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**Systems and synthetic biology:
constructing smart and
programmable microbes and
microbiota to address global
problems**

The past decade has witnessed the tremendous power of systems and synthetic biology in the creation of genetic parts, devices, and systems, which helps understand complex biological systems. However, its potential for real-world applications has not been fully exploited. One of its promising applications is the construction of programmable cells that integrate multiple environmental signals and implement synthetic control over biological processes. My research interests are focused on developing microbes and microbiota that can process multiple input signals and generate user-defined outputs. Specifically, I aim to build genetic programs to control various bacterial processes such as gene expression, chemical reactions, and evolution. I will present published and unpublished results of my selected research projects by discussing the potential and challenges of systems and synthetic biology to address global problems, including plastic and agricultural waste issues, non-invasive diagnostics and disease treatment using smart probiotics and microbiota engineering, sustainable bioproduction, and biocontainment of genetically engineered microbes.

Monday 10th November 14:00 - 15:00,
Room A401, School of Engineering