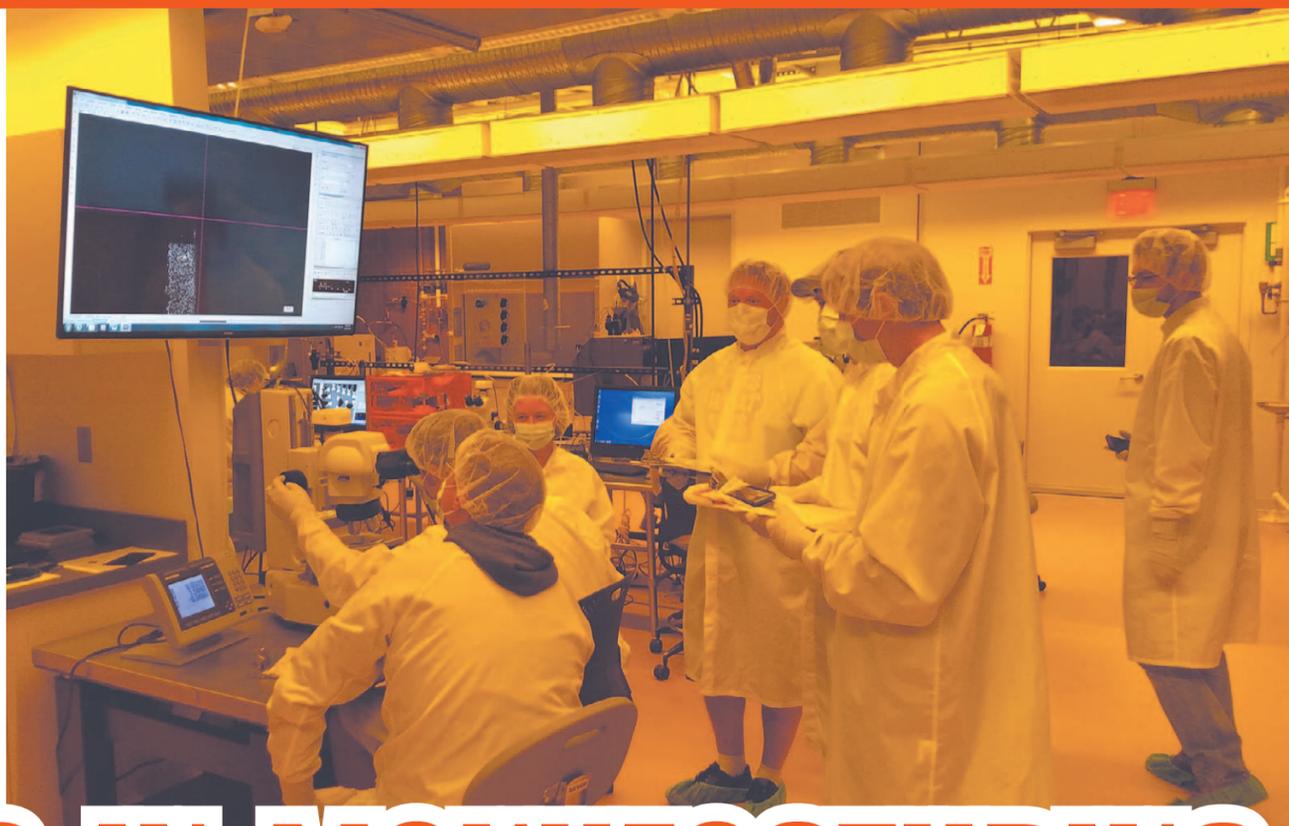


## October is Manufacturing Month in Ohio

Manufacturing is the process of converting raw materials, components, or parts into finished goods that meet a customer's expectations or specifications. Manufacturing has long been a cornerstone of our national economy. This crucial sector is central to the creation and retention of good jobs and a good standard of living for working families.



# CAREERS IN MANUFACTURING

**Micro-Electrical Mechanical Systems, MEMS, is a technology that consists of electronic components, sensors, mechanical actuators, and structures that are built on a micro and submicro scale. Micro-electronic technology is the manufacturable integration of electronic components and MEMS devices in a functioning circuit or product.**

## MEMS

Lorain County Community College is offering a new associate degree program that prepares students to work in the emerging micro-electromechanical field.

The MEMS degree offers a variety of challenges to students interested in pursuing careers in any of the above fields. Students enrolled in MEMS courses at LCCC get hands-on experience and training working with materials, equipment, protocols, and processes related to the microelectronics industry. Included are lectures on problem solving skills related to MEMS theory of design, sensor and microcircuit operation, material and size constraints, microelectronic packaging, printed circuit design, manufacturing, and project management. Students have the option of pursuing an associate degree, one-year technical certificate, or short-term technical certificate.

## TRAIN OH

In addition, LCCC has launched a new program called TRAIN OH (Training Recruitment Acceleration Innovation Network of Ohio), an Earn & Learn degree which combines a hands on college degree in Micro Electrical Mechanical Systems (MEMS) with a paid internship working with a northeast Ohio microelectronics industry company. We have partnered with employers to offer paid internship positions. Those selected for the internships will be enrolled at LCCC in the MEMS program, and working toward their associate degree in MEMS.

Classes are tailored by supporting microelectronics companies to teach what they want students to know on the job. Students will receive hands-on experience in Microelectronic Sensor Fabrication and Hybrid Board Assembly learning how to operate microelectronics packaging equipment, work with semiconductor fabrication materials, build a hybrid printed circuit board, and learn typical cleanroom terminology and protocols that will help accelerate your professional career in MEMS and microelectronics.

## The Desich SMART Center

The Lorain County Community College campus is also home to the Richard Desich SMART Commercialization Center for Microsystems. According to a press release from August, 2015, the Richard Desich SMART Commercialization Center for Microsystems will participate in a new federal initiative to advance the manufacturing and commercialization of flexible electronics in Northeast Ohio. The Desich SMART Center will utilize its unique expertise, facility and equipment in microsystems packaging and assembly to develop manufacturing

...this technology can be integrated into clothing for real-time health monitoring of patients.

processes for ultra-thin flexible sensor devices. Fully developing and optimizing these processes will be critical in reducing costs and increasing production for technology applications such as wearable electronics and the 'Internet of Things'.

"Flexible electronics is a key enabler for a rapidly growing need to have sensors integrated in products," said Matt Apanius, director of the Desich SMART Center. "For instance, this technology can be integrated into clothing for real-time health monitoring of patients at home. It can also be used to remotely monitor health conditions of military personnel or first-responders when performing duties. Our role at the Desich SMART Center will be to address the manufacturability of these technologies and get them to market."

## According to O\*Net Online:

**Electromechanical Engineering Technologists** assist electromechanical engineers in such activities as computer-based process control, instrumentation, or machine design. They may prepare layouts of machinery or equipment, plan the flow of work, conduct statistical studies, or analyze production costs.

Some of the tasks associated with this position include:

- Collaborate with engineers to implement electromechanical designs in industrial or other settings.
- Consult with machinists or technicians to ensure that electromechanical equipment or systems meet design specifications.
- Install or program computer hardware or machine or instrumentation software in microprocessor-based systems.
- Analyze engineering designs of logic or digital circuitry, motor controls, instrumentation, or data acquisition for implementation into new or existing automated, servomechanical, or other electromechanical systems.
- Fabricate or assemble mechanical, electrical, or electronic components or assemblies.
- The median hourly wage in 2015 was approximately \$29.50/hour, equating to an annual salary of over \$61,000.



## LCCC MEMS student John Bukovac

My cousin Anne, who is also in the program, introduced me to the MEMS program. I signed up for one of the info sessions and was completely sold. I went and signed up for school a couple of days later and here I am back in school, training in an exciting, fun and constantly changing field that blows your mind at times at the things that we do in class.

Classes are fun and incredibly informative, thanks to Professor Johnny Vanderford, who is so enthusiastic and full of energy that you never get bored in class or labs. I enjoy the current events web links that he sends us about what is going on in the industry. I also enjoy the labs. Each is a building block for the next and

I am truly amazed almost every class and lab at how the devices, that are so small, can be so complex and sometimes so simple. It truly is a fantastic learning experience and it's in a growth industry.

Being the lab tech in our clean room has been awesome. I am learning how and what it takes to run a full lab with many different pieces of equipment, chemicals, all kinds of parts and consumables to keep on hand for labs, helping other students in the lab and whatever else comes up. Our Professor lets me learn by example and also by giving me a project and letting me run with. He is there for me to answer any questions I have and is

very patient.

This has been a great experience so far and I'm just getting started. I can't wait to get into classes and labs to learn something new every day. This is a program that I would recommend to anybody who has any interest in how things, like how your phone, really work or what it takes to make all those tiny little microscopic devices work together to make your phone, tv, car, blood pressure machines, and thousands of other things in our world function. The words "That's so cool!" are not uncommon in our classrooms and labs. That's one of the main reasons why I'm doing this degree. Every day is cool. Bukovac is pictured left.