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ISWIM
International Society for Weigh in Motion

ISWIM NEWSLETTER

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Message from the ISWIM president

ISWIM Members and Friends,

Welcome to the first edition of our Newsletter for 2021.

ISWIM produces this Newsletter to inform its membership and the broader community about the developments within the association and to provide a snapshot of the world of WIM. The Newsletter also provides a forum for the exchange of ideas.

This is a 'bumber edition' covering ISWIM specific issues, research initiatives and user/vendor experiences. As an international association it is fitting that the material and projects cross the globe.

We invite you to visit your new official ISWIM website at www.is-wim.net. At your first visit you will be asked to renew your membership or to register as a new member. The 3rd Regional ISWIM Seminar 'Optimising Road Freight Transport using WIM Data' is scheduled for November 2021 in Pretoria, South Africa.

We also take the opportunity to welcome two new members to the ISWIM Vendors & Consultants College, namely iWIM based in Italy and the Australian company Excel Technology.

The newsletter presents the latest research projects from the United States, the new products and certifications of vendor equipment and user/vendor use cases from Slovenia, Philippines and the United States.

I invite you all to contribute to the Newsletter. The ISWIM Newsletter is your newsletter and your articles, research initiatives, programs and learnings are very welcomed. As such, please do not hesitate to submit an article!

Thank you all for your contribution.

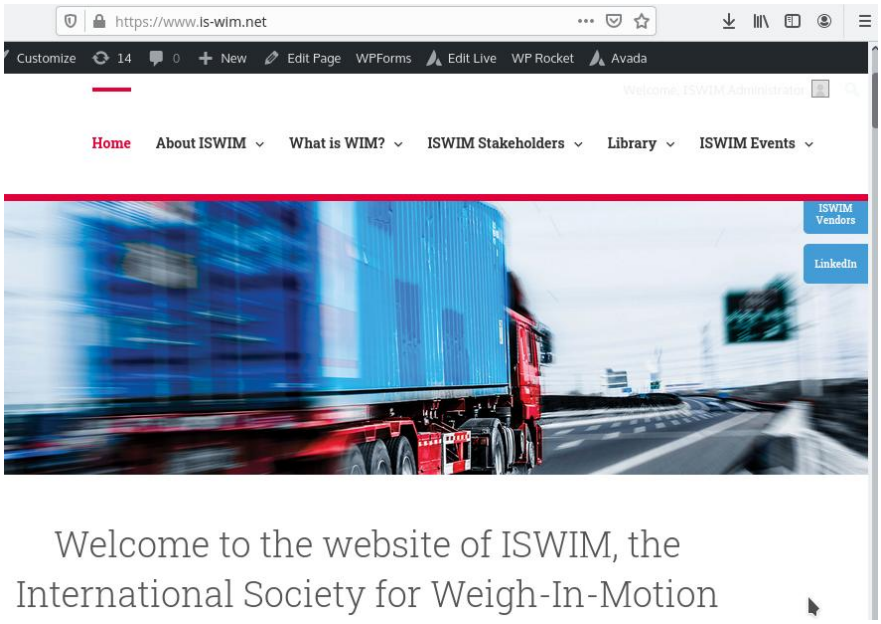
Chris Koniditsiotis
President – ISWIM

Chris Koniditsiotis | ChrisK2.0@bigpond.com

New ISWIM Website www.is-wim.net

We invite you to visit our new official website at www.is-wim.net! At your first visit you will be asked to renew your membership or to register as a new member. As you know the individual membership of ISWIM is free of charge. It allows easy access to ISWIM events (e.g. registration for ISWIM events and the submission of abstracts and papers) and specific member information.

Perhaps the first thing you will notice is the changed look of the website to match our publications and brochures. What has remained is the information on the ISWIM Organization, Newsletters, the list with ISWIM Events and links to our Vendors & Consultants. However, the content of most pages has been updated and we have added new content and new features.



Front page of new ISWIM website.

Perhaps the first thing you will notice is the changed look of the website to match our publications and brochures. The content of most pages has been updated and we have added many new pages and some new features. What has remained is the information on the ISWIM Organization, Newsletters, the list with ISWIM Events and links to our Vendors & Consultants.

■ Aleš Znidarič | Ales.znidaric@zag.si
■ Hans van Loo | hans.vanloo.int@gmail.com

The International Society for Weigh-In-Motion is a global non-profit organization, bringing together all stakeholders with an interest in WIM technology and data. Our members are users, researchers and vendors of WIM systems including systems in or under the road pavement, bridges, rail tracks and on-board vehicles.

The aims of ISWIM are to support:

- Advances in Weigh-in-Motion technologies; and
- The more widespread use of WIM systems and data.

Disclaimer

The projects described, ideas shared, and claims made in this Newsletter do not necessary represent the official view or position of ISWIM.

While care has been taken in the preparation of the content of this Newsletter, ISWIM accepts no responsibility in its use, for any omission, or damage that may be caused and does not endorse any specific product presented in the Newsletter.

ISWIM LinkedIn Group

Besides the new ISWIM website and the periodical Newsletter there is another way of keeping up to date with the latest developments in Weigh-In-Motion - the ISWIM LinkedIn Group.

In this group, researchers, end-users and vendors can find AND post short articles on initiatives, new projects, test result, or other developments related to WIM-technology, applications and data.

As with the Newsletter, the aim is to find a balance between research and application and between public and commercial items. The ISWIM LinkedIn Group has currently more than 275 members.

If you want to join, please visit: linkedin.com/groups/13400438

OIML certificate for Kistler WIM system up to 140 km/h

The 9835A Weigh In Motion system from Kistler was recently awarded a second OIML certificate. This provides official confirmation that the system accurately measures overall weights and axle loads of trucks at speeds of up to 120 km/h (and 140 km/h for vans). Certified accuracy is class F10, that means that during the initial verification the accuracy of measurement had to be within ±5% for total vehicle weight for all test tuns and all vehicle types.

This performance was achived using only two rows of Lineas sensors. The certificate was issued by the Czech Metrological Institute (CMI). Test runs had to be performed on a special closed track due to the very high vehicle speeds

Kistler WIM system during high speed tests.

Several hundred test runs were accomplished using four different types of vehicles (5-axle, 4-axle, 2-axle and a van) in loaded and unloaded conditions at valiable speeds up to 140 km/h. Furthermore, the Kistler solution can deal with very high axle loads of up to 30 tons, and there is no limitation of the maximum gross vehicle weight. With Lineas quartz sensors successfully proven over 20 years and operating at temperature ranges from −40 to +80°C, the system is universally applicable on a global scale and now comes with the additional advantage of proven accuracy also under realistic circumstances.

It is worth mentioning that the OIML certificate from 2015 that proves that Kistler WIM system performs with accuracy class F5 with 4 rows and up to 35 km/h continues to be valid and will co-exist with the new certificate.

■ Tomas Pospisek | tomas.pospisek@kistler.com

Coming Events
(subject to changes)

ISWIM Webinar
Introduction to Weighing-In-Motion
17 June 2021
www.is-wim.net

NaTMEC 2021
All Virtual Event
21-25 June 2021
www.natmec.org

South African Transport Conference
Pretoria, South Africa
5-8 July 2021
www.satc.org.za

HVTT16
Qingdao, China
7-9 September 2021
www.hvttforum.org

ITS World Congress 2021
Hamburg, Germany
11-15 October 2021
www.hamburg.com/business/its

ISWIM 3rd Regional Seminar
Pretoria, South Africa
7-9 November 2021
www.is-wim.net

Intertraffic Amsterdam
Amsterdam, the Netherlands
29 March – 1 April 2022
www.intertraffic.com

ITS Central Eastern Europe
Kazan, Russia
19-21 September 2022
www.itsinceeurope.com

Transport Research Arena
Lisbon, Portugal
14-17 November 2022
www.traconference.eu

ICWIM-9
Melbourne, Australia
2023 (dates to be decided)
www.is-wim.net

For other WIM-related events contact:
■ Hans van Loo | hans.vanloo.int@gmail.com

Call for Abstracts for the 3rd Regional ISWIM Seminar

ISWIM has published the call for abstracts for the 3rd Regional ISWIM Seminar 'Optimising Road Freight Transport using WIM Data'. The seminar will be held from the 7th to the 10th of November 2021 in the CSIR Convention Centre in Pretoria, South Africa. This is a key ISWIM event between two International Conferences (namely ICWIM8 and 9) with a specific focus on Sub-Saharan Africa.

The CSIR Convention Centre in Pretoria, South Africa.

The seminar will cover the following topics concerning in-road and on-board Weigh-In-Motion:

- Recent advances in WIM systems, sensors, applications, implementation, operation and testing;
- Practical experiences with the implementation and operation of WIM systems and use of vehicle mass data in Sub-Saharan Africa for different applications;
- Use of WIM data for pavement and bridge engineering, pre-selection for weight enforcement, direct enforcement and tolling by weight;
- Use of mass information in innovations in road transport logistics, Performance Based Standard (PBS), Road Transport Management System (RTMS) and on-board vehicle approaches.

Abstracts must be submitted in English and on-line at www.is-wim.net. The authors of abstracts selected for presentation will be notified early 2021. All abstracts presented at the symposium will be made available to the delegates in electronic form and via the ISWIM web-site.

The timetable for submission of abstracts and registrations is as follows:

- 1 May 2021: Closure of submission for extended abstracts
- 30 July 2021: Notification of successful authors/presenters
- 1 September 2021: Final date for registration of presenters
- 7-10 November 2021: 3rd Regional ISWIM Seminar.

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■ Chris Koniditsiotis | ChrisK2.0@bigpond.com

3rd Regional ISWIM Seminar in South Africa

In 2021 ISWIM will be hosting its 3rd Regional ISWIM Seminar in Pretoria, South Africa with a specific focus on Sub-Saharan Africa. Several countries in this region have been using WIM systems for many years, while others have only recently started implementation. By bringing all these users together ISWIM wants to support the development of WIM in Southern Africa.

The seminar will be held from 7-10 November 2021 at the CSIR Convention Centre in Pretoria, South Africa. The hosts of the seminar are ISWIM, PIARC Technical Committee TC2.3 'Freight' and Mikros Systems, with the support of the ITS South Africa, South African Road Federation, SANRAL, World Bank, ASANRA, CSIR, FEHRL, IRFTT/HVTT, Namibian Road Agency, Bakwena, N3TC, Trac-N4 and the Cross Border Agency.

During the seminar there will also be an exhibition where ISWIM Vendors will have the opportunity to present their systems and solutions.

The seminar offers different levels of sponsorship; each level includes a booth at the exhibition, a 15-minute presentation at an end-user session, and a number of free registrations depending on the sponsorship level.

For details on the possibilities and conditions for sponsoring please visit our website: www.is-wim.net or contact:

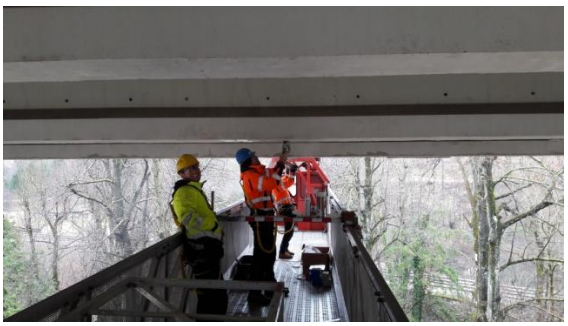
■ Andy Lees | Andrew.Lees@q-free.com
■ Andrew Houliston | Andrew@syntell.co.za

Use of SiWIM in structural health monitoring

Cestel's SiWIM bridge WIM-system has been used for measuring traffic loads for more than two decades. In 2018, Cestel and the Slovenian national building and civil engineering institute used SiWIM as part of a comprehensive Structural Health Monitoring (SHM) upgrade of an existing viaduct, giving engineers valuable information on the structure behavior.

Structure of the Ravbarkomanda highway viaduct.

Older structures, such as the 50-year-old Ravbarkomanda highway viaduct, were not constructed according to current design principles. Hence, when it was up for rehabilitation, the engineers decided to set up a continuous structural monitoring system of the viaduct coupled with SiWIM application to additionally support the maintenance program of this specific structure.



Installation of the SiWIM sensors under the bridge.

In the past three years since the SHM system was established, it has been determined that the actual movements and forces experienced by the bridge due to heavy traffic are lower than expected, which is beneficial for the structure's life expectancy. SiWIM also measured the percentage of stress caused by traffic over individual girders. The data showed that vehicles driving on the passing lane cause a substantial eccentric load on the bridge structure, which is essential information for the bridge engineers.

Building on many years of experience in bridge assessments, the Ravbarkomanda project showed SiWIM's usefulness as an affordable portable SHM solution. This is particularly advantageous for older structures with safety and durability issues, and consequently allows optimilization and maintenance activities of bridge owners.

Matija Mavrič | matija.mavric@cestel.si

New ISWIM Members

ISWIM has welcomed two new members in its Vendors & Consultants College:

iWIM, founded in 2011, is a company based in Trento, Italy, which has developed, certified and approved the first Weigh-In-Motion system in the country. Their system is OIML R134 certified and marketed under the BISON brand.
The BISON WIM-system is composed of 2 stainless steel bending plates equipped with fiber optic sensors connected to a data logger. The bending plates are installed flush with the road surface. The data logger processes, and stores all information collected in a database. All the transit information is made available to the user through a web interface.
www.iwim.it

BISON WEIGHS FAST. BORN TO LAST.

Excel Technology is an innovative Intelligent Transport Systems (ITS) company that designs, develops, manufactures, and distributes global solutions for precise road network analysis.
Excel Technology's Weigh-In-Motion solutions are based their versatile XL-1000 platform. This allows for multiple functions to be delivered via a single configurable unit, available in a 19-inch rack-mount chassis. Features include high-accuracy weigh-in-motion, axle-based classification, presence detection and incident detection.

www.exceltech.com.au

EXCEL Technology Co

IRD Delivers 4-Way E-Screening in Idaho, USA

Sage Junction is a port-of-entry weigh station operated by the Idaho Transportation Department (ITD) at the intersection of a major interstate highway and a lower volume state highway. This project, to install WIM at the four approaches to the station, is the first application of WIM at Sage Junction, which had been previously equipped with only a static scale for enforcement and a bypass lane for unloaded trucks.

Sage Junction, Idaho Port of Entry Weigh Station

All four sites utilize IRD's iSINC® electronics. IRD's Single Load Cell (SLC) WIM scales were installed at the two high-volume interstate sites as SLC scales provide high accuracy and durability for preclearance operations. Kistler Lineas® quartz sensors were selected as optimal for the state highway sites, which get approximately 5% of the total traffic volume at the station. When integrated with iSINC electronics, the SLC and quartz sensors meet the ASTM Type III specification, measuring within ±6% of GVW with 95% confidence..

iSINC® WIM Electronics and CMS at the eastbound WIM location

In addition to WIM, each approach is equipped with Automatic Vehicle Identification, License Plate Readers, and Changeable Message Signs. IRD's iROC enables screening against state and federal databases for safety and credential issues. VI2M® cloud-based software is used to generate historical reports from the WIM data. ITD have derived significant value from the new WIM system, noting that it has benefitted operations by improving efficiency while enabling checks for federal bridge formula violations on the interstate.

Roy Czinku |roy.czinku@irdinc.com

ISWIM Vendors & Consultants

Axtec	www.axtec.co.uk
Betamont	www.betamont.sk
Camea	www.cameatechnology.com
Captels	www.pesage-captels.com
Cestel	www.cestel.eu
Ciemsa	www.ciemsa.com.uy
Corner Stone	www.corner-stone-int.com
Cross	www.cross.cz
ECM	www.ecm-france.com
Excel Technology	www.exceltech.com.au
Intercomp	www.intercompcompany.com
IRD / PAT Traffic	www.irdinc.com
iWIM	www.iwim.it
Kapsch	www.kapsch.net
Kistler	www.kistler.com
Mettler Toledo	www.mt.com
Mikros	www.mikros.co.za
Osmos Group	www.osmos-group.com
NMi	www.nmi.nl
Q-free/TDC	www.q-free.com/products
RTS GmbH	doupal@hispeed.ch
Sterela	www.sterela.fr
TE Connectivity	www.te.com
TDS	www.traffic-data-systems.net
Tramanco	www.tramanco.com.au
VanJee Technology	www.wanji.net.cn

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CAMEA's Innovative WIM Sensor Layout

Weigh-In-Motion can use piezoelectric quartz crystal or strain gauge sensors to measure the weight of a passing vehicle. These sensors are usually installed in 2 or 3 rows perpendicular to the driving direction, so the speed of the vehicle can also be measured.

Piezopolymer sensors, such as RoadTrax BL, are commonly added to the layout. They are installed approximately at a 20–40-degree angle to the weighing sensors and are used for measuring axle tracks, detecting the vehicle's position in lane and for dual tire detection. These outputs are very important for classifying purposes and for measurement validation.

CAMEA developed advanced WIM algorithms that allow installing the weighing sensors in place of the low-end position sensors. Thanks to that, less sensors in total need to be deployed which not only saves costs but facilitates cabling works as well. For instance, a configuration of 4 weighing (2 rows) + 2 piezopolymer sensors (Figure 1) can be replaced with only 4 weighing sensors of the same or combined technology, as in Figure 2 below:

Fig. 1: Example of common layout with low-end tilted sensors

Fig.2: Example of innovative layout with high-end tilted sensors

This brings further improvements:

- More reliable dual-tire detection,
- More accurate and reliable position-in-lane detection,

More accurate and reliable axle-track measurement The layout also offers new functionalities:

- Weighing with tilted (position) sensors,
- Tire pressure measurement.

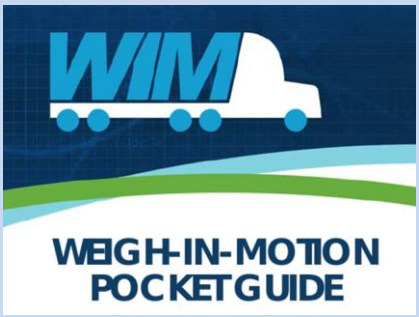
To summarize the presented innovation, a CAMEA's SW upgrade now enables installing the WIM with the sensor layout that provides system users with better results for lower price and less works.

Prokop Kudlik | P.kudlik@camea.cz

ISWIM Virtual Workshop

On June 17th ISWIM is organising a virtual workshop titled: **"An Introduction to Weigh-In-Motion."** The 2 hour event will start at 09:00EST = 15:00CET and is scheduled right before the NaTMEC 2021

The workshop is supported by the FHWA, NaTMEC and TRB WIM-sub-committee. It is intended for starting users of WIM systems and data. It will provide a basic yet comprehensive overview of all aspects related to WIM based on the ISWIM 'WIM User Guide' and the FHWA 'WIM Pocket Guide'.



The program has presentations from 3 international WIM experts covering different aspects of WIM. This is followed by practical experiences from 2 end users of WIM data sharing their experiences with using WIM data for road pavement design and weight enforcement.

Participation in the webinar is open for anyone with an interest in WIM and will be free of charge. All you need to do is visit the new ISWIM website at: www.is-wim.net
register as a member of ISWIM and you will receive an email with the link to join the virtual meeting (using MS Teams).

Hans van Loo | hans.vanloo.int@gmail.com

Ongoing WIM research projects in the USA

Several WIM-related research initiatives are underway in the United States:.

Practical Tools and Procedures to Improve WIM Data Quality

The objective of this research is to develop the next generation of tools and procedures to improve accuracy and increase reliability of WIM data through (1) more appropriate site selections; (2) WIM system selection, installation, calibration, and maintenance; (3) data analysis methods; and (4) quality control and quality assurance procedures. Expected duration: 01-10-2018 – 30-12-2021 URL: https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4412

Olga Selezneva, Ph.D. | oselezneva@ara.com

Development of a Self-Powered Weigh-In-Motion (WIM) System

This study further develops a roadside piezoelectric energy harvesting system. The basic sensing element is a stack of 6 piezoelectric disks, a set of 4 of these stacks supports a metal load carrying plate installed flush with the pavement surface. These 4 piezoelectric stacks generate very high voltages but relatively low amperages. The electrical power generated is sufficient to keep the rechargeable batteries on site sufficiently charged to power a microprocessor. The dual-role for the piezo-stacks developed allows the development of a low-cost WIM system that can operate off the electrical grid. This will provide state agencies a much better-informed picture of the utilization of their roadway and bridge infrastructure.Expected duration: 15-08-2019 – 15-02-2021.
URL: https://transet.lsu.edu/research-in-progress/

Christopher Melson | cmelson1@lsu.edu

Sensitivity and Accuracy Assessment of Pavement WIM System

The objective of this study is to provide scientific evidences of the systematic sensitivity analysis on the influences of external contributors on the measurement accuracy of a WIM system based on in-pavement strain sensors. The main external contributors to be investigated in this study include air temperature, vehicle wander behavior, air humidity, and wind speed on the measurement accuracy of a WIM system. Expected duration: 16-04-2019 – 31-07-2022. URL: https://www.mountain-plains.org/research/details.php?id=498

Robin Kline | robin.kline@dot.gov

Development of Low-Cost WIM System

This project proposes to develop a long-life weigh-in-motion (WIM) system with much lower costs using the piezoelectric sensors developed in a former EAR (Exploratory Advanced Research) project. The system will be named as P-WIM. The P-WIM will essentially consist of several piezoelectric disks sealed in a protective package made from engineering plastics. A wireless transmission module will be included in the package of the P-WIM to enable wireless data transmission. The P-WIM will be powered by solar panels and supplemented by the energy harvested from pavement deformations and vibrations. Expected duration: 01-03-2019 – 01-03-2021. URL: https://r3utc.psu.edu/research/ current-research-projects/projects-year-1-2/ciam-utc-reg13/

Eric Donnell | edonnell@engr.psu.edu

ISWIM Guide for Users of Weigh-In-Motion

The ISWIM Guide for Users of Weigh-In-Motion serves as a basic, yet comprehensive introduction to Weigh-In-Motion. The Guide covers different aspects related to the working, specifying, buying, installing, testing, maintaining and using of WIM systems and data. To enhance accessibility for users starting with WIM, these topics are described in easy-to-understand language.

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The guide has been well received at the conference both by vendors of WIM systems and end users of WIM data. As one of the vendors said: "This is exactly what we needed. We are definitely going to use the guide in our contacts with customers especially the ones that are new to WIM".

A PDF version of the WIM User Guide can be downloaded at the ISWIM website: www.is-wim.net.

Hans van Loo | hans.vanloo.int@gmail.com

Weigh-In-Motion systems in the Philippines by CROSS

CrossWIM is a high-speed, weigh-in-motion system that meets demanding criteria for traffic detection and dynamic weighing. CrossWIM is used to gather traffic statistics and facilitates pre-selection and direct enforcement. It was developed with an emphasis on accuracy, reliability and simplicity. It is suitable for basic, single lane installations through to extensive, multi-lane environments with heavy traffic.

CrossWIM is designed as a modular system and can be configured to deliver the precision required. The potential exists to combine various units and build stations suitable for particular applications. Overloaded lorries cause ruts, potholes, damaged edges and costly repairs, easily avoided by diverting them off motorways. CROSS WIM systems protect roads, extend their lifetimes and cut costs.

Cross Weigh-In-Motion system in the Philipines

The system uses an automatic profiled counting of vehicles on roads, their classification and measuring of wheel (axle) load, thus determining their weight. Data from the individual driving lanes are obtained using a combination of inductive loops and piezoelectric quartz sensors (optional piezoelectric sensors) in the road. The counter allows to connect the sensors in several rows in a single lane thereby enhancing measurement accuracy. In one lane there can be added a combination of quartz and piezo sensors to increase the functionality of the system.

In the year 2019 we implemented this type of system in the Philippines, specifically on the E1 highway near the city of Balagtas with a relatively high traffic intensity. We installed 1 station for 4 lanes, complete with LPR cameras connected to Invipo, which connects technologies and systems, collects and validates data, centralizes control of technologies and systems, delivers smart scenarios, analytical tools and opens data.

Simona Kovaříková | kovarikova@cross.cz

Contact ISWIM

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Young Researcher Awward – Deadline Extended

Every year, ISWIM offers scholarships to bachelor, master and PhD students, or post docs up to five years after graduation working on WIM-related research projects. Participants must demonstrate a passion for WIM through either their studies or early professional life and show "substantial evidence" of their research. "Substantial evidence" could be an original contribution in the form of a journal or conference paper; a report; or a series of presentations that clearly defines the scope of the project, technical approach, and anticipated or final conclusion(s).

ISWIM will fully sponsor the travel and registration expenses for recipients to present their work at an ISWIM event worldwide, such as ICWIM, an ISWIM seminar, or a sponsored session by ISWIM at another conference. Sponsorship from ISWIM will not exceed 2500 Euro. Applicants should send their CV, two reference letters, and an abstract up to 1000 words with supporting "substantial evidence" of their work. Submissions should be emailed to Lily Poulikakos at lily.poulikakos@empa.ch. This year's deadline is extended to April 30th and the award winners will be announced mid 2021.

Lily Poulikakos | Lili.Poulikakos@empa.ch