Machine-to-Machine Payments in Consumer IoT," in *Proc. of the 37th ACM/SIGAPP Symposium on Applied Computing (SAC)*, pp. 1–8, 2022.

[28] **M. Zichichi**, L. Serena, S. Ferretti, and G. D'Angelo, "Incentivized Data Mules Based on State-Channels," in *Proc. of the 2022 IEEE International Conference on Blockchain and Cryptocurrency (ICBC)*, pp. 1–2, 2022.

[29] A. Li, L. Serena, **M. Zichichi**, S.-K. Tang, G. D'Angelo, and S. Ferretti, "Modelling of the Internet Computer Protocol Architecture : the Next Generation Blockchain," in *Proc. of the 4th International Congress on Blockchain and Applications (Blockchain 22)*, pp. 1–10, 2022.

[30] L. Serena, **M. Zichichi**, G. D'Angelo, and S. Ferretti, "On the modeling of p2p systems as temporal networks : a case study with data streaming," in *Proc. of the 2022 Annual Modeling and Simulation Conference (ANNSIM)*, pp. 1–12, Society for Modeling and Simulation International (SCS), 2022.

[31] **M. Zichichi**, L. Serena, S. Ferretti, and G. D'Angelo, "DLT-based Data Mules for Smart Territories," in *Proc. of the 31st International Conference on Computer Communications and Networks (ICCCN 2022)*, pp. 1–7, 2022.

[32] G. Bigini, **M. Zichichi**, E. Lattanzi, S. Ferretti, and G. D'Angelo, "Decentralized Health Data Distribution : a DLT-based Architecture for Data Protection," in *Proc. of the 5th IEEE International Conference on Blockchain (IEEE Blockchain 2022)*, pp. 1–7, 2022.

[33] S. Casale-Brunet, **M. Zichichi**, L. Hutchinson, M. Mattavelli, and S. Ferretti, "The impact of nft profile pictures within social network communities," in *Proc. of the Conference on Information Technology for Social Good (GoodIT)*, pp. 1–11, ACM, 2022.

[34] L. Serena, A. Li, **M. Zichichi**, G. D'Angelo, S. Ferretti, and S.-K. Tang, "Simulation of the internet computer protocol : the next generation multi-blockchain architecture," in *Proc. of the 2022 IEEE/ACM 26th International Symposium on Distributed Simulation and Real Time Applications (DS-RT 2022)*, pp. 1–8, IEEE, 2022.

[35] M. Rossini, **M. Zichichi**, and S. Ferretti, "Smart contracts vulnerability classification through deep learning," in *Proc. of the 20th ACM Conference on Embedded Networked Sensor Systems (SenSys 2022)*, pp. 1–2, ACM, 2022.

[36] N. Pocher, **M. Zichichi**, and S. Ferretti, "Aml/cft/cpf endeavors in the crypto-space : From blockchain analytics to machine learning," in *Proc. of Selected Papers of the Workshop on Artificial Intelligence Governance Ethics and Law (AIGEL 2022)*, pp. 1–10, Ceur, 2022.

[37] G. Bigini, **M. Zichichi**, E. Lattanzi, S. Ferretti, and G. D'Angelo, "On the Decentralization of Health Systems for Data Availability : a DLT-based Architecture," in *Proc. of the 2023 IEEE 20th Annual Consumer Communications & Networking Conference (CCNC 2023)*, pp. 1–6, 2023.

[38] M. Rossini, **M. Zichichi**, and S. Ferretti, "On the use of deep neural networks for security vulnerabilities detection in smart contracts," in *Proc. of the 4th Workshop on Blockchain theoRy and ApplicatIoNs (BRAIN 2023), co-located with the 21nd International Conference on Pervasive Computing and Communications (PerCom 2023)*, pp. 1–6, IEEE, 2023.

[39] F. Barbara, **M. Zichichi**, S. Ferretti, and C. Schifanella, "A decentralized data sharing framework based on a key-redistribution method," in *Proc. of the 5th Distributed Ledger Technology Workshop*, pp. 1–16, Ceur, 2023.

[40] **M. Zichichi**, C. Bomprezzi, G. Sorrentino, and M. Palmirani, "Protecting digital identity in the metaverse : the case of access to a cinema in decentraland," in *Proc. of the 5th Distributed Ledger Technology Workshop*, pp. 1–16, Ceur, 2023.

[41] M. Bonini, **M. Zichichi**, S. Ferretti, and G. D'Angelo, "Proof of location through a blockchain agnostic smart contract language," in *Proc. of the 1st Workshop on Fintech and Decentralized Finance (FiDeFix), co-located with the 43rd IEEE International Conference on Distributed Computing Systems (ICDCS 2023)*, pp. 1–6, IEEE, 2023.

[42] E. Fazzini, **M. Zichichi**, S. Ferretti, and G. D'Angelo, "Keyword-based multimedia data lookup in decentralized systems," in *Proc. of the 2023 International Conference on Information and Communication Technologies for Disaster Management (ICT-DM)*, pp. 1–6, IEEE, 2023.

[43] F. Barbara, **M. Zichichi**, S. Ferretti, and C. Schifanella, "Dlt-based personal data access control with key-redistribution," in *Proc. of the 2023 Fifth International Conference on Blockchain Computing and Applications (BCCA)*, pp. 1–8, IEEE, 2023.

[44] L. Gigli, F. Montori, **M. Zichichi**, L. Bedogni, S. Ferretti, and M. Di Felice, "On the decentralization of mobile crowdsensing in distributed ledgers : an architectural vision," in *Proc. of the Proc. of the 2024 IEEE 21th Annual Consumer Communications & Networking Conference (CCNC 2024)*, pp. 1–7, IEEE, 2024.

## Projects

### [desp3d] The PhD Thesis Software Repository 2022

github.com/stars/miker83z/lists/phd-thesis

A set of software modules that support the work behind the PhD thesis.

Personal Data Space | Decentralized Indexing | Distributed Authorization | Policy Based Access Control | Self-Sovereign Identity

### TruDaMul Smart Contracts 2021

github.com/miker83z/TruDaMul

TruDaMul is a decentralized application that combines the use of Distributed Ledger Technologies and Decentralized File Storages, mostly for verifying the correct behavior of all the participants and to incentivize them in Data Mule-based communications.

Data Mule | Ethereum | Smart Contracts | Payment Channels | Protocol

### Reference Software for ISO/IEC 21000-23 Smart Contracts for Media 2021

github.com/miker83z/desp3d-policy-dlt-manager

Implementation of the ISO/IEC 21000-23 standard specification. The aim of the Smart Contracts for Media standard is to provide the means (e.g., application programming interfaces) for converting MPEG media contracts, that codify intellectual property (IP) rights, to smart contracts that can be executed on existing DLT environments. It is composed of conversion modules, smart contracts, demo and APIs.

ISO/IEC | Ethereum | Smart Contracts | Non Fungible Tokens | MPEG | Ontologies

### Intelligible Identity and Certificate 2020-2021

github.com/miker83z/desp3d-intelligible-packages

Implementation of the Intelligible models for verifying the authenticity of digital certificates and online identity assertions, namely Intelligible Identity and Intelligible Certificate, based on the use of DLTs, smart contracts and standards for mark-up and identification of legal documents.

Self-Sovereign Identity | Ethereum | ERC-721 | Non Fungible Tokens | Smart Contracts | Akoma Ntoso

### UMBRAL-RS 2020

github.com/miker83z/umbral-rs

Implementation of the Umbral threshold proxy re-encryption scheme, built with Rust by taking as reference the Python version (created by the original Umbral authors). Umbral consists of a Proxy Re-Encryption scheme, in which a data holder can delegate decryption rights to a data recipient for any encrypted text. A re-encryption process is performed by several semi-trusted proxies. When a threshold of these proxies participates by performing the re-encryption and creating some shares, the recipient is able to combine these independent re-encryption shares and decrypt the original message using his private key.

Cryptography | Proxy Re-Encryption | Rust | Threshold Scheme

### MOVO 2019

github.com/miker83z/movoApp

MOVO is a decentralized application (dApp) for smart mobility. The dApp consists of an Android application intended for use inside a vehicle, which helps the user/driver collect contextually generated data (e.g. a driver's stress level, an electric vehicle's battery level), which can then be shared through the use of Distributed Ledger Technology (i.e., IOTA DLT and Ethereum smart contracts) and Decentralized File Storage (i.e., IPFS). The third module consists of an implementation of a communication channel that, via Wi-Fi Direct, allows two devices to exchange data and payment information with respect to DLT (i.e., cryptocurrency and token) assets.

Android | IOTA | Ethereum | Solidity | Truffle | Ganache | Wi-Fi Direct | Javascript | Node | React Native

### LIKESTARTER 2018 - 2019

github.com/miker83z/LikeStarterContracts

LikeStarter is a blockchain-based decentralized platform that combines social interactions with crowdfunding mechanisms, allowing any user to raise funds while becoming popular in the social network. Being built over the Ethereum blockchain, it is structured as a Decentralized Autonomous Organization (DAO), that fosters crowdfunding without the intervention of any central authority, and recognizes the active role of donors, enabling them to support artists or projects, while making profits.

Ethereum | Solidity | Truffle | Ganache | Web3 API | Python | Javascript | Docker | Django | Node | Express | React

In compliance with the GDPR and the Italian Legislative Decree no. 196 dated 30/06/2003, I hereby authorize the receiver of this document to use and process my personal details contained in it

Palermo, December 2023

Mirko Zichichi