



Dr. Marek Kujath (left) and Dr. Ted Hubbard (right) lead a team in MEMS Research at Dalhousie University using tools and technologies provided by CMC.

Building Tiny Machines for Big Impact on Human Health

Dr. Ted Hubbard, Dr. Marek Kujath and their research team at Dalhousie University are building tiny electrical machines and robots that could improve health care and help save human lives. The research team is developing micro-robots, motors and mechanical 'grippers' to manipulate human cells and living bacteria—not one cell at a time, but thousands of cells at a time.

This could enable greater efficiency and productivity in medical screening, help keep Canada's national blood stock safe, enable doctors to diagnose patients faster, and allow researchers to isolate diseased cells when working towards a cure for the world's most common diseases.

Using MEMS technology, the team has designed and manufactured amplified 'micro-grippers' or mechanical claws so small (10-50 microns) they can isolate, clamp and manipulate a single bacterial cell. The devices have already been used on microscopic spores and could soon be used to monitor and test living bacteria. The team hopes to evaluate how the cell responds to movement, and study what happens when the environment of the cell is altered.

Dr. Hubbard says that without research infrastructure from CMC, none of this would be possible. "Access to chip fabrication and design software through CMC is essential to our continued research. MEMS is a design-intensive field; you have to build a lot of chips to get a final working device."

The team is working on many biomedical MEMS applications that promise to improve health care delivery. Dr. Hubbard states: "Smaller objects such as human blood cells are mobile and difficult to manipulate. MEMS technology could provide massively parallel, rapid, automated sampling. If we could test many red blood cells at one time, we could diagnose patients much faster."

Dr. Hubbard's team is close to overcoming some key challenges. They hope to have 'a grasp' on living cells and bacteria, and new technology to improve human health, in the next five years. [cmc](#)