Dr Choe Leo Peng, Associate Professor, University Sains Malaysia
Championing water reuse

Dr Leo is passionate about the potential of water reuse and recovery as a solution to the world's growing water crisis. She first became involved with water sustainability research after studying the uses of membranes for carbon capture, when she realised they also had potential in water reuse. After a change in direction inspired by rainwater harvesting, Leo is encouraging the use of IoT devices to reduce consumption of clean, drinkable water and for purposes other than drinking.

The challenge
More than 40% of the global population suffers from water stress, with the severity increasing due to climate change. One solution to the water crisis is to reuse water for non-potable (non-drinking) purposes. The treated greywater, rainwater, and stormwater can be used to flush toilets, gardening, and even in the agricultural industry. Reusing water in this way can help to reduce the consumption of drinkable water by up to 40%.

For this strategy to be successful, it requires a widespread community of water users to accept and integrate new technologies into their water systems.

The ambition
Leo sees IoT devices as a crucial solution to the water crisis, enabling continuous, real-time monitoring, analysis, and control of water quality. However, water reuse systems can only be sustained if end-users understand how to use IoT devices and are educated on their benefits. Her aim is to use the global network that she is built through Frontiers Champions to promote the positive impacts of IoT in water reuse.

Her project has three stages: training water reuse experts across the world to use IoT devices, encouraging these experts to pass this knowledge on to communities in their home countries, and hosting a competition among engineers and students to incentivise innovation in water reuse.

The initial training will occur through online events and hands-on activities using IoT devices shipped to participants. After learning about the IoT devices, rainwater harvesting systems, and greywater treatment systems, the experts will engage with local organisations, schools, and universities to share their knowledge with others and boost local water facilities. Data will be collected to understand implementation challenges and develop insights to educate the public, shape future policy, create standards for water reuse, and raise awareness of water management issues.
Leo hopes that this project will help to clarify how IoT devices for water reuse can be pragmatically implemented on a global scale.

Relevant UN Sustainable Development Goals (SDGs)
- Clean water and sanitation (SDG 6)
- Climate action (SDG 13)
- Quality education (SDG 4)

Involvement with the Royal Academy of Engineering

Leo first became involved with the Academy after attending a Frontiers Symposium on Engineering Inclusive Cities in 2020. She then completed a collaborative project with Frontiers seed funding on urban water reuse. After building a network spanning the UK, Malaysia, Mexico, Nigeria, and South Africa, Leo decided to apply for Frontiers Champions in 2021.

To prospective applicants, Leo says "Frontiers Champions is one of the best projects in terms of engaging with communities. If you have collaborators, it becomes fun and if they come from different backgrounds or different cultures, you can create a very good idea that can be shared with everyone".