InSecTT Newsletter July 2022

Welcome!

This is the **July 2022 edition** of the InSecTT newsletter, highlighting news & achievements from InSecTT during Q2 2022.

Please distribute this newsletter to all interested parties in your organization. We appreciate your feedback, please send comments or requests to Insectt@v2c2.at.

Enjoy the reading!

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InSecTT at IoT Week 2022

Jun 20, 2022

InSecTT Project Coordinator Michael Karner (Virtual Vehicle) will present the InSecTT project and give a talk about "Bringing Internet of Things and Artificial Intelligence together – But is it Trustworthy?" at IoT Week 2022 taking place in Dublin, Ireland. Join us at 23-June 11:00 in session "Identity, trust and privacy in an intelligent, smart IoT World. Challenges and outcomes - Session 2: AI and ML technologies as enablers for a more secure IoT", organized by projects ERATOSTHENES and ARCADIAN-IoT.

# Interference tracking and prediction in wireless sensor networks

Jun 16, 2022

In the scope of Silicon Austria Labs work on interference tracking and prediction in wireless sensor networks, their researchers have implemented methods to track active Bluetooth Low Energy (BLE) connections over time and predict future collisions with the own network. By listening to only one BLE channel the algorithm is able to reconstruct the connection parameters of all active BLE connections with low-cost HW, which is definitely beyond state of the art. The targeted applications are:

- Improve coexistence with other communication standards by avoiding access to the channel at predicted collisions.
- Follow active BLE connections and sniff the exchanged data (while it is not needed to be present at the initialization of the BLE connection).
- Instead of jamming the whole 2.4 GHz ISM band, apply synchronized jamming with the possibility to only disturb certain links or nodes.

If you are interested on this topic, example measurements of sniffed BLE connections are published as open-source dataset in:

Julian Karoliny, Thomas Blazek, Hans-Peter Bernhard, & Andreas Springer. (2022). InSecTT BLE Channel Sniff Dataset. https://doi.org/10.5281/zenodo.6523365

BLE sniffer
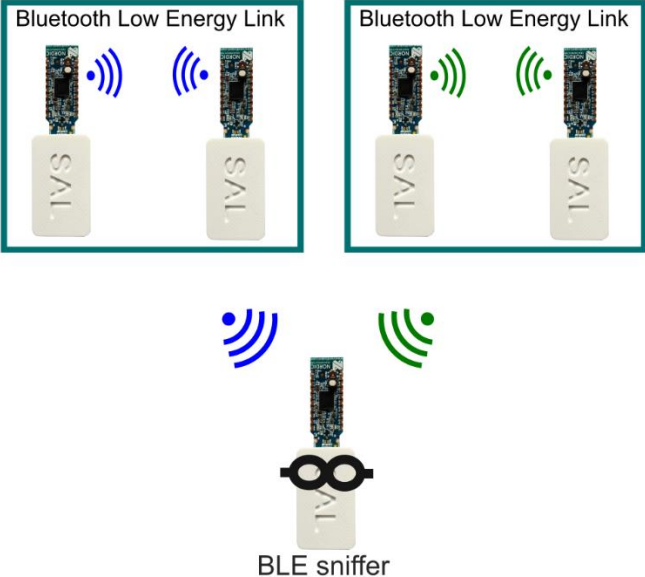
Distributed Channel Monitoring

Jun 15, 2022

Silicon Austria Labs is working on a distributed channel monitoring solution that is capable to measure interference directly as a real part of an industrial sensor network. The work is being developed as part of the Use-Case 3: Wireless Security Testing Environment for smart IoT in the #InSecTT project. This low cost solution (requires minimum and low cost hardware) enables to evaluate interference caused by other networks/devices, find unusual (intended) interference behavior due to malicious devices, track inference, perform predictions on future channel access and apply counter measures for own network.
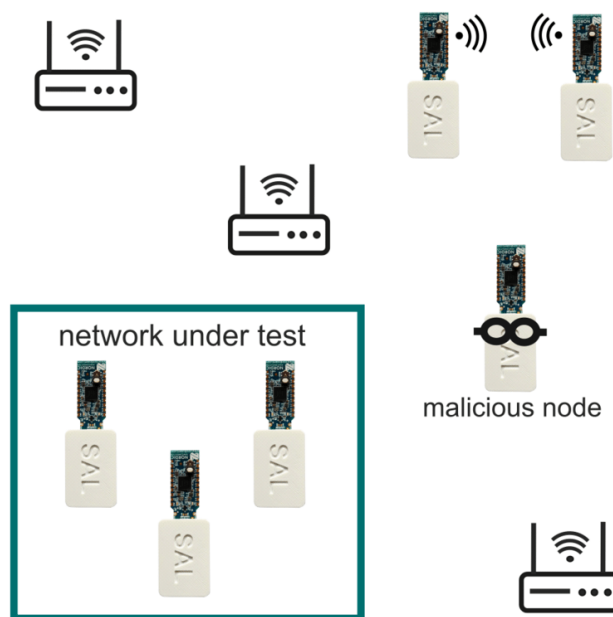
Optimal Wireless Network Structures

Jun 14, 2022

As part of the Building Block BB3.4 in the InSecTT project, Silicon Austria Labs is working together with Gdansk University of Technology in developing an algorithm that finds the best network structure by minimizing latency and maximizing SNR. This solution is based on QoS criteria and considers a switched beam ESPAR antenna developed by researchers at GUT. The algorithm provides a hierarchical structure of the network sorted in layers of relay nodes, where each relay node is capable to operate either in omnidirectional or directional mode.

The results indicate that by utilizing a directional mode with just as low as two switching beams can reduce the number of layers by 65% and still maintain the same QoS criteria. This solution can be especially beneficial in delay-critical applications. See more about this topic on our recent publication "Relay-Aided Wireless Sensor Network Discovery Algorithm for Dense Industrial IoT Utilizing ESPAR Antennas" published in IEEE Internet of Things Journal.
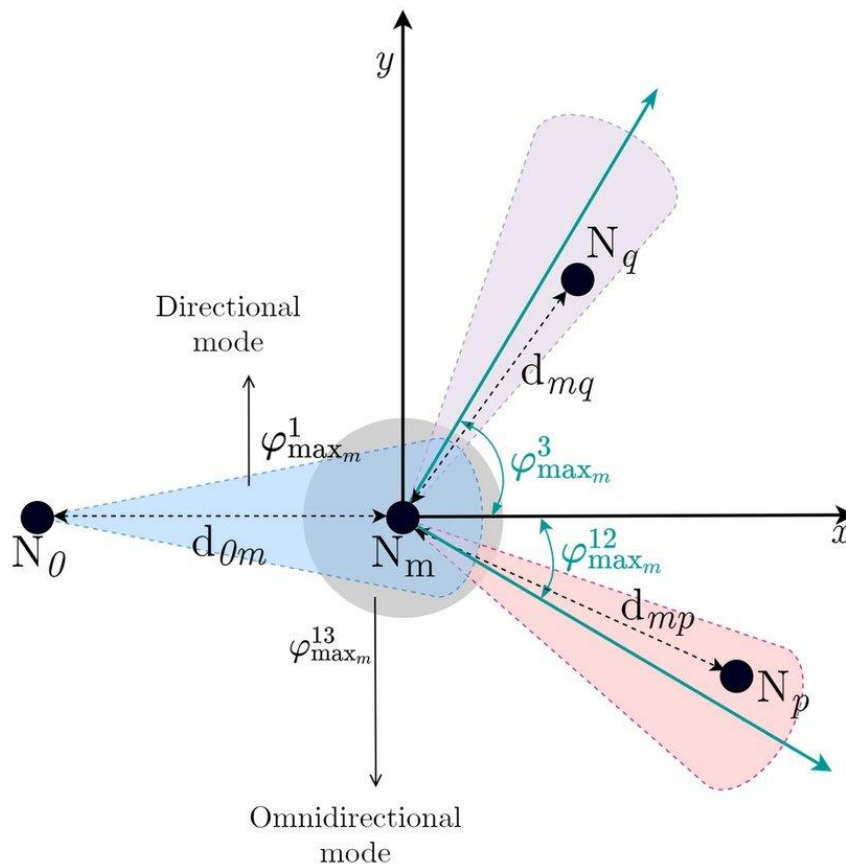
Multi Hypothesis Interference Tracking algorithm

Jun 13, 2022

Silicon Austria Labs (SAL) is working on Multi Hypothesis Interference Tracking algorithm that is capable to detect and track periodic interference in a wireless channel. The main goal is to find different sources of interference and distinguish them by their channel access behavior. If the channel access is not random, which is for example the case for many low-power and synchronized WSNs, it will show a certain pattern, e.g., periodic channel access. This allows to detect and synchronize to these patterns which are then used to identify the source of interference, estimate the transmission frequency, predict future channel access, avoid collisions with own network.
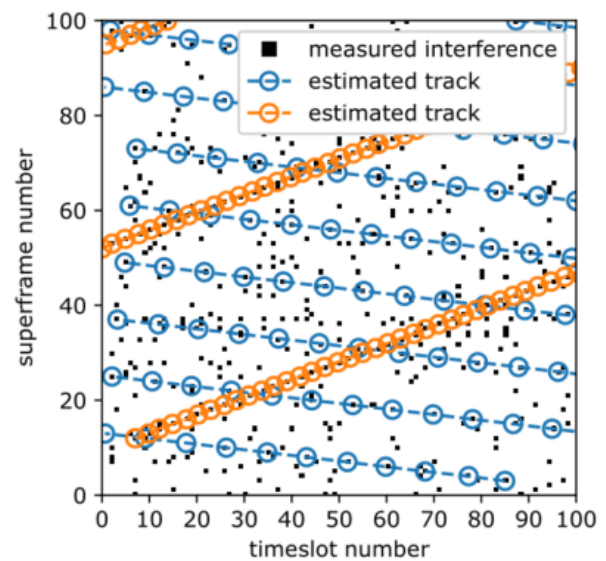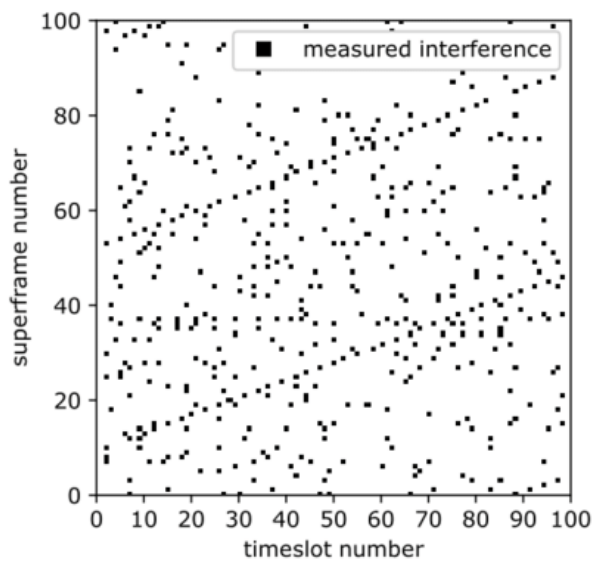
How can Artificial Intelligence help in Driver Distraction Detection?

Jun 3, 2022

RISE Research Institutes of Sweden is leading a use case on "Driver Monitoring and Distraction Detection using Artificial Intelligence" in the InSecTT project. Researchers from RISE are working together with EU partners from industry, research and academia to provide a solution to improve driver distraction detection processes in order to reduce risks and accidents. Technical challenges include: (a) labelling driving distraction data efficiently without compromising privacy, (b) predicting distractions in real-time depending on edge computing.

ICSSIM – A Framework for Building Industrial Control Systems Security Simulation Testbeds

Jun 1, 2022

ICSSIM framework (Developed by "#RISE" in #InSecTT Project) is to simulate customized virtual Industrial Control Systems (ICS) security testbeds, which facilitates attack/threat investigation. Through ICSSIM, realistic details and high-fidelity ICS testbeds are produced that are extendable, versatile, reproducible, low-cost, and comprehensive. (Link: https://github.com/AlirezaDehlaghi/ICSSIM)

The Docker container technology is used in ICSSIM, which enables realistic network simulation and isolates the ICS components on private kernels for a private operating system. As well as reducing the time spent developing ICS components, ICSSIM also enables physical process modeling using software and hardware.

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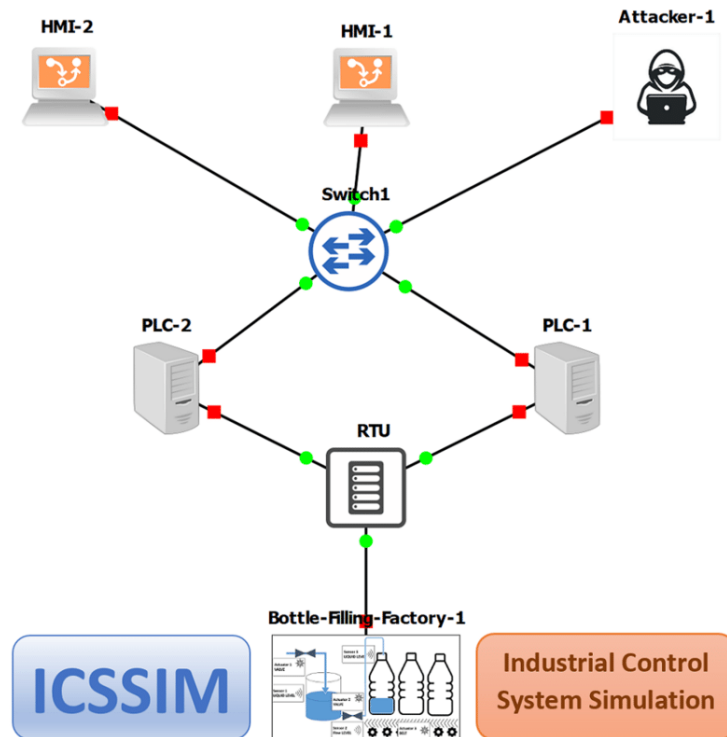
Intrusion Detection for Industrial Control Systems

May 25, 2022

Interested in knowing how #Artificial_Intelligence could contribute to Industrial Control Systems (#ICS) safety and security? Check out our paper " Digital Twin-based Intrusion Detection for Industrial Control Systems," recently published in the 2022 IEEE International Conference on Pervasive Computing and Communications Workshops and other Affiliated Events.

This paper presents "#RISE" Contributions to the "#InSecTT" Project, building up a digital twin-based security framework for industrial control systems and extending its capabilities for simulation of attacks and defense mechanisms.
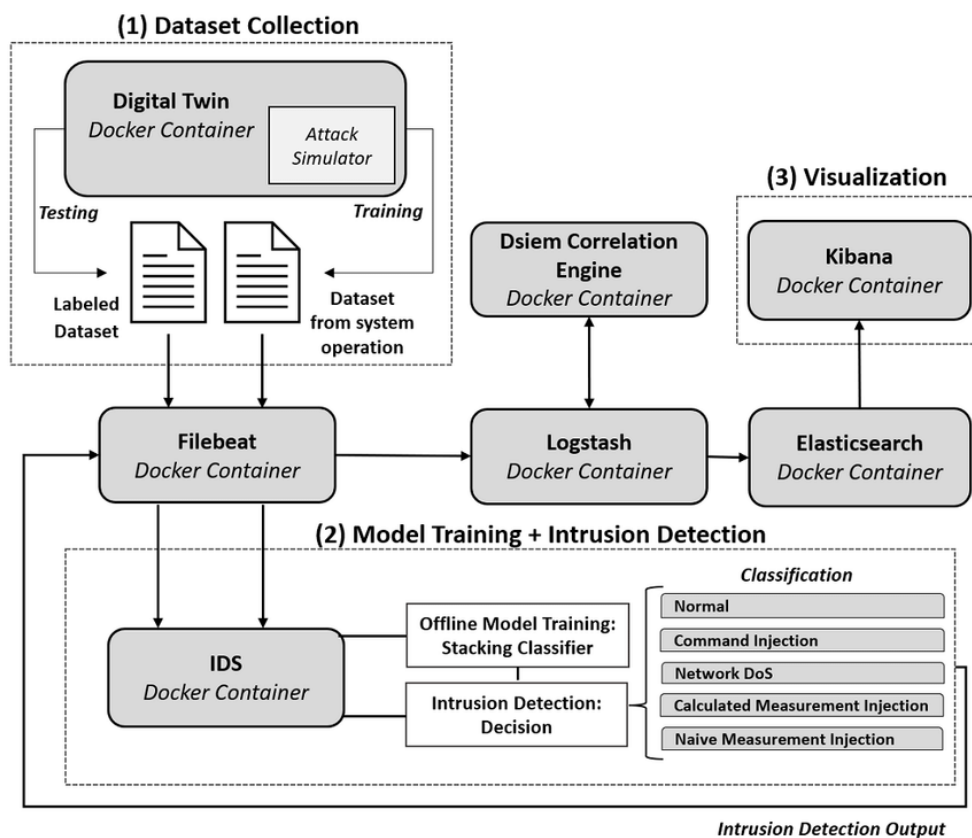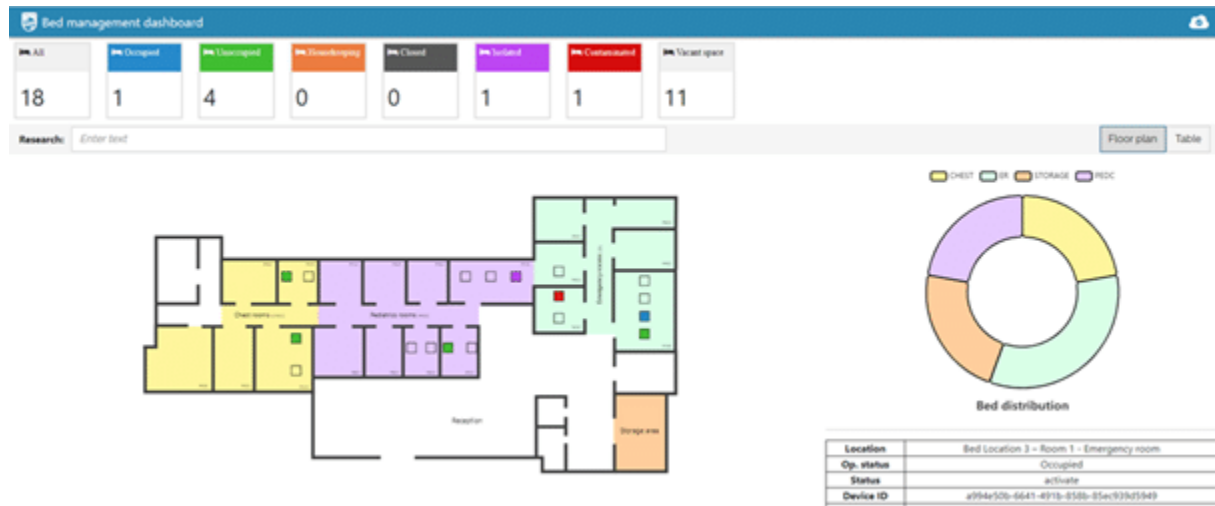
Hospital Asset Management

May 10, 2022

Within the InSecTT project Philips Research Eindhoven works on the improvement of hospital asset management solutions using AI and IoT. The concept demonstrator (under development) will demonstrate an end-to-end implementation suitable to be deployed in a healthcare environment.

An integrated dashboard calls the RESTful API of various subsystems (length-of-stay prediction, vital signs monitors, …) to fetch associated patient data in a JSON format. A floorplan on the dashboard can show the location and status of each asset (e.g. bed) based on the FHIR operational status of the location resource. A smart IoT device is used to update the status and location in an automated way using proximity technologies. Technical challenges include:

- Reduction of manual data entry using smart IoT sensors to update status and location.
- Integration of subsystems in a (FHIR) standardized way.
- Security and safety of patient's and personnel's data

See also: https://www.philips.co.uk/healthcare/consulting/clinical-operational-excellence/performanceflow.

Location awareness in healthcare

May 9, 2022

Philips Research Eindhoven is leading a use-case on "Location awareness for improved outcomes and efficient care delivery in healthcare" in the InSecTT project. Experts from Philips Research together with EU partners from both universities and industry are working together on providing new and improved solutions for tracking of casualties in Mass Casualty Incidents (MCI) and valuable or critical assets on a hospital campus.

Technical challenges include:

- Providing location information both indoor and outdoor without local network infrastructure such as Wi-Fi or Bluetooth.
- Combining indoor and outdoor localization technologies both on IoT device and dashboard side.

InSecTT Podcast #5 is online: Markus Pistauer from CISC Semiconductors on trustworthy IoT

May 5, 2022

In this episode, Anamarija talks with Markus Pistauer, CEO of CISC Semiconductors. Markus explains his vision for trustworthy, intelligent IoT, and how this will shape our future. We also hear some thoughts on how collaboration in such a large project works.

https://podcasts.apple.com/at/podcast/markus-pistauer-from-cisc-on-trustworthy-iot/id1605747720?i=1000559698763

Innovative Logistics IoT Device for Healthcare

May 5, 2022

Within the InSecTT project, Philips Research Eindhoven has developed a **logistics IoT device** with GPS for outdoor localization, a tricolor LED for indicating triage status and cellular (LTE-M) communication for having bi-directional connection to a cloud server anytime and anywhere.
An NFC tag (or QR code) on the device allows for linking the battery operated IoT device to a patient, a caregiver or a hospital asset. The programmable IoT device supports TCP, UDP or HTTPS protocol using the standardized geoJSON format (RFC 7946) to report the device's location. In the absence of a GPS signal the device will report its location based on the nearest cell location. The device is being used for concept evaluation in health care use-cases. Technical challenges include:

- Improving battery-life for asset tracking purposes.
- Improving localization accuracy in the presence of high buildings.
- Handling transitions from indoor to outdoor and v.v.

Improving a hospital workflow

May 3, 2022

Philips Research Eindhoven is leading a use-case on "Smart and adaptive connected solutions across health continuum" in the InSecTT project. Experts from Philips Research together with EU partners from both universities and industry are working together on providing an AI and IoT driven solution to improve a hospital workflow in order to reduce length-of-stay (LOS) and healthcare costs. Technical challenges include:

- Predicting LOS based on patient and hospital data
- Concept IoT sensors to obtain real time information reflecting the ground truth that exists at a hospital floor.
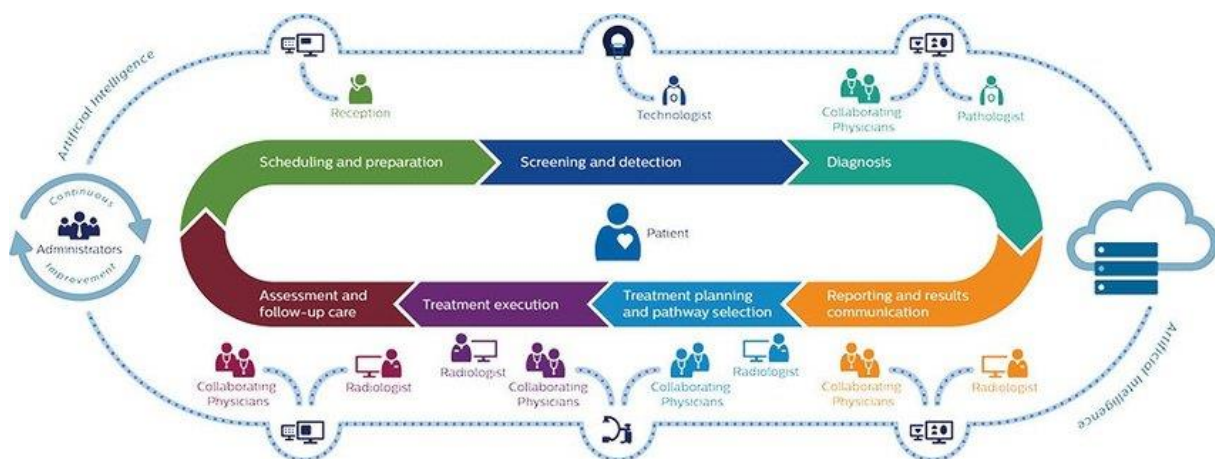
Now available: InSecTT Podcast #4

Apr 23, 2022

In this Podcast, Peter (substituting for Anamarija) interviews Ramiro Robles from ISEP.

What is a "high level architecture"? How is it used in such a large project like InSecTT? And why is trustworthy, intelligent IoT important for airplanes? Ramiro has the answers....

see https://podcasts.apple.com/at/podcast/ramiro-robles-from-isep-portugal/id1605747720?i=1000558443683

White Paper: NXP Ethical Framework for Artificial Intelligence

Apr 6, 2022

Interested in #explainable-AI techniques? Read the #whitepaper from NXP Netherlands on Ethical framework and European directives: THE MORALS OF ALGORITHMS

https://www.nxp.com/docs/en/white-paper/AI-ETHICAL-FRAMEWORK-WP.pdf