WhizniumSBE And WhizniumDBE

Project Portfolio

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FOR INTERNAL USE

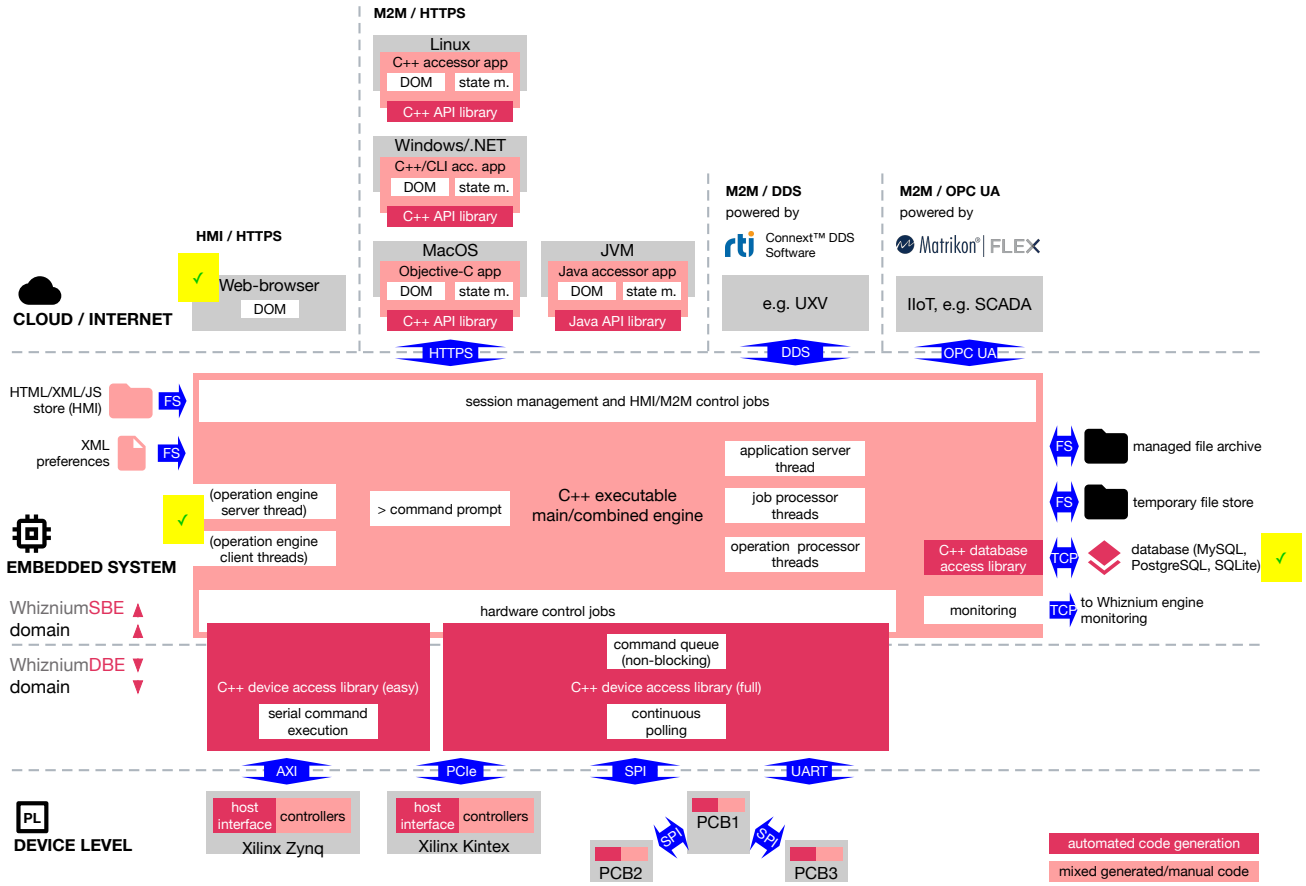
BeamRelay

Use publicly available flight schedule data to determine the feasibility of multi-hop relayed all-optical ground-to-{airliner/ground} communications

Implementation: pre-MPSI (2012-2014)
Type: private project of founder
Revenue: -
References:
NASA/ICNS conference contribution https://www.researchgate.net/publication/263009853_Global_coverage_of_multi-hop_free-space_optical_ground-to-airliner_data_links
technical flyer https://www.mpsitech.com/wp-content/uploads/2018/03/beamrelay.pdf

In a private effort and out of curiosity, the task was to determine the feasibility of using commercial airplanes as relay stations for free-space optical communication e.g. for high-speed on-board internet access. Features of the underlying software tool include:

- reading and analyzing airline timetable information into a database
- calculating mutual visibilities airports/airplanes and airplanes/airplanes using a parallelized geometrical algorithm
- establishing possible communication relay paths
- accumulating statistics
- graphical result output



✓ seed project for this functionality

✓ crucial functionality for this project

WhizniumSBE

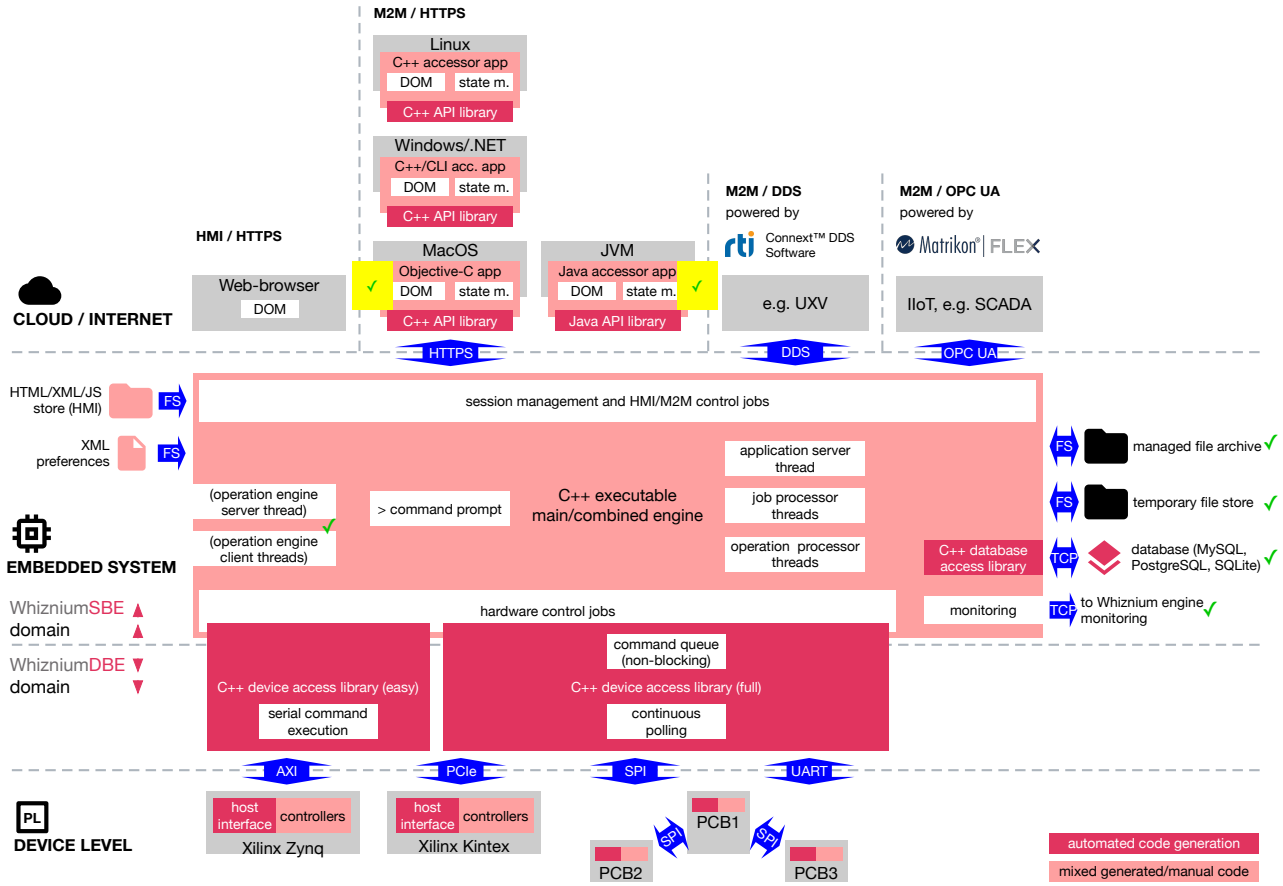
Process model-based descriptions of (mainly) embedded systems software to automatically generate and iterate the corresponding source code tree

Implementation: 2008-
Type: MPSI's main product
Revenue: (indirect)
References:
technical flyer https://www.mpsitech.com/products/whiznium-sbe
aws Cloud installation (old) https://www.mpsitech.cloud:13106/web/CrdWznmStart/CrdWznmStart_testdrive.html

WhizniumSBE with its extensive database modelling & distributed execution capabilities is perfectly suited to tackle a complex project … such as WhizniumSBE itself.

The automated API library generation (native MacOS and Java) greatly helps to provide the end-user (of WhizniumSBE) with comfortable „five-clicks-per-iteration" tool access.

WhizniumSBE writes C++, SQL, HTML, JavaScript and Java source code along with Makefiles / shell scripts.



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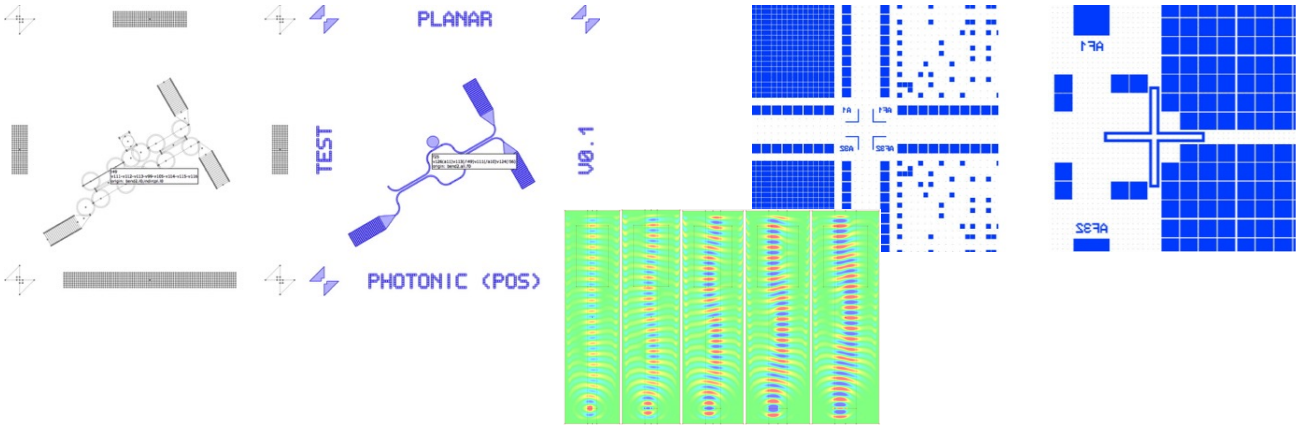
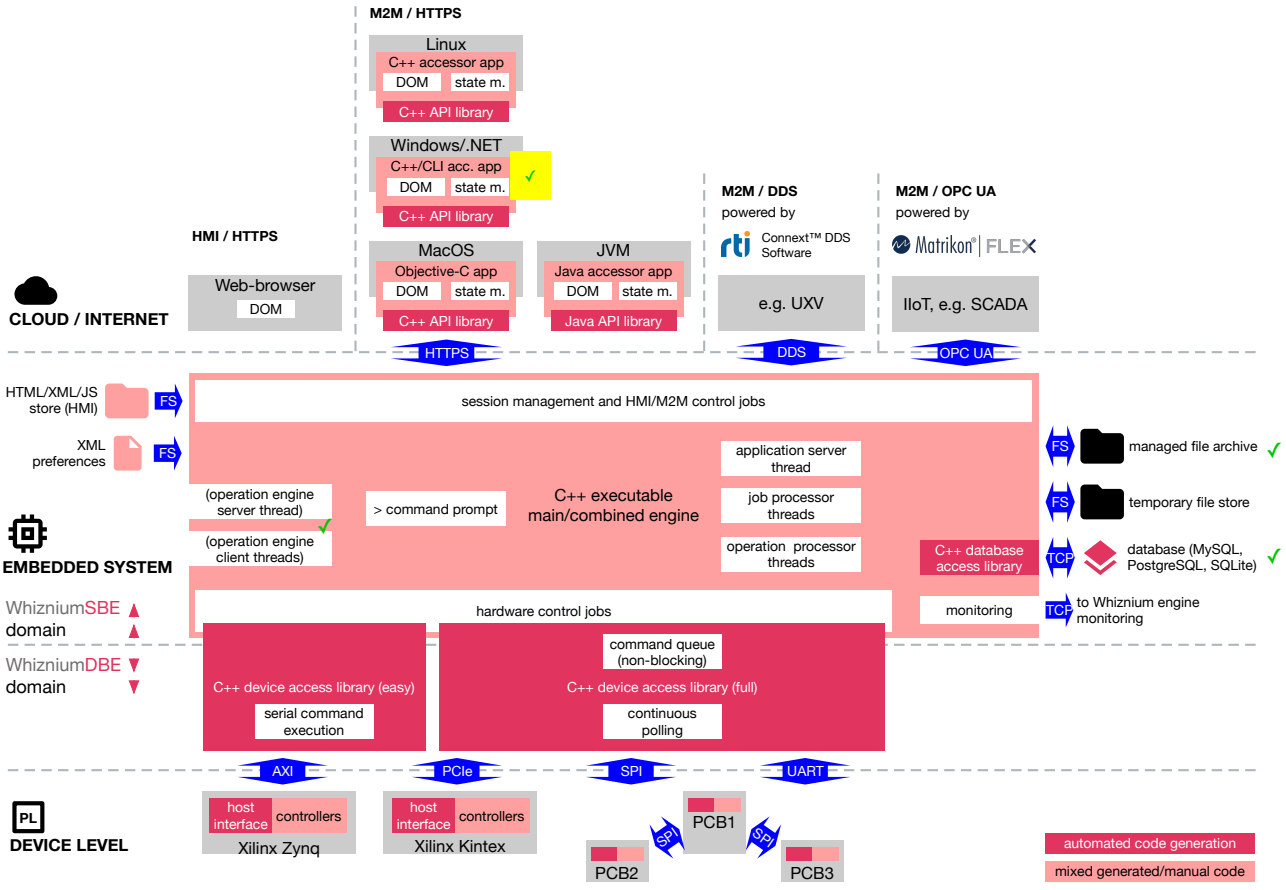
Planar

Integrated solution to parametrically generate designs for photolithography (context: micro-/ optoelectronics) and run electronic/photonic simulations on them

Implementation: pre-MPSI (2008-2012), 2017-
Type: helper tool e.g. for ICARUS project (see below), re-use of parts for customer nextnano
Revenue: €15k to date
References:
nextnano.QCL simulation result video https://www.nextnano.com/applications/quantum_cascade_laser.php





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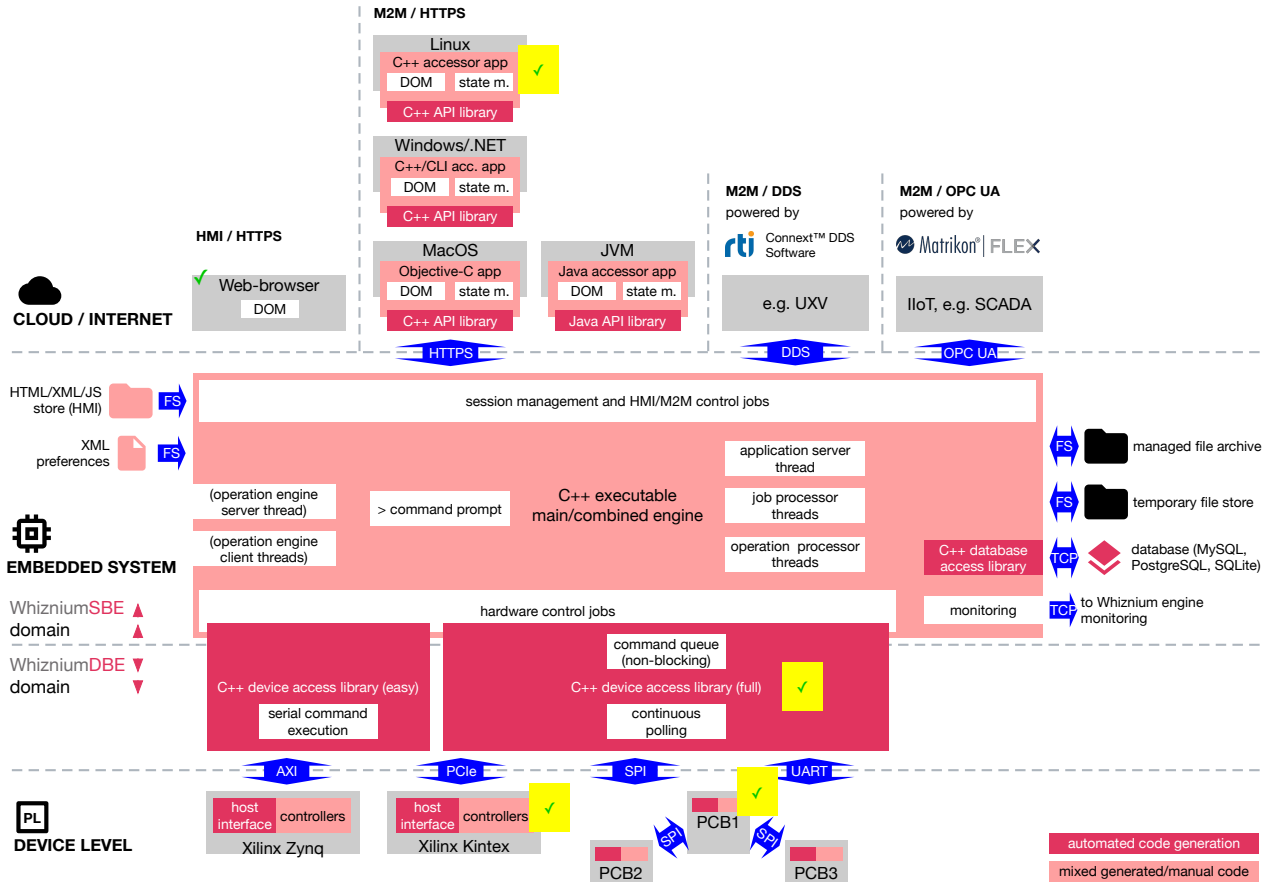
ICARUS Detector

Combine the information from two cameras, a thermal imager and a specialized 8x8 pixel detector and deliver the data to a robotic control system

Implementation: pre-MPSI (2012-2016)
Type: FP7 EU project with 25 partners, 6 partners in detector context
Revenue: -
References:
project homepage http://www.fp7-icarus.eu
technical flyer https://www.mpsitech.com/wp-content/uploads/2018/03/icarus.pdf

Within a European Commission funded robotics project for Search and Rescue by the name of ICARUS, the task at hand was to design a complex detector system featuring:

- two cameras and stereo vision
- a thermal imager
- auxiliary functionalities of actuation (tilt/pan), high-power LED illumination and a modulated laser pointer
- custom hardware (FPGA among others) along with gumstix/ARM embedded computer



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WhizniumDBE

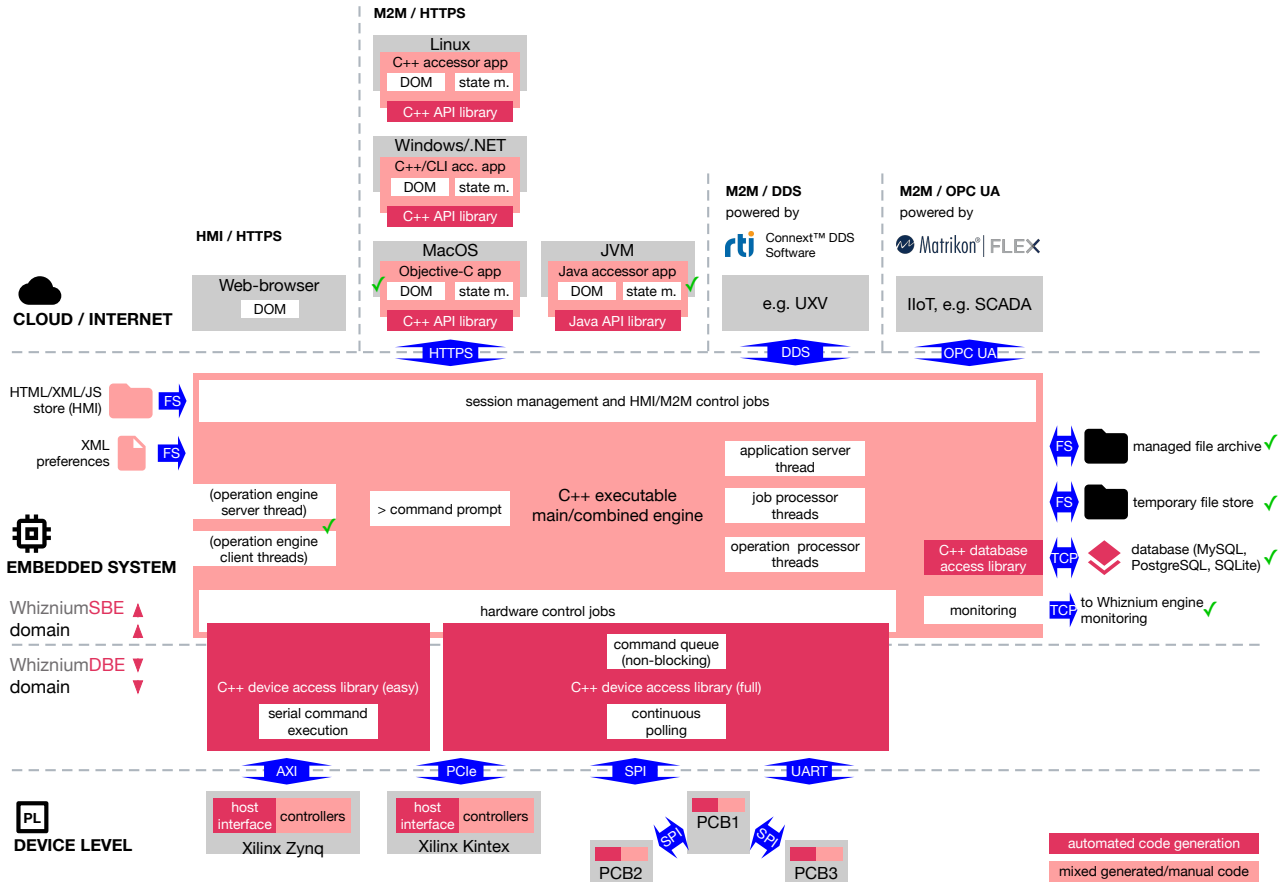
Process model-based descriptions of programmable logic (FPGA) systems to automatically generate and iterate the corresponding source codes

Implementation: 2015-
Type: MPSI's second product
Revenue: (indirect)
References:
technical flyer https://www.mpsitech.com/products/whiznium-dbe
aws Cloud installation (old) https://www.mpsitech.cloud:13105/web/CrdWdbeStart/CrdWdbeStart_testdrive.html

As with WhizniumSBE, WhizniumDBE is implemented as a WhizniumSBE project.

WhizniumDBE writes C++ and VHDL source code along with Makefiles / shell scripts.

Deployment options include on-premise (container-based) and amazon's aws cloud.



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FabSight

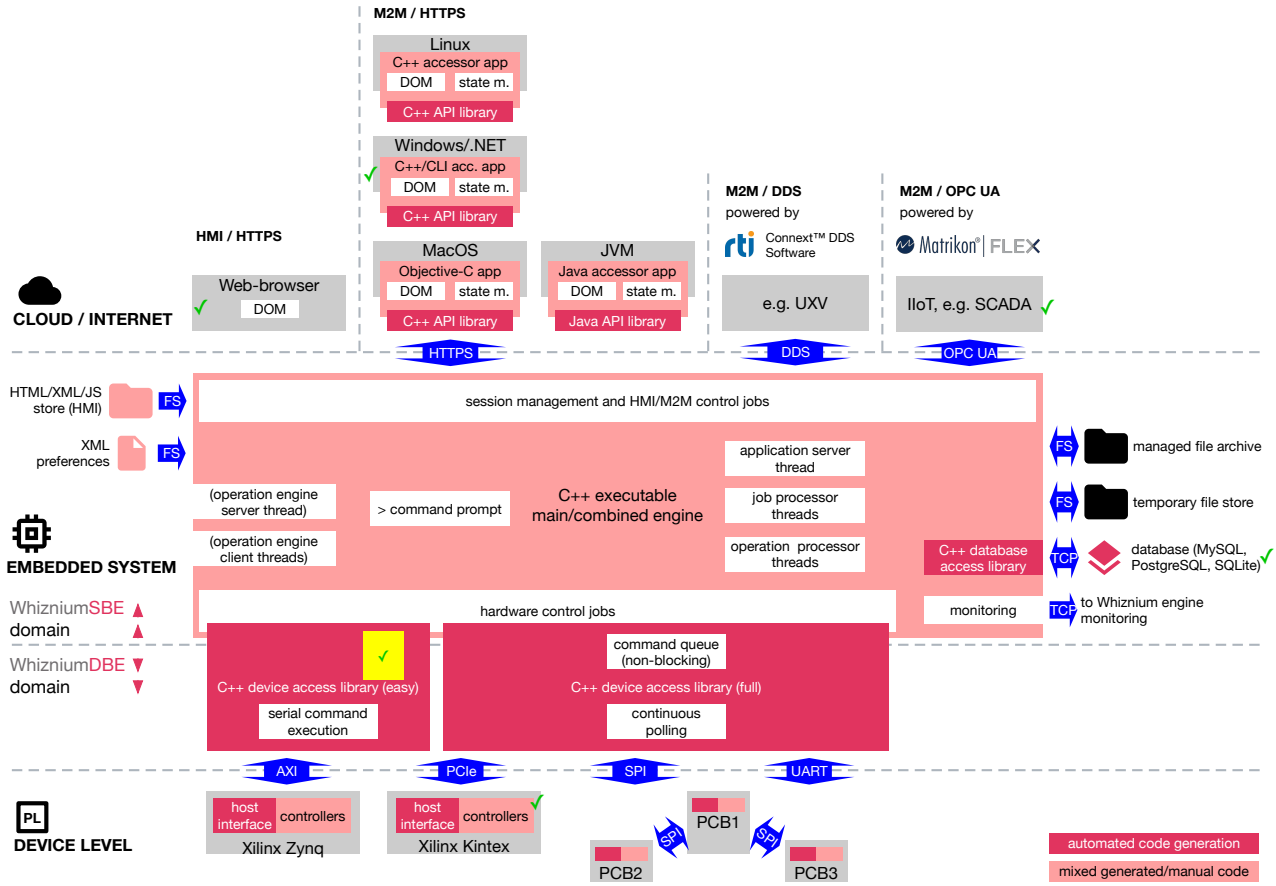
Non-invasively measure the current flow (mains side) into industrial appliances and derive insights from that data

Implementation: 2017-2018
Type: use case for collaborative effort with Holsten, PULS Power and Alexander Thamm
Revenue: -
References:
technical flyer https://www.mpsitech.com/wp-content/uploads/2018/03/fabsight.pdf
YouTube video https://youtu.be/Z-NvdSHfAvM

A typical IIoT application is to continuously monitor a machine's operation parameters on the factory floor in order to determine its state and health. Higher-level applications such as predictive maintenance furthermore require the aggregation of data for many machines over long periods of time in the cloud.

Our demo application FabSight shows how this can be done using the Whiznium tools. Highlights of the project include:

- an FPGA board configured as oscilloscope with peak detection and FFT, processing current and voltage (I/V) on the supply line of a mobile beer cooling box
- a data model on the edge computer which allows to store raw data and insights derived from them
- simple machine learning for the interpretation of I/V traces and spectra
- multiple connectivity options for the edge-based tool to receive additional known process parameters via software and to display live data through a web-based HMI
- the cloud-based counterpart to the edge device database which can be used for periodic synchronization via its API



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Multi-spectral detector

Testbed derived from the ICARUS detector with the goal of showcasing as many WhizniumSBE/DBE features in action as possible

Implementation: 2018
Type: technology testbed (internal, used for trade shows as well)
Revenue: -
References:
technical flyer M2M https://www.mpsitech.com/wp-content/uploads/2018/08/M2M-communication.pdf
code walkthrough https://www.mpsitech.com/wp-content/uploads/2018/09/Thermal-Imager-Data-Path.pdf

MPSI's modular vision demonstrator can be re-configured from low-cost (e.g. ZedBoard and USB webcams) to high end (e.g. Minnowboard Turbot, Xilinx Kintex and industrial GigE cameras), and everything in between. Its features include:

- two cameras
- a thermal imager
- a modulated laser pointer mounted on a tilt/pan unit
- high-power LED's and accelerometer

Functionalities such as stereo imaging, sensor fusion and visual feature tracking using the laser pointer can be implemented.

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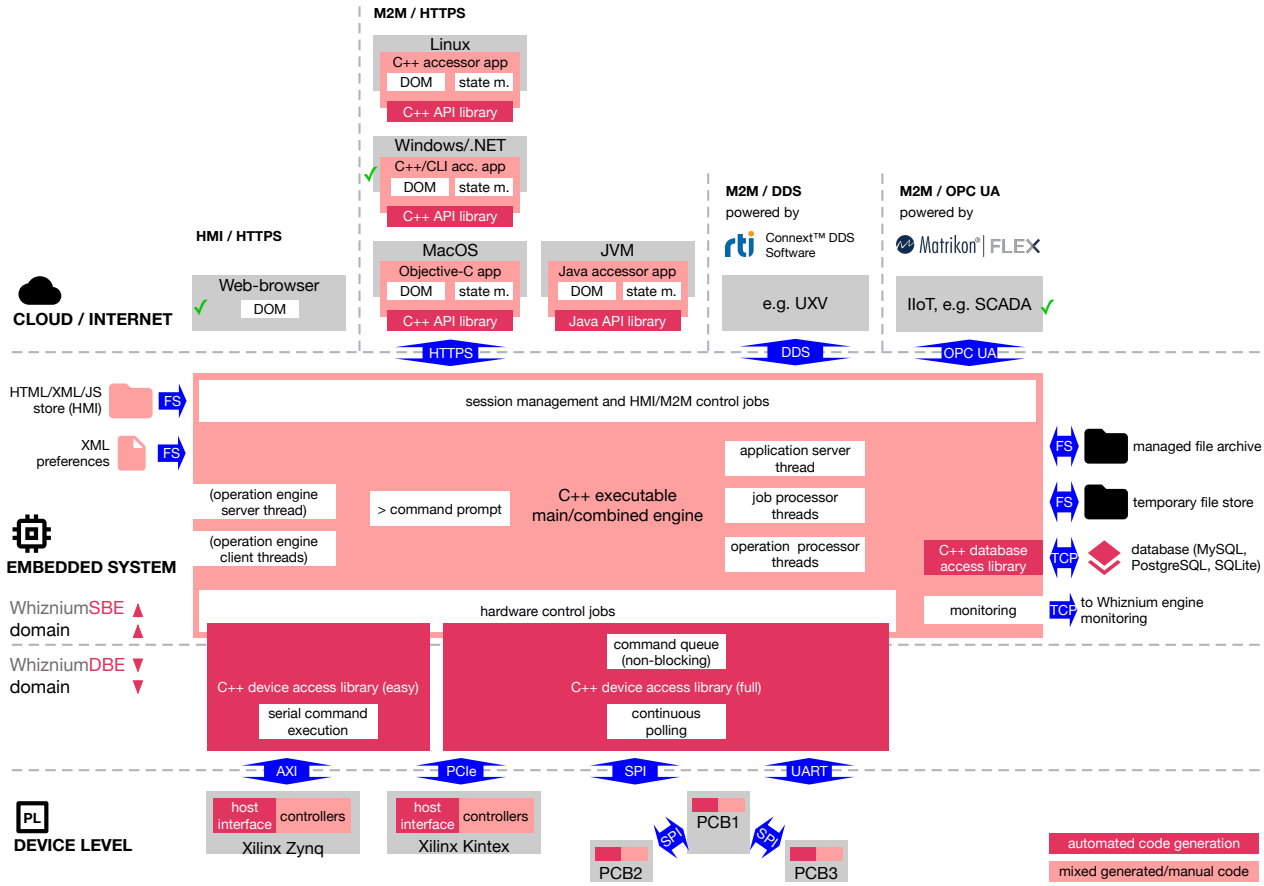
OPC UA Connector

Provide legacy manufacturing equipment with OPC UA connectivity

Implementation: 2019
Type: use case for Klingelnberg
Revenue: - (for now)
References:

Klingelnberg is a renowned manufacturer of gear production machines.

In an effort to help them comply with the OPC UA companion specification “umati“, we implemented a corresponding Windows-based software tool connecting to their pre-existing machine control software using Whiznium “in no time“.



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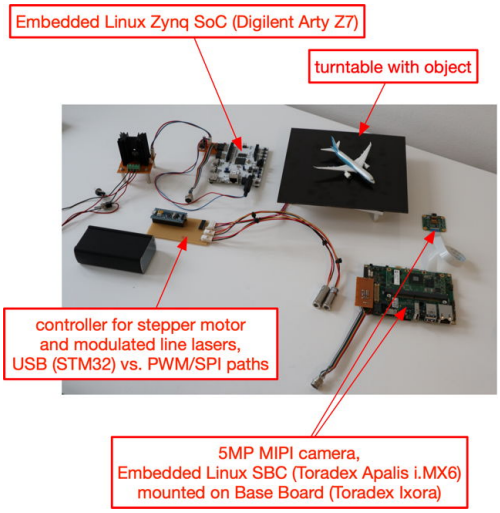
Starter Kit

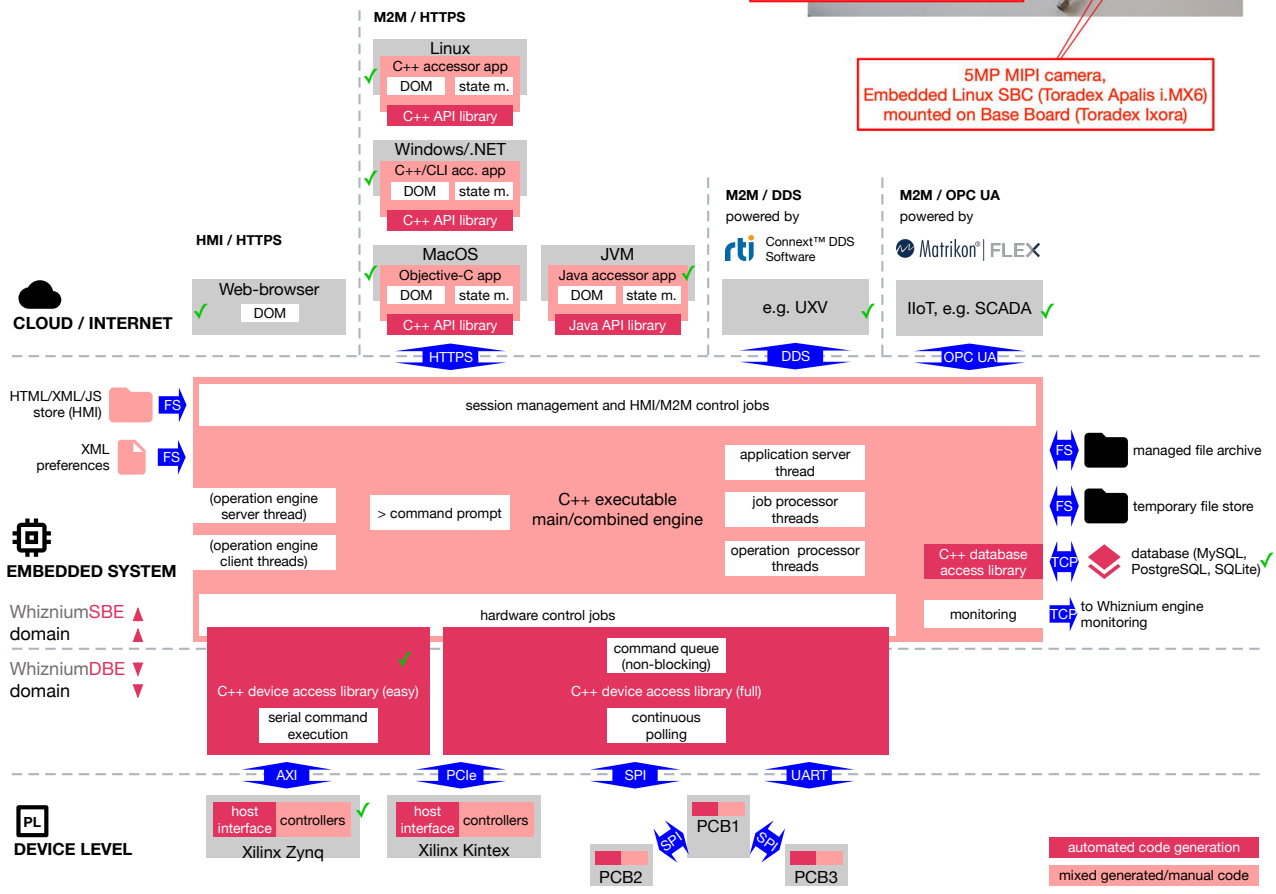
Facilitate Whiznium on-boarding by offering a complex example embedded system with fun functionality to embedded software developers

Implementation: 2019
Type: product for marketing purposes
Revenue: €500/kit
References:

Experience from first attempts to market Whiznium to customers directly (SaaS, no additional services by MPSI involved) shows a certain restraint which is related to the learning curve associated with using a new development tool. To address this issue pro-actively, we are currently developing a starter kit around a tabletop 3D laser scanner in three configurations:

- FPGA: using the well-known Digilent Arty Z7 development board, image processing takes place largely in programmable logic
- Embedded: Toradex, supplier of single-board-computers for embedded systems (same audience as MPSI's) agrees to provide their Ixora/Apalis products to make a Embedded Linux version of the starter kit
- Workstation: no embedded involved - focus on cloud connectivity and data analysis





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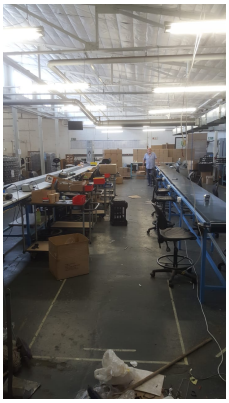
Sonnenglas Companion

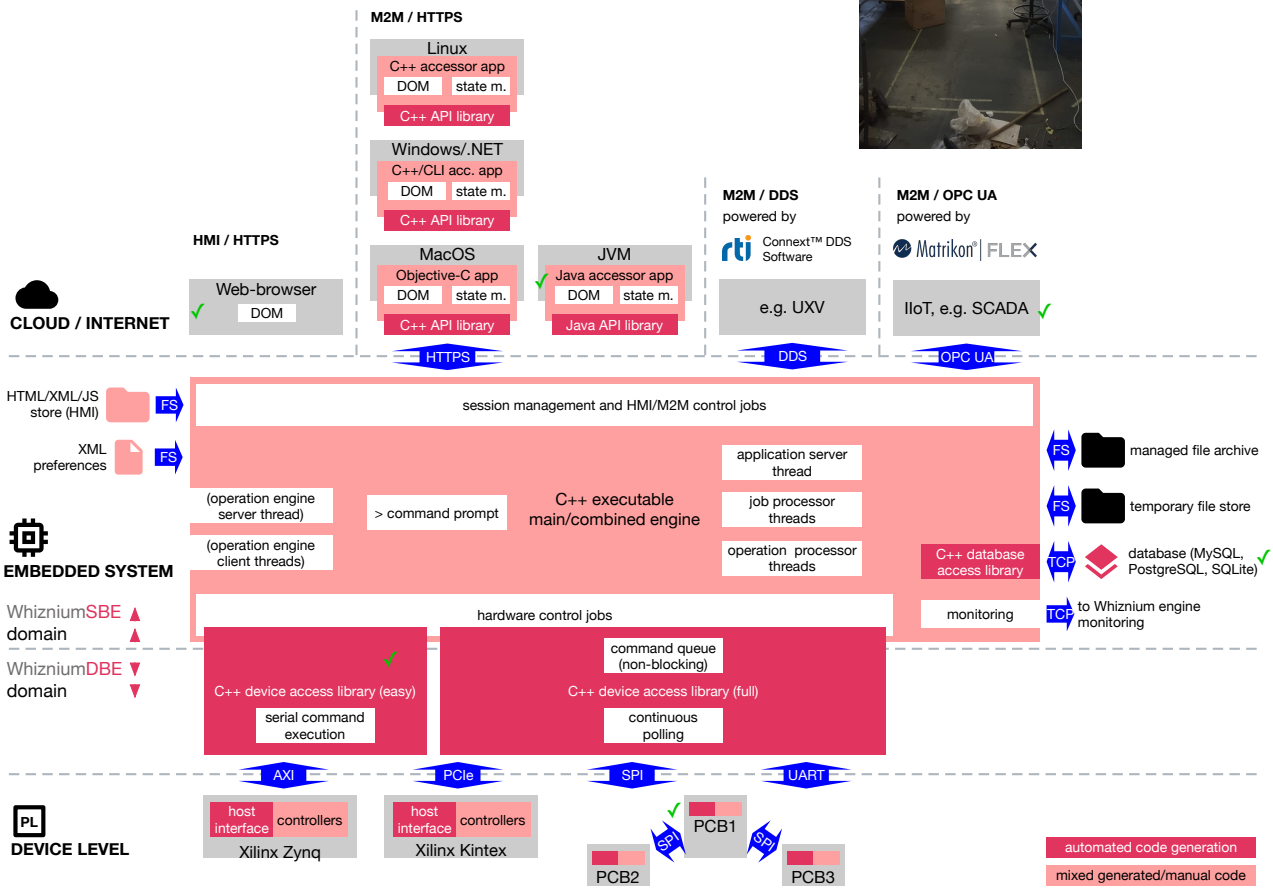
End-of-production-line calibration for popular solar-powered consumer product and lifecycle quality control

Implementation: 2019
Type: project for Sonnenglas
Revenue: €20k (projected)
References:
Sonnenglas home page: https://sonnenglas.net/de

The Consol Solar Jar (manufactured in South Africa) and its non-African market "Sonnenglas" derivate have become a popular lifestyle objects with cumulated sales exceeding 2m pieces. Future versions of the gadget will be calibrated at the factory using an embedded hardware device which communicates with the Sonnenglas' micro controller via light pulses directed at its solar panel.

The corresponding embedded software, along with a database-backed quality control / tracking tool (installation on-premise in Johannesburg with worldwide remote access) is under development using both Whiznium tools.





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