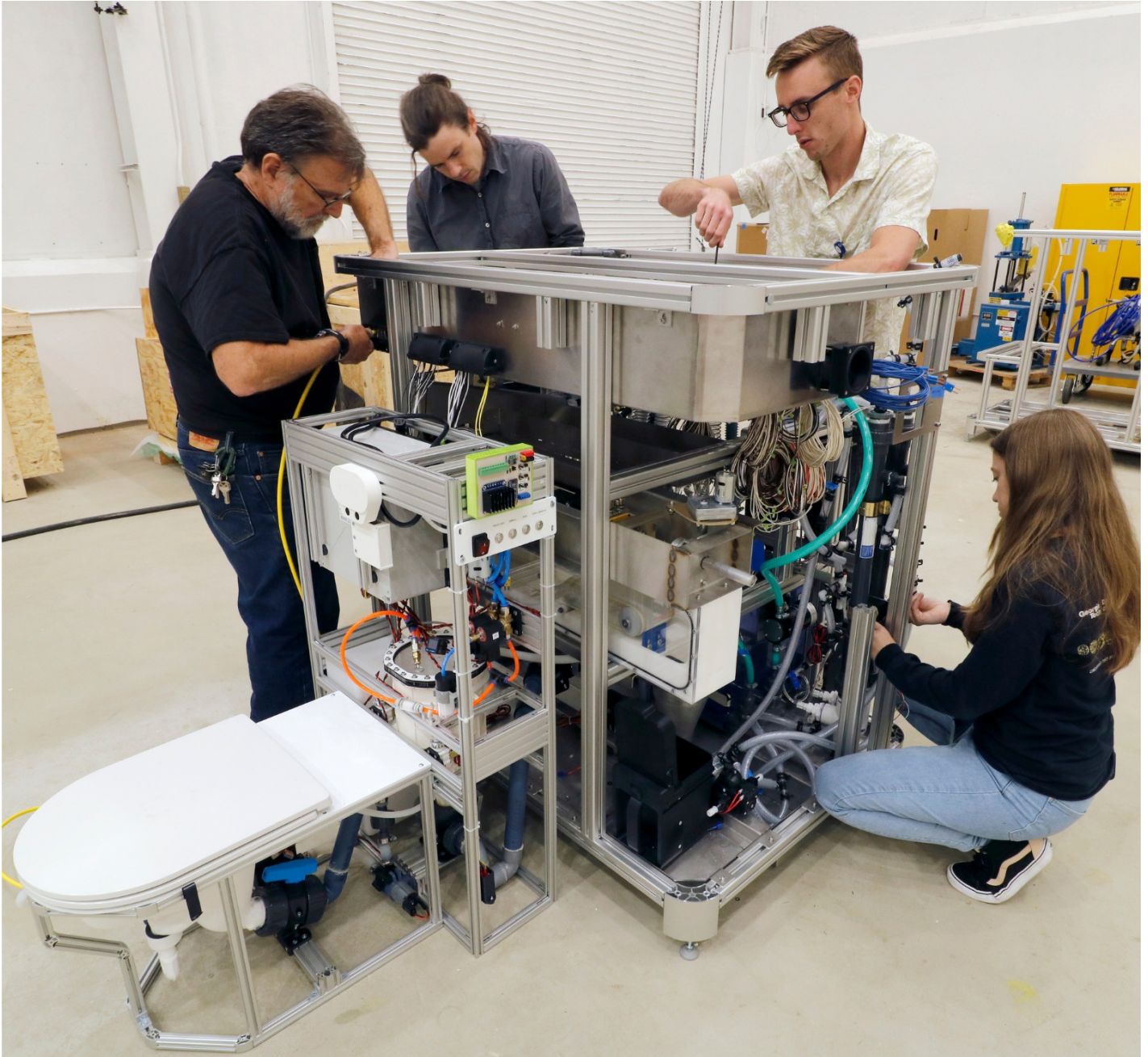


Universities Come Together To Reinvent The Toilet

Gates Foundation

Georgia Institute of Technology

Georgia Tech Research Institute



The global sanitation crisis is an emergency with devastating consequences. In 2020, nearly 3.5 billion people lacked access to safely managed sanitation. This deficiency is not merely a matter of convenience; it is a critical threat to public health and environmental stability. Without proper systems, human waste is discharged directly into lakes, rivers, and oceans, contaminating the water people rely on for drinking, bathing, and recreation. This sewage

contamination fuels a cycle of disease, causing diarrhea and dehydration that leads to the tragic deaths of over 1,000 children every day.

While the world's poorest communities face the most immediate danger, developed markets are not immune. Rapid urbanization is placing unsustainable pressure on aging sewage infrastructure, while thousands in rural areas depend on inefficient septic tanks prone to leakage. This crisis is set to accelerate as climate change increases the frequency of both severe flooding and prolonged droughts, further straining traditional waste management.

Innovation is now rising to meet this. At Georgia Tech, Professor Shannon Yee is leading a global research team of more than 70 engineers, scientists, and industrial designers to reinvent the toilet for the 21st century. This team developed the Generation 2 Reinvented Toilet, or G2RT, a portfolio of technologies that distill a decade of research from the Gates Foundation's Reinvent the Toilet Challenge.

Developing a cost-effective, globally scalable toilet with built-in sewage treatment required unprecedented collaborative problem solving from the three main engineering and industrial design teams: Georgia Tech Research Institute, EOOS NEXT in Vienna, Austria, and Helbling Technik in Wil, Switzerland. "We can't do this without a true global collaboration. There are a lot of parties that have to work well together," said Yee.

The G2RT represents a fundamental shift in how we process waste. Instead of relying on expensive, water-intensive infrastructure, like miles of underground pipes and centralized treatment plants, the G2RT functions as a standalone bathroom appliance. It neutralizes waste at the source, using cleaning technology to kill pathogens and transform feces into harmless, odorless ash. It requires no connection to a sewage system and no continuous water supply, needing only a single cup of water to begin its cycle.

The journey from a laboratory breakthrough to a global solution required a sophisticated commercialization strategy led by the Georgia Tech Office of Technology Licensing. The office managed the complex intellectual property, marketed the technology to industrial leaders, and negotiated the necessary license agreements to ensure the invention could be manufactured at scale. By working closely with the inventors, the office successfully signed agreements with three separate global companies poised to bring these toilets to the international market.

Following extensive testing of prototypes in diverse global markets, the technology is now ready for deployment. Manufacturers and sanitation providers have licensed the technology to companies who will deliver this innovation to the millions of people who need it.

Academic partners played a pivotal role in the project, as the Georgia Tech team worked closely with various organizations and disciplines to solve the water challenges from many angles. Key academic partners supporting the G2RT project include:

- Cranfield University: Filtration design lead and lead for field testing coordination across all G2RT testing sites
- Duke University Center for WaSH-AID: U.S. laboratory testing and analysis lead, providing expertise in the design, engineering, and field-testing of onsite waste treatment technologies
- University of Kwazulu-Natal (UKZN): Coordination and laboratory analysis for G2RT's South African field-testing campaign

- Birla Institute of Technology & Science Pilani: Coordination and laboratory analysis for G2RT's Indian field-testing campaign
- University of Science and Technology Beijing (UST-Beijing): Coordination and laboratory analysis for G2RT's Chinese field-testing campaign
- Colorado State University (CSU): Expert in design and experimental testing for G2RT's combustor module, which facilitates the safe and efficient combustion of processed waste
- Washington University in St. Louis (WUSTL): Professor Anne Marie Knott is crafting commercialization strategies for how the toilets can be moved out of the laboratory and into manufacturing

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