europass

Maxim Van de Wynckel

Date of birth: 10/03/1995 | **Nationality:** Belgian | **Gender:** Male | **Phone number:** (+32) 489861848 (Home) | **Email address:** me@maximvdw.be | **Website:** https://maximvdw.be | **Twitter:** https://twitter.com/MVdWSoftware | **ORCID:** https://orcid.org/0000-0003-0314-7107 | **LinkedIn:** https://linkedin.com/in/maximvdw | **Google Scholar:** https://scholar.google.com/citations?user=NB6760YAAAAJ | **GitHub:** https://github.com/Maximvdw | **Mastodon:** https://mas.to/@maximvdw | **Address:** Invalidenlaan 178/5, 1160, Oudergem, Belgium (Home)

ABOUT ME

I am a software engineer and researcher with a passion for interoperable and privacy-aware systems.

WORK EXPERIENCE

01/10/2019 – CURRENT Elsene, Belgium

UNIVERSITY TEACHING ASSISTANT AND RESEARCHER VRIJE UNIVERSITEIT BRUSSEL

6-year Ph.D grant on indoor positioning and interoperability. Teaching assistant for various Bachelor and Master courses.

Business or Sector Education | **Department** Department of Computer Science | **Address** Pleinlaan 2, 1050, Elsene, Belgium | **Email** maxim.van.de.wynckel@vub.be | **Website** https://vub.be

01/07/2019 – CURRENT Oudergem, Belgium

SOFTWARE CONSULTANT MVDW-SOFTWARE

Freelance software development and consultancy. Projects spanning from web development to IoT and AI implementation in business processes.

Business or Sector Information and communication | **Address** Invalidenlaan 178/5, 1160, Oudergem, Belgium | **Email** maxim@mvdw-software.com | **Website** https://mvdw-software.com

01/07/2018 – 31/07/2018 Edegem, Belgium

SOFTWARE ENGINEER CHEMSTREAM BV.

Development of chemical database software.

Address Drie Eikenstraat 661, 2650, Edegem, Belgium | **Website** https://chemstream.be

01/03/2016 – 30/04/2016 Edegem, Belgium

SOFTWARE ENGINEER CHEMSTREAM BV.

Maintenance of chemical database search by substructures.

Address Drie Eikenstraat 661, 2650, Edegem, Belgium | **Website** https://chemstream.be

01/09/2015 – 30/09/2015 Edegem, Belgium

SOFTWARE ENGINEER CHEMSTREAM BV.

Development and maintenance of chemical database software.

Address Drie Eikenstraat 661, 2650, Edegem, Belgium | **Website** https://chemstream.be

01/04/2015 – 30/04/2015 Edegem, Belgium
SOFTWARE ENGINEER CHEMSTREAM BV.

Migration from Access database to Web-based chemical database software.

Address Drie Eikenstraat 661, 2650, Edegem, Belgium | **Website** https://chemstream.be

01/08/2014 – 31/08/2014 Edegem, Belgium
SOFTWARE ENGINEER CHEMSTREAM BV.

Development of PHP and MySQL based chemical database software.

Address Drie Eikenstraat 661, 2650, Edegem, Belgium | **Website** https://chemstream.be

01/02/2016 – 31/05/2016 Jette, Belgium
SOFTWARE DEVELOPER INTERNSHIP UZ BRUSSEL

Development of QR-code based appointment system. Google Fit integration for patients. Healthcare software development.

Address Laarbeeklaan 101, 1090, Jette, Belgium | **Website** https://uzbrussel.be/

01/10/2015 – 31/12/2015 Evergem, Belgium
SOFTWARE DEVELOPER INTERNSHIP BITPOWER BV.

eID cloud authentication Bachelor thesis preparatory training.

Address 9940, Evergem, Belgium | **Website** https://www.nieuwsblad.be/cnt/dmf20150604_01714431

01/08/2015 – 30/09/2015 Evergem, Belgium
SOFTWARE DEVELOPER BITPOWER BV.

eID cloud authentication and security penetration testing.

Address 9940, Evergem, Belgium | **Website** https://www.nieuwsblad.be/cnt/dmf20150604_01714431

01/07/2014 – 31/07/2014 Humbeek, Belgium
SOFTWARE DEVELOPER VDW-CONSULTING BV.

Web UI for print management software.

Address Dijkstraat 17, 1851, Humbeek, Belgium | **Website** https://vdw-consulting.com/

01/07/2013 – 31/08/2015 Humbeek, Belgium
SOFTWARE DEVELOPER VDW-CONSULTING BV.

File server deployment and print job submitting in C#.

Address Dijkstraat 17, 1851, Humbeek, Belgium | **Website** https://vdw-consulting.com/

EDUCATION AND TRAINING

01/10/2019 – CURRENT Elsene, Belgium
PHD, COMPUTER SCIENCE Vrije Universiteit Brussel

Address Pleinlaan 2, 1050, Elsene, Belgium | **Website** https://www.vub.be/en | **Level in EQF** EQF level 8 |

Thesis Interoperable and Discoverable Indoor Positioning Systems

01/10/2018 – 01/07/2019 Elsene, Belgium

MASTER OF SCIENCE (MSC), APPLIED COMPUTER SCIENCE Vrije Universiteit Brussel

Parallelism, distributed systems, multicore programming (Java, Erlang and GPU with OpenCL), software security and Indoor navigation master thesis.

Address Pleinlaan 2, 1050, Elsene, Belgium | **Website** https://www.vub.be/en | **Final grade** magna cum laude |

Level in EQF EQF level 7 | **Type of credits** ECTS | **Number of credits** 60 | **Thesis** Indoor Navigation by Centralized Tracking

01/10/2016 – 01/07/2018 Elsene, Belgium

BRIDGING PROGRAM, COMPUTER SCIENCE Vrije Universiteit Brussel

Bridging program from professional bachelor to academic bachelor.

Address Pleinlaan 2, 1050, Elsene, Belgium | **Website** https://www.vub.be/en | **Type of credits** ECTS | **Number of credits** 60

01/10/2013 – 01/07/2016 Anderlecht, Belgium

BACHELOR (BA), APPLIED COMPUTER SCIENCE Erasmushogeschool Brussel

Software Security, Software Development (Java, C++, C#, Objective-C), Agile development.

Address Nijverheidskaai 170, 1070, Anderlecht, Belgium | **Website** https://www.erasmushogeschool.be/en |

Final grade magna cum laude | **Level in EQF** EQF level 6 | **Type of credits** ECTS | **Number of credits** 180 |

Thesis eID IO - Applicatie Besturing

LANGUAGE SKILLS

Mother tongue(s): **DUTCH**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C2	C2	C2	C2	C2
FRENCH	B1	B1	B1	B1	B1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

DIGITAL SKILLS

Research

Semantic interoperability | Web Semantic and Linked Data | Indoor robot navigation | Localization and Positioning

PUBLICATIONS

2024

Towards Distributed Intelligent Tutoring Systems Based on User-owned Progress and Performance Data

The use of recommendation engines to personalise students' learning experiences can be beneficial by providing them with exercises tailored to their knowledge. However, the use of these systems often comes at a cost. Most learning or tutoring systems require the data to be stored locally within a proprietary database, limiting learners' freedom as they move across different systems during their learning journey. In addition, these systems might potentially cause additional stress, as the learner might feel observed without knowing who has access to their learning progress and performance data. We propose a solution to this problem by decentralising learning progress and performance data in user-owned Solid Pods. We outline the proposed solution by describing how it might be applied to an existing environment for programming education that already includes research on how to align difficulty levels of exercises across different systems.

Malaise, Y., Van de Wynckel, M., & Signer, B. (2024, May). Towards Distributed Intelligent Tutoring Systems Based on User-owned Progress and Performance Data. Proceedings of SoSy 2024 (Poster), 2nd Solid Symposium, Leuven, Belgium, May 2024.

Link https://maximvdw.be/publications/2024/sosy2024yoshi/

2024

Discoverable and Interoperable Augmented Reality Environments Through Solid Pods

Augmented Reality (AR) environments are physical environments with virtual objects superimposed through AR-enabled devices. These virtual objects can range from simple aesthetic objects like pictures to superimposed contextual information about physical items. In most modern AR applications, the augmented spaces exist only for the user who created the environment or for proprietary applications that enable multi-user collaboration in the same environment. However, there is a lack of solutions that enable interoperable collaboration in these personal AR spaces, allowing users to share and contribute to an AR space. We propose a solution that enables users to create their personal AR space that can then be discovered by other users who are in physical proximity to this space, enabling them to view or contribute to the augmented space. In addition, we discuss a solution that utilises the same technique to create AR spaces that are bound to a specific room and can be discovered by users who are in close vicinity to these rooms.

Van de Wynckel, M., & Signer, B. (2024, May). Discoverable and Interoperable Augmented Reality Environments Through Solid Pods. Proceedings of SoSy 2024 (Poster), 2nd Solid Symposium, Leuven, Belgium, May 2024. https://events.vito.be/sosy2024

Link https://maximvdw.be/publications/2024/sosy2024maxim/

2024

FidMark: A Fiducial Marker Ontology for Semantically Describing Visual Markers

Fiducial markers are visual objects that can be placed in the field of view of an imaging sensor to determine its position and orientation, and subsequently the scale and position of other objects within the same field of view. They are used in a wide variety of applications ranging from medical applications to augmented reality (AR) solutions where they are applied to determine the location of an AR headset. Despite the wide range of different marker types with their advantages for specific use cases, there exists no standard to decide which marker to best use in which situation. This leads to proprietary AR solutions that rely on a predefined set of marker and pose detection algorithms, preventing interoperability between AR applications. We propose the FidMark fiducial marker ontology, classifying and describing the different markers available for computer vision and augmented reality along with their spatial position and orientation. Our proposed ontology also describes the procedures required to perform pose estimation, and marker detection to allow the description of algorithms used to perform these procedures. With FidMark we aim to enable future AR solutions to semantically describe markers within an environment so that third-party applications can utilise this information.

Van de Wynckel, M., Valadez, I., & Signer, B. (2024). FidMark: A Fiducial Marker Ontology for Semantically Describing Visual Markers. Proceedings of The Semantic Web (ESWC 2024), 235–250.

Links https://videolectures.net/videos/eswc2024_van_de_wynckel | https://maximvdw.be/publications/2024/eswc2024/

2023

SemBeacon: A Semantic Proximity Beacon Solution for Discovering and Detecting the Position of Physical Things

Discovering smart devices in the physical world often requires some type of indoor positioning system. Bluetooth Low Energy (BLE) beacons are a well-established technique to create scalable lowcost positioning systems for indoor navigation, tracking and location awareness. While various BLE specifications aim to provide a generic way to uniquely identify a beacon and optionally detect its location, they are either deployment specific or do not broadcast enough information to be used without a proprietary database containing the locations of installed beacons. We present a novel BLE advertising solution and semantic ontology extension called SemBeacon that is backwards compatible with existing specifications such as iBeacon, Eddystone and AltBeacon. With the help of a prototype application, we demonstrate how SemBeacon enables the creation of real-time positioning systems that can describe their location as well as the environment in which they are located. In contrast to Eddystone-URL beacons which were originally used in Google's Physical Web project to broadcast web pages of physical objects, SemBeacon is a specification for broadcasting semantic data about the environment and positioning systems that are available within a beacon's proximity using linked data.

Van de Wynckel, M., & Signer, B. (2023). SemBeacon: A Semantic Proximity Beacon Solution for Discovering and Detecting the Position of Physical Things. Proceedings of the 13th International Conference on the Internet of Things, 9–16.

Link https://maximvdw.be/publications/2023/iot2023/

2022

POSO: A Generic Positioning System Ontology

While satellite-based positioning systems are mainly used in outdoor environments, various other positioning techniques exist for different domains and use cases, including indoor or underground settings. The representation of spatial data via semantic linked data is well addressed by existing spatial ontologies. However, there is a primary focus on location data with its specific geographical context, but a lack of solutions for describing the different types of data generated by a positioning system and the used sampling techniques to obtain the data. In this paper we introduce a new generic Positioning System Ontology (POSO) that is built on top of the Semantic Sensor Network (SSN) and Sensor, Observation, Sample, and Actuator (SOSA) ontologies. With POSO, we provide missing concepts needed for describing a positioning system and its output with known positioning algorithms and techniques in mind. Thereby, we enable the improvement of hybrid positioning systems making use of multiple platforms and sensors that are described via the presented POSO ontology

Van de Wynckel, M., & Signer, B. (2022). POSO: A Generic Positioning System Ontology. The Semantic Web – ISWC 2022, 231–247.

Links https://openhps.org/publications/2022/5b3-Van de Wynckel-Video-MQ.mp4 | https://maximvdw.be/publications/2022/iswc2022/

2022

A Solid-based Architecture for Decentralised Interoperable Location Data

In today's technological world of privacy-conscious users, the tracking of individuals via different positioning systems and services can be considered obtrusive. Furthermore, linking and integrating data from these positioning systems is not always possible or requires the major effort of creating new interfaces between systems. In this paper, we propose an architecture for the realisation of a decentralised positioning system based on the W3C's Solid platform specification. Using this specification, sensor data as well as an individual's location information is stored in secure decentralised data stores called Pods, that are hosted by user-selected Pod providers. We demonstrate that these Pods do not only offer transparent and interoperable data stores for persisting sensor data as well as processed location information, but also aid in linking multiple positioning systems for high- and low-level sensor fusion. For indoor positioning, this interoperability provides a way to offer users a single location-based service while also providing additional semantic context for other positioning systems to improve their data output. Developers of indoor positioning systems can store all data in a format that is readable, understandable and accessible by any other system that their users might be using, enabling collaboration between researchers and companies implementing these indoor positioning systems.

Van de Wynckel, M., & Signer, B. (2022). A Solid-based Architecture for Decentralised Interoperable Location Data. Proceedings of the 12th International Conference on Indoor Positioning and Indoor Navigation (IPIN), CEUR Workshop Proceedings.

Links https://openhps.org/publications/2022/WiP65_MaximVandeWynckel.mp4 | https://maximvdw.be/publications/2022/ipin2022/

2021

Indoor Positioning Using the OpenHPS Framework

Hybrid positioning frameworks use various sensors and algorithms to enhance positioning through different types of fusion. The optimisation of the fusion process requires the testing of different algorithm parameters and optimal lowas well as high-level sensor fusion techniques. The presented OpenHPS open source hybrid positioning system is a modular framework managing individual nodes in a process network, which can be configured to support concrete positioning use cases or to adapt to specific technologies. This modularity allows developers to rapidly develop and optimise their positioning system while still providing them the flexibility to add their own algorithms. In this paper we discuss how a process network developed with OpenHPS can be used to realise a customisable indoor positioning solution with an offline and online stage, and how it can be adapted for high accuracy or low latency. For the demonstration and validation of our indoor positioning solution, we further compiled a publicly available dataset containing data from WLAN access points, BLE beacons as well as several trajectories that include IMU data.

Van de Wynckel, M., & Signer, B. (2021). Indoor Positioning Using the OpenHPS Framework. 2021 International Conference on Indoor Positioning and Indoor Navigation (IPIN), 1–8. https://doi.org/10.1109/IPIN51156.2021.9662569

Link https://maximvdw.be/publications/2021/ipin2021/

2021

OpenHPS: Single Floor Fingerprinting and Trajectory Dataset

This dataset contains fingerprint information of WLAN access points and BLE beacons with a known position and IMU sensor data. Data was collected on the floor of the Web and Information Systems Engineering (WISE) Lab at the VUB (Pleinlaan 9, 3rd floor) with 110 training reference points and 30 test data points. Each reference point was recorded for 20 seconds in four different orientations.

Van de Wynckel, M., & Signer, B. (2021). OpenHPS: Single Floor Fingerprinting and Trajectory Dataset. https://doi.org/10.5281/zenodo.4744380

Link https://maximvdw.be/publications/2021/dataset/

2020

OpenHPS: An Open Source Hybrid Positioning System

Positioning systems and frameworks use various techniques to determine the position of an object. Some of the existing solutions combine different sensory data at the time of positioning in order to compute more accurate positions by reducing the error introduced by the used individual positioning techniques. We present OpenHPS, a generic hybrid positioning system implemented in TypeScript, that can not only reduce the error during tracking by fusing different sensory data based on different algorithms, but also also make use of combined tracking techniques when calibrating or training the system. In addition to a detailed discussion of the architecture, features and implementation of the extensible open source OpenHPS framework, we illustrate the use of our solution in a demonstrator application fusing different positioning techniques. While OpenHPS offers a number of positioning techniques, future extensions might integrate new positioning methods or algorithms and support additional levels of abstraction including symbolic locations.

Van de Wynckel, M., & Signer, B. (2020). OpenHPS: An Open Source Hybrid Positioning System (WISE-2020-01). Vrije Universiteit Brussel. https://doi.org/10.48550/ARXIV.2101.05198

Links https://video.fosdem.org/2022/L.lightningtalks/lt_openhps.webm | https://maximvdw.be/publications/2020/openhps2020/

2019

Indoor Navigation by Centralized Tracking

The main goal of this thesis is to create an indoor positioning system that guides a patient or visitor through a hospital building. Using only the smartphone of a person, the system should be able to track and guide the user to his/her destination. Unlike other possible solutions that focus on the smartphone application to determine the position, the proposed solution uses a centralized server with Bluetooth scanners.
These scanners are distributed throughout the hospital and report their scan results back to the centralized server for position calculation and navigation instruction generation. Finally, these instructions are sent to the smartphone application to guide the user to his/her destination. Apart from starting the transmission of a Bluetooth signal, the task of the smartphone application is limited to receiving and displaying these navigation instructions.
The centralized server approach provides companies that implement this system, complete control over which other functionalities to implement related to the determined location of the end-user (i.e. the patient or visitor). For instance, companies can trigger actions based on the end-user's location such as automatic registration when a user arrives at their destination or use it to track assets.
Starting from a comparison of existing positioning techniques, such as beacons or Wi-Fi positioning, this thesis gradually explains how the system can track a smartphone; how both visual and textual navigation instructions are created and the pros and cons of using this system in a hospital environment.
To achieve the goal of the thesis, first theoretical research was needed to come to a possible solution. Next, the solution was implemented, i.e. software was created. The software implementation shows the feasibility of the positioning approach as well as the navigation approach.

Van de Wynckel, M. (2019). Indoor Navigation by Centralized Tracking [Master's thesis, Vrije Universiteit Brussel]. https://researchportal.vub.be/en/studentTheses/indoor-navigation-by-centralized-tracking

Links https://youtu.be/fMFZu4Z49SU | https://maximvdw.be/publications/2019/thesis/

CONFERENCES AND SEMINARS

Brussels, Belgium

Presentation at FOSDEM 2025

Presentation titled 'Discovering Indoor Environments and Positioning Systems'

Links https://fosdem.org/2025/schedule/event/fosdem-2025-4526-discovering-indoor-environments-and-positioning-systems/ | https://maximvdw.be/presentations/2025/fosdem2025/

26/05/2024 – 30/05/2024 Hersonissos, Crete, Greece

Conference presentation at ESWC 2024

Paper presentation titled 'FidMark: A Fiducial Marker Ontology for Semantically Describing Visual Markers'

Links https://2024.eswc-conferences.org/accepted-papers/ | https://videolectures.net/embed/videos/eswc2024_van_de_wynckel | https://maximvdw.be/presentations/2024/eswc2024/

02/05/2024 – 03/05/2024 Leuven, Belgium

Poster presentation at SoSy 2024

Poster presentation titled 'Discoverable and Interoperable Augmented Reality Environments Through Solid Pods'

Links https://events.vito.be/sosy2024 | https://maximvdw.be/presentations/2024/sosy2024/

07/11/2023 – 10/11/2023 Nagoya, Japan

Conference presentation at IoT 2023

Paper presentation titled 'SemBeacon: A Semantic Proximity Beacon Solution for Discovering and Detecting the Position of Physical Things'

Links https://iot-conference.org/iot2023/ | https://maximvdw.be/presentations/2023/iot2023/

12/05/2023 – 12/05/2023 Brussels, Belgium

Poster presentation at BeJS conf 2023

Poster presentation of the OpenHPS framework

Links https://www.react.brussels/conferences/bejs-conf-2023 | https://maximvdw.be/presentations/2023/bejsconf/

23/09/2022 – 27/09/2022 Hangzhou, China

Conference presentation at ISWC 2022

Paper presentation titled 'POSO: A Generic Positioning System Ontology'

Links https://iswc2022.semanticweb.org/index.php/accepted-papers/index.html | https://openhps.org/publications/2022/5b3-Van de Wynckel-Video-MQ.mp4 | https://maximvdw.be/presentations/2022/iswc2022/

05/09/2022 – 07/09/2022 Beijing, China

Conference presentation at IPIN 2022

Paper presentation titled 'A Solid-based Architecture for Decentralised Interoperable Location Data'

Links https://ipin-conference.org/2022/ | https://openhps.org/publications/2022/WiP65_MaximVandeWynckel.mp4 | https://maximvdw.be/presentations/2022/ipin2022/

05/02/2022 – 06/02/2022 Brussels, Belgium

Presentation at FOSDEM 2022

Presentation titled 'Rapid Prototyping of a Positioning System Using the OpenHPS Framework'

Links https://archive.fosdem.org/2022/schedule/event/lt_openhps/ | https://video.fosdem.org/2022/L.lightningtalks/lt_openhps.webm | https://maximvdw.be/presentations/2022/fosdem/

29/11/2021 – 02/12/2021 Lloret de Mar, Spain

Conference presentation at IPIN 2021

Paper presentation titled 'Indoor Positioning Using the OpenHPS Framework'

Links https://ipin-conference.org/2021/ | https://maximvdw.be/presentations/2021/ipin2021/

PROJECTS

01/10/2019 – CURRENT

OpenHPS

Link https://openhps.org

01/10/2022 – CURRENT

SemBeacon

Link https://sembeacon.org

HOBBIES AND INTERESTS

Scuba diving

3* (Bachelor) diver at the VUB Diving Center

Link https://www.vubdivingcenter.be

Scuba diving

2* CMAS diver

Link https://www.nelos.be