

BattLeDIM 2020

Battle of the Leakage Detection and Isolation Methods

Competition Winners

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BATTLEDIM Organizing Committee

September 3rd, 2020

Acknowledgements

- Part of this work has been partially funded by the European Union Horizon 2020 program under Grant Agreement No. 739551 (KIOS CoE), by the Interreg V-A Greece-Cyprus 2014-2020 program, co-financed by the European Union (ERDF) and National Funds of Greece and Cyprus under project SmartWater2020.
- Part of this work has been partially funded by the Deutsche Forschungsgemeinschaft (DFG).

A journey with obstacles...

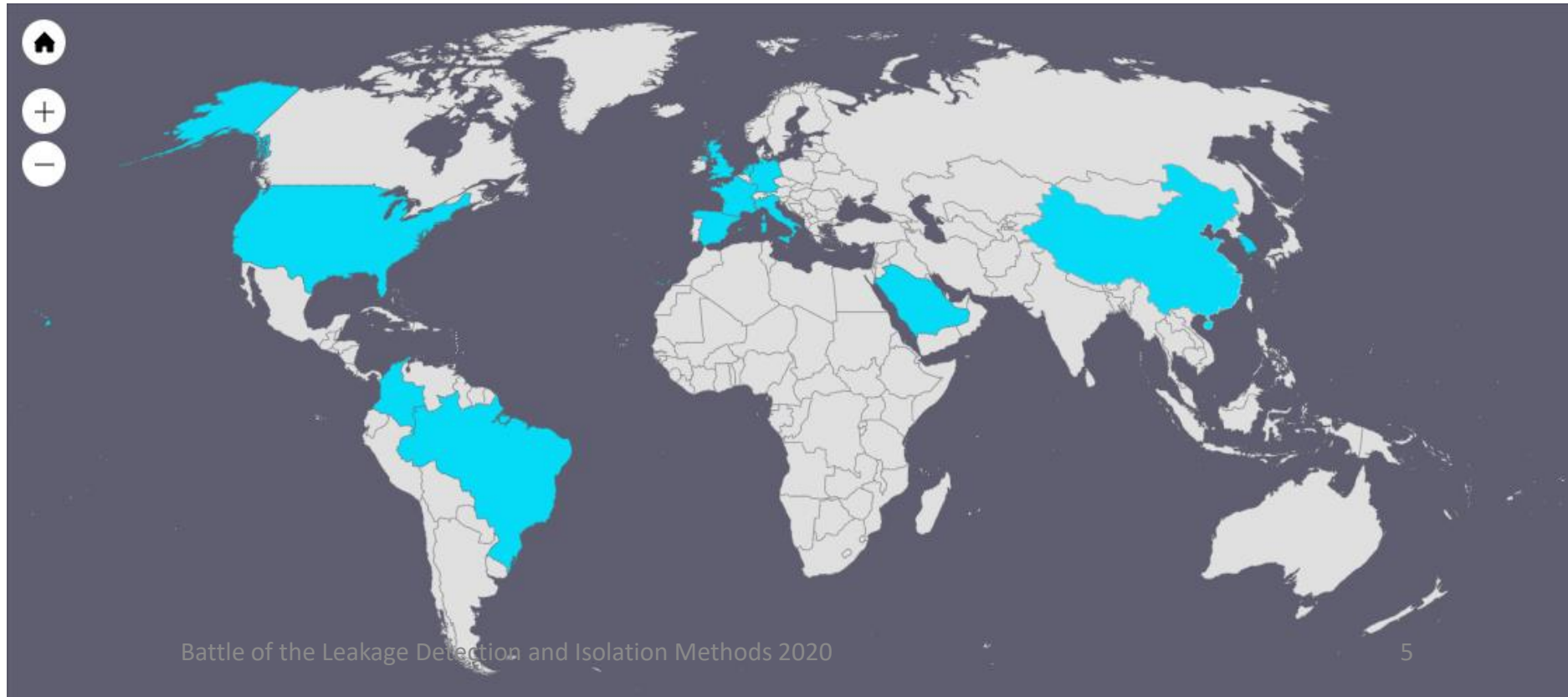
Timeline

- **December 2019:** Announcement of competition and release of 2018 “historical” SCADA dataset and L-TOWN model
- **January 2020:** Updated network and 2018 dataset. Publication of the 2019 “evaluation” SCADA dataset
- **February/March 2020:** Pandemic – Postponement of CCWI/WDSA
- **March 2020:** Decision to organize BattLeDIM despite the COVID-19 situation
- **June 2020:** Submission of the detection and isolation report by participants (extended deadline)

Statistics

- 95 downloaded the dataset
- 18 teams participated
- 13 countries

Brazil	Netherlands
China	United Kingdom
Colombia	USA
France	Saudi Arabia
Germany	Singapore
Italy	Spain
Korea	



Teams

1. **ArtesiaTeam**: Artesia Consulting (UK)
2. **Cheng00**: KAUST (SA), Harbin Institute of Technology (CN)
3. **CIACUA**: Universidad de los Andes (CO)
4. **Cubalytics_GmbH**: Cubalytics (DE)
5. **DandW**: Kunming University of Science and Technology (CN), Guangdong University of Technology (CN)
6. **DHI-China**: DHI China (CN)
7. **DHI-SG**: DHI Water & Environment (SG)
8. **FluING**: Universidade Federal de Minas Gerais (BR), University of Campinas (BR), IngeniousWare (DE), Universitat Politècnica de Valencia (SP)
9. **InfraSenseLabs**: Imperial College (UK)
10. **IRI**: Institut de Robòtica i Informàtica Industrial (SP), UPC (SP), IMT Lille Douai (FR)
11. **KU_Hydrosystem**: Korea University (KR)
12. **Leakbusters**: TU Berlin (DE), NC State University (USA), Einstein Center Digital Future (DE)
13. **Tongji-Team**: Tongji University (CN)
14. **Tsinghua_team**: Tsinghua University (CN)
15. **Under Pressure**: TU Delft (NL), 3S Consult (DE), INRAE (FR)
16. **UNIFE**: Università degli Studi di Ferrara (IT)
17. **Wu_BSY**: Bentley Systems (USA)
18. **Zhiyun0601**: Zhejiang University (CN), Industrial Technology Research Institute of Zhejiang University (CN)

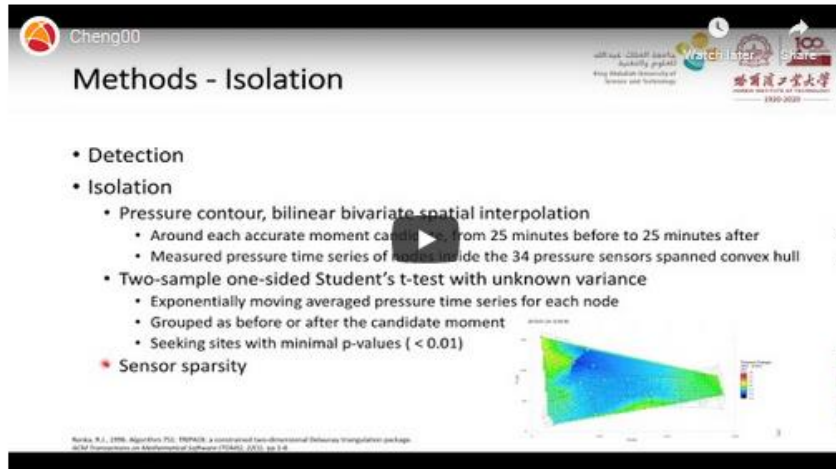


Thanks to all participants!

Papers & Presentations

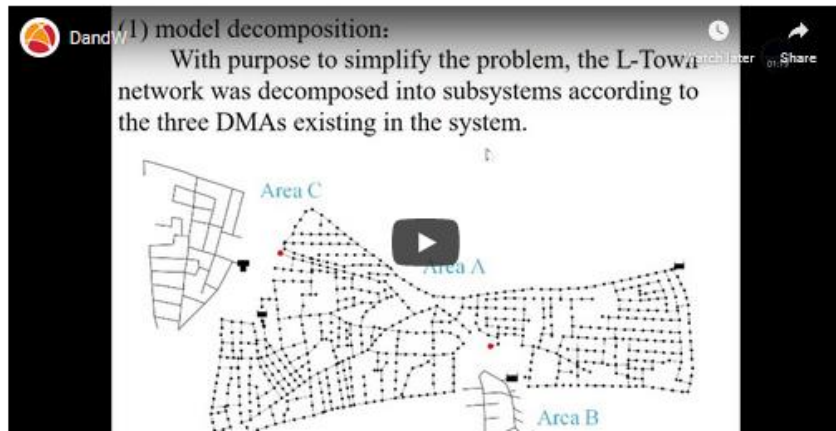
[A Hybrid Leakage Detection and Isolation Approach Based on Ensemble Multivariate Changepoint Detection Methods](#)

Cheng, Tuoyuan; Li, Yuanzhe; Harrou, Fouzi; Sun, Ying; Gao, Jinliang; Leiknes, TorOve



[The combined usage of the hydraulic model calibration residual and an improved vectorial angle method for solving the BattLeDIM problem](#)

HUANG, Lefeng; DU, Kun; GUAN, Miaoting; WANG, Qi



RULES

Download the BattLeDIM Rules v1.3.1 ([PDF](#))
(updated 4/2/2020)

KEY DATES

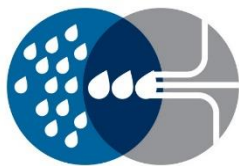
- 27/12/2019: Announcement of competition and release of 2018 dataset
- 20/1/2020: Updated network and 2018 dataset.
- 24/1/2020: Publication of the 2019 evaluation SCADA dataset
- 1/6/2020: Submission of the detection and isolation report by participants
- 3/9/2020: Online pre-conference workshop
- TBD: Development of jointly authored journal manuscript

All papers and presentations are available on the project website (click “Papers”)

All presentations will also be available on the CCWI/WDSA 2021 website.

The top 6 winners

Honorable mentions go to...



Computing and Control
for the Water Industry



Water Distribution
Systems Analysis

Honorable Mention

presented to

Irene Marzola, Filippo Mazzoni, Stefano Alvisi and Marco Franchini
(UNIFE team)

for outstanding achievements in the **Battle of the Leakage Detection**
and **Isolation Methods (BattLeDIM) 2020**

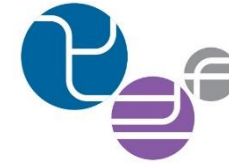
September 3rd, 2020

Shuming Liu, on behalf of BattLeDIM organizers
Vrachimis S., Eliades D., Taormina R., Ostfeld A., Kapelan Z.,
Liu S., Kyriakou M., Pavlou P., Qiu M., Polycarpou M.





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Systems Analysis

Honorable Mention

presented to

Xiaoting Wang, Junyu Li, Xipeng Xu, Ziqing Ma and Yujun Huang
(Tsinghua team)

for outstanding achievements in the **Battle of the Leakage Detection**
and **Isolation Methods (BattLeDIM) 2020**

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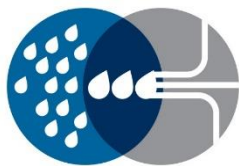
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3rd place is shared between...



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Systems Analysis

THIRD PLACE AWARD

presented to

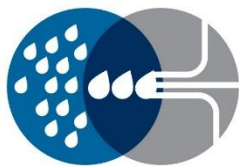
**Ivo Daniel, Jorge Pesantez, Simon Letzgus, Mohammad Ali Khaksar Fasaee,
Faisal Alghamdi, Kumar Mahinthakumar, Emily Berglund and Andrea Cominola**
(Leakbusters team)

for outstanding achievements in the **Battle of the Leakage Detection and Isolation
Methods (BattLeDIM) 2020**

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THIRD PLACE AWARD

presented to

**Luis Romero, Joaquim Blesa, Débora Alves, Gabriela Cembrano,
Vicenç Puig and Eric Duviella (IRI team)**

for outstanding achievements in the **Battle of the Leakage Detection
and Isolation Methods (BattLeDIM) 2020**

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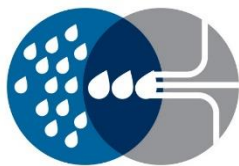


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1st place is shared between...





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FIRST PLACE AWARD

presented to

D.B. Steffebauer, J. Deuerlein, D. Gilbert, O. Piller and E. Abraham
(Under Pressure team)

for outstanding achievements in the **Battle of the Leakage Detection**
and **Isolation Methods (BattLeDIM) 2020**

September 3rd, 2020

Shuming Liu, on behalf of BattLeDIM organizers

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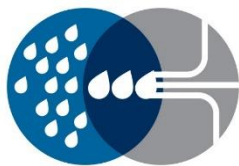


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Computing and Control
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Water Distribution
Systems Analysis

FIRST PLACE AWARD

presented to

Zhirong Li and Kunlun Xin (Tongji team)

for outstanding achievements in the **Battle of the Leakage Detection
and Isolation Methods (BattLeDIM) 2020**

September 3rd, 2020

Shuming Liu, on behalf of BattLeDIM organizers

Vrachimis S., Eliades D., Taormina R., Ostfeld A., Kapelan Z.,
Liu S., Kyriakou M., Pavlou P., Qiu M., Polycarpou M.



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Ranking Scores

Team Name	Ranking	True Positive Rate	False Positives	Economic score (Euro)
Tongji	1 st	0,56	3	€264,873
Under Pressure	1 st	0,65	4	€260,562
IRI(*)	3 rd	0,43	1	€210,772
Leakbusters	3 rd	0,47	7	€195,490
Tsinghua	4 th	0,47	5	€167,981
UNIFE	5 th	0,43	4	€127,626

(*)The score has been updated to include IRI in the 3rd position, see Update 8/9/2020 on website.

Online Presentations

Video Presentations

1. Tongji: <https://youtu.be/dsS3wJP6klc>
2. Under Pressure: <https://youtu.be/oPXuyqyboAQ>
3. Leakbusters: <https://youtu.be/PrHgNnQn-IQ>
4. IRI: <https://youtu.be/DnwfCd0RbWI>
5. Tsinghua: <https://youtu.be/dIAyUhzwAZY>
6. UNIFE: <https://youtu.be/Ez0UNwsTs-s>

What's next?

Next steps

- Participants can **score their solutions** using the scoring algorithm provided online.
- The committee will invite participants of the competition to express their interest in preparing a **joint journal paper** the following months.
- Send your abstracts for CCWI/WDSA 2021!
- Start preparing for the next battle!
- See you in **CCWI/WDSA 2021** in China!

CCWI / WDSA 2020

Smart Water

September - October, 2021 | Beijing, China