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Sustainable Communication Networks

Faculty 1: Physics / Electrical Engineering
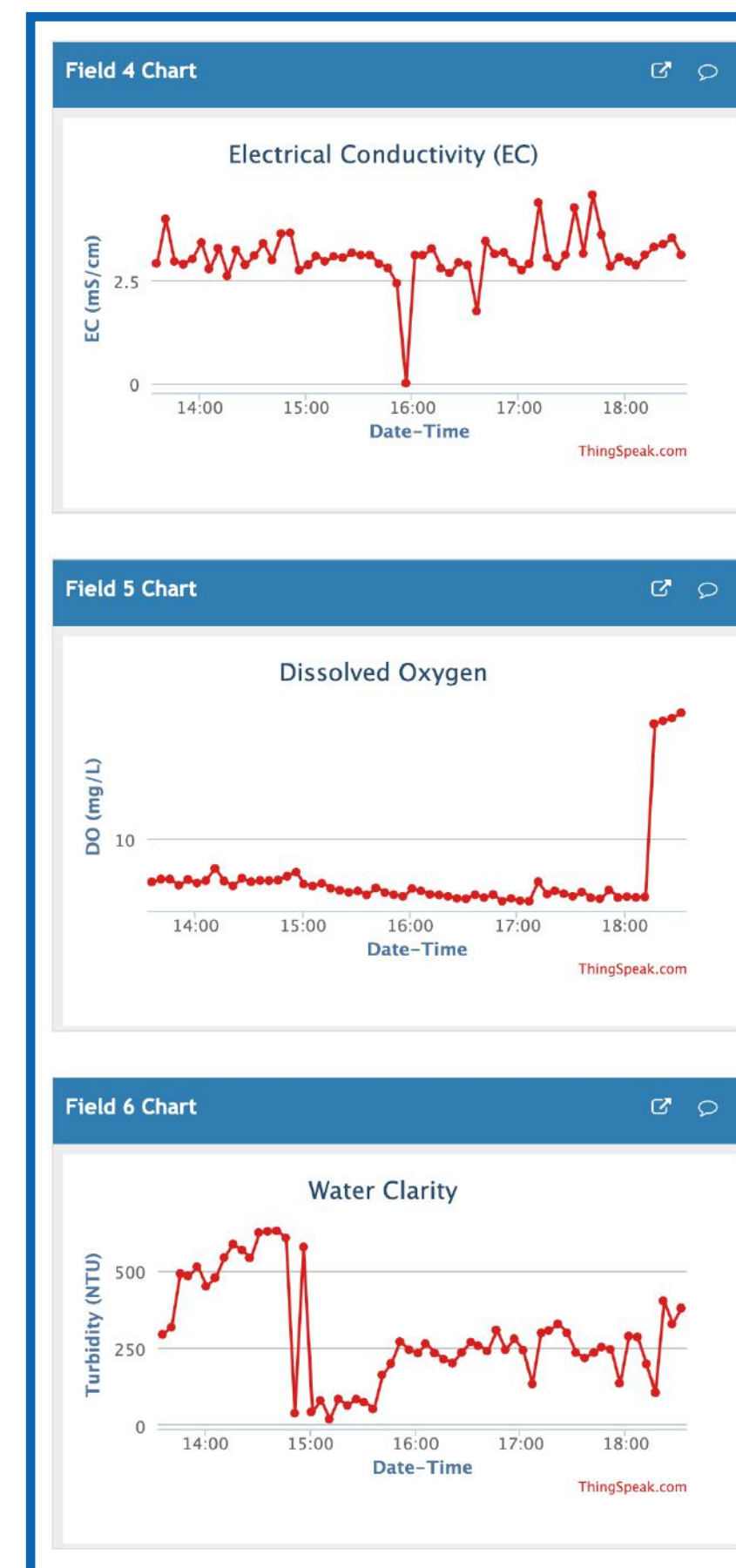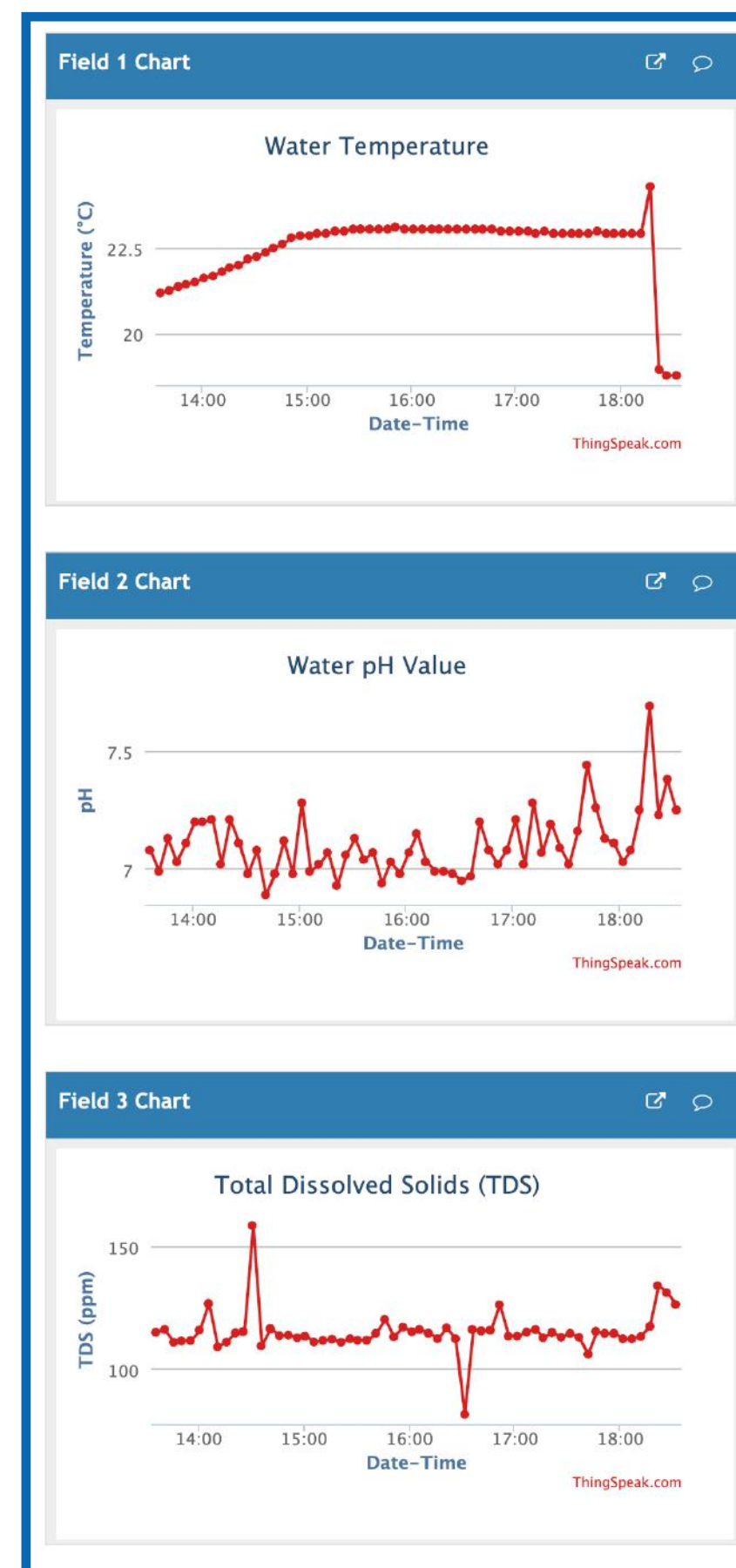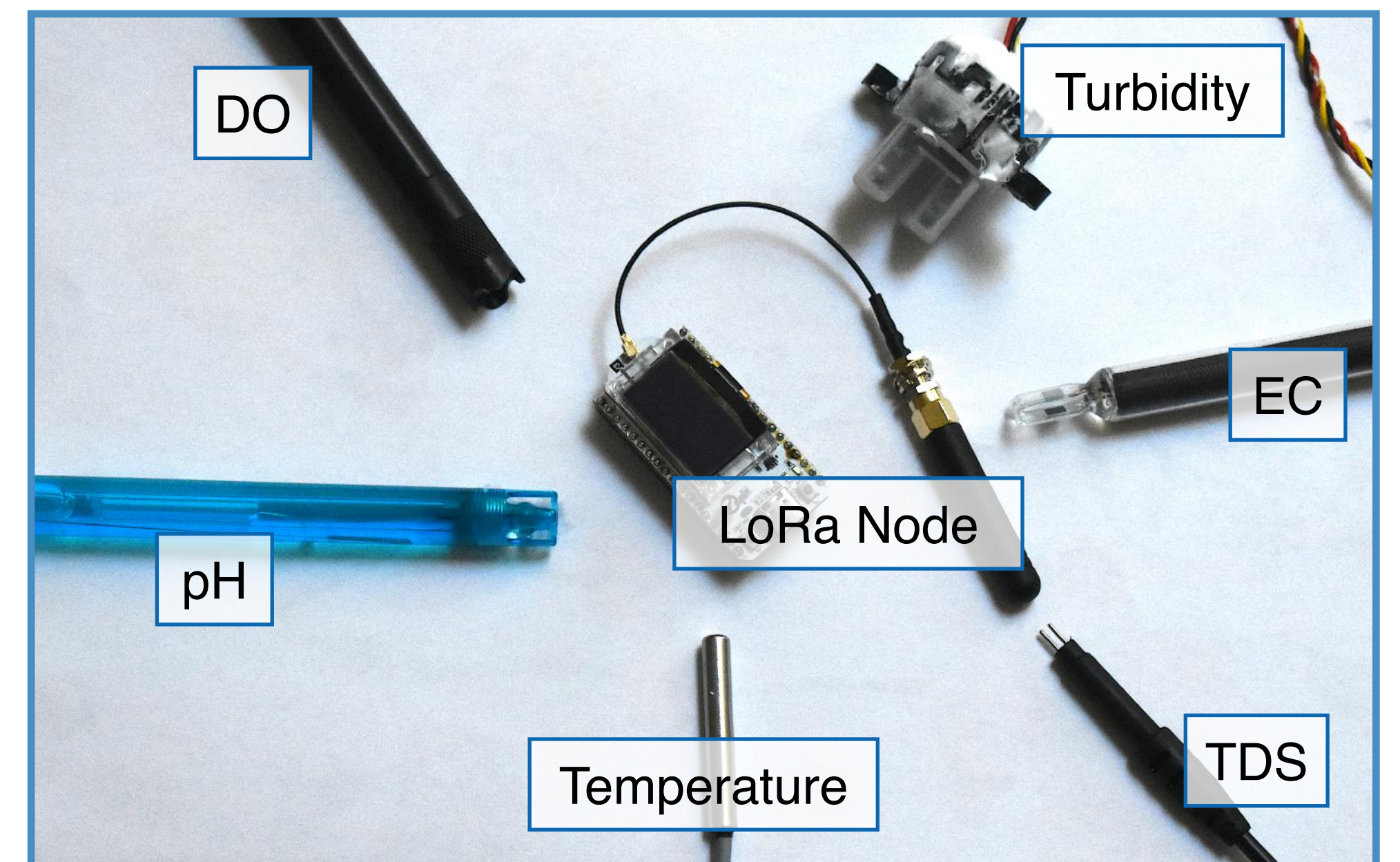Research Group Prof. Dr. Förster

IoT-based Anomaly Detection for Identifying Point Sources of Water Pollution

Motivation

- Human right to water and sanitation.
- Agenda 2030: 17 Sustainable Development Goals.
- 2 billion people globally without access to clean water and proper sanitation.
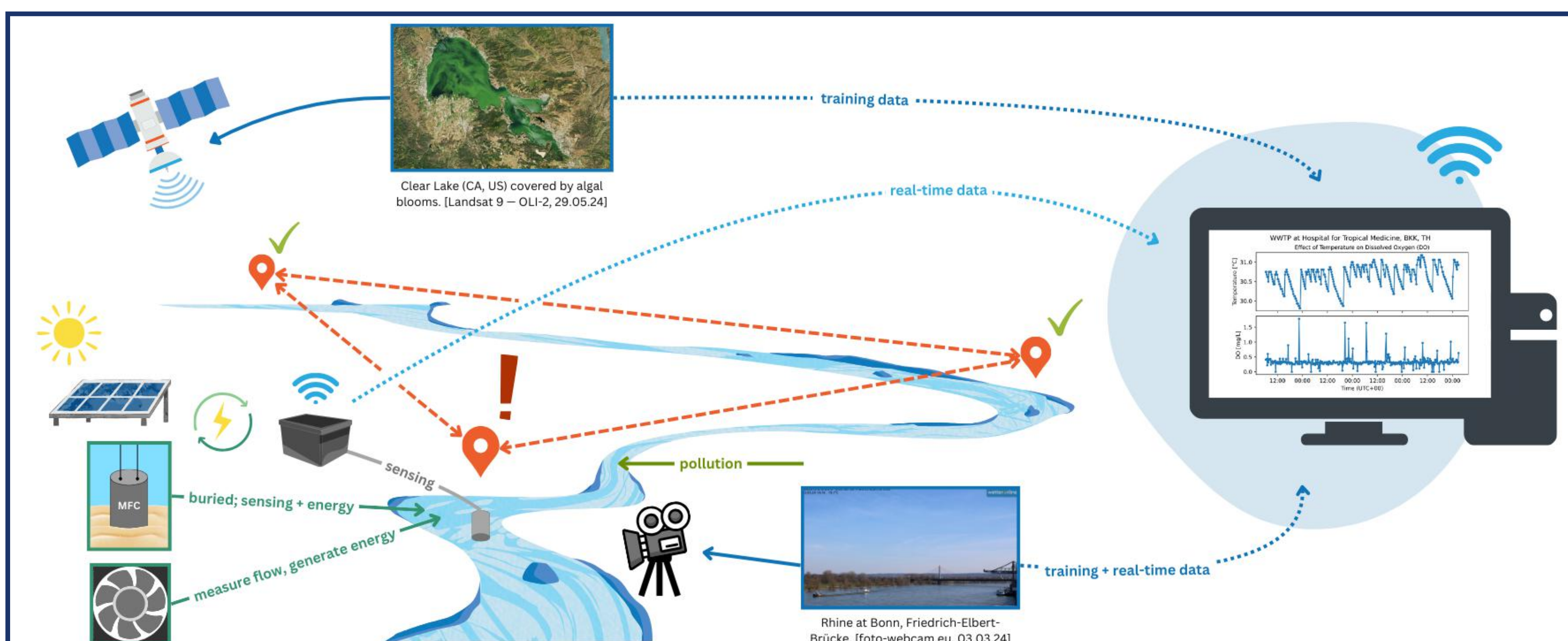- 1 million deaths per year to preventable diarrhea alone.

First Prototype

- LoRaWAN to TheThingsNetwork (TTN).
- ThingSpeak for visualization.
- Deep sleep during inactivity.
- Solar panel.

Next Steps | Ongoing Research

- Expand sensor suite: BOD/COD, phosphate, nitrate/ammonia, pathogens (e.g. *E. coli*, *Legionella*).
- Monitor external factors to assess environmental conditions, e.g. flow rate, solar irradiance, rainfall.
- Microbial fuel cell (MFC) as sensor (microbial activity, BOD/COD).
- Increase system resilience: monitor individual sensors (S. Attarha), monitor battery state and adapt actions (WoCA, FAU Erlangen), monitor communication (S. Band).
- Integrate remote sensing approaches (satellites, webcams) to monitor large-scale pollution.
- Use image and sensor data to train prediction and anomaly detection models; predict, identify and localize pollution events.
- Create a (web) app to use as a warning system and to make findings available.

Clear Lake (CA, US) covered by algal blooms. (Landsat 9 – OLI-2, 29.05.24)

Rhine at Bonn, Friedrich-Elbert-Brücke. [foto-webcam.eu, 03.03.24]

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