

**NextFlex QUARTERLY REPORT
QUARTER 8**

**Reporting Period: JULY 01, 2018 -SEPTEMBER 30, 2018
Lorain County Community College**

Project Title: TRAIN OH for MicroElectrical Mechanical Systems
(Training & Recruitment Accelerated Innovation Network)

Sponsor: NextFlex

Overall Project Dates: October 1, 2016 – September 30, 2018 (24 Months)

52

Employer Partners

interested in reviewing resumes, interviewing students, and/or committing to help in design of TRAIN OH and/or FlexFactor.

43

Work-Based Learning Commitments

with eighteen (18) different employers.

27

High School and/or Career Center Connections

for campus tours, program presentations, lab tours, and partners in FlexFactor.

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Training & Recruitment Accelerated Innovation Network

Pilot program launched at Lorain County Community College, with support from Ohio TechNet, through a grant from the U.S. Department of Labor, Employment & Training Administration, and NextFlex, the Flexible Hybrid Electronics Manufacturing Innovation Institute

Quarterly Report to NextFlex:

Quarter 8 (July 01, 2018 – September 30, 2018)

Performance Target Metrics

Deliverable	Performance Metric	Completed Quarter	Status
Launch two (2) cohorts of students	14-20	Q1 & Q4	Cohort 1 launched =10 students Cohort 2 launched = 20 students* TOTAL = 30 students
Recruit Students for First Cohort	8	Q1	Cohort 1, Q4: 10 total Cohort 2, Q6: 20 total*
Graduate Students for First Cohort	7 (90%)	Q8	As of Q8: 6 graduated 24 retained in program
Successful entrance into FT employment by cohort 1	7 (90%)	Q8	As of Q8: 6 graduated and received FT employment. 24 retained in program To Date: 100% of graduates received full-time employment after graduation
Employer partner survey	90% positive feedback	Q2 & Q6	Survey Feedback contained within Q2 Report Q6&Q7: continual feedback received from employers. Suggestions to curriculum, but overall, all positive feedback.
Expand # of Employer Partners for Cohort 2	10	Q3	Q3: 29 Q4: 30 Q5: 36 Q6: 44 Q7: 47 Q8: 51
Identify and support industry leaders to serve as co-chairs	2	Q3 & Q4	Industry leaders support the degree but the project management continues to be led by LCCC.

Recruit students for second cohort	10-12	Q1 & Q3	<p>Q4: 12, Class Full</p> <p>Q5: 11 retained in class</p> <p>Q6: Intro course added with 9 students Cohort 2 = 20 students</p> <p>Q7: 20 students retained in program</p> <p>Q8: Cohort 3 launched with an Intro to MEMS course of 18 students. Currently a waitlist for Fall of 2019 Intro to MEMS course.</p>
Sharing of replication model at events	2	Q3 & Q5	<p>Q3: Shared at Celebration Event</p> <p>Q6:</p> <p>1/30/18: Terri Sandu presented the TRAIN OH model at the American Association of Community Colleges</p> <p>1/18/18: Held replication meeting at Lorain to replicate TRAIN OH into Digital Fabrication.</p> <p>1/24/18: Held replication meeting at Lakeland Community College to replicate TRAIN OH into their Cybersecurity degree.</p> <p>10/18: approached by local company to replicate earn and learn model into automation degree. Continuing forward to launch TRAIN OH with LCCC's Automation Engineering degree.</p> <p>10/18: LCCC received an NSF award with Columbus State Community College to replicate TRAIN OH in the Digital Fabrication degree and replicate the earn and learn models state-wide.</p>
Replication Guides – Materials including online access	1	Q4	Replication Guide included with final report
Business & operations plan for sustainability and scaling	1	Q4	A replication guide is completed and provided. LCCC continues to work on understanding the business model needed to sustain and scale this earn and learn model. The College has expressed a goal of integrating this earn and learn approach in all applied degrees. The first replication of the model is taking place with an Automation Degree, to be followed by Digital Fabrication. These and other projects will give us further insights as to sustainability. Ongoing partnerships with colleagues in Ohio via Ohio TechNet and with the Manufacturing USA network offer the vehicle for sharing lessons learned.
Final report and presentation on approach and lessons	1	Q8	Final report is completed. A presentation on the approach used and lessons learned was provided via a NextFlex webinar on 8/2/18. Further, a white paper is in development by LCCC and will be shared once completed.
<p>* Due to the increase in demand, an additional Intro to MEMS course was added in January of 2018 and enrolled 9 students, increasing cohort 2 from 11 students to 20.</p> <p>**The Ohio Department of Higher Education gave approval for LCCC to offer an Applied Bachelor Degree. Approval from the Higher Learning Commission occurred in 2018 and the degree was launched in October 2018.</p>			

EXECUTIVE SUMMARY

TRAIN OH blends school and work into a 21st century earn and learn hybrid activity where companies and educators integrate activities in both space and time. A focus on MicroElectrical Mechanical Systems (MEMS), an existing program of study at Lorain County Community College designed to operate in concert with its SMART Center for Microsystems, was used to pilot this earn/learn model. The goal is to expand the model to include other areas of mechatronics, both at LCCC and other colleges, which brings together industrial maintenance studies in both electrical and mechanical areas. The TRAIN network builds on existing collaboration with manufacturing companies in the region involved with microelectronic assemblies and flexible hybrid electronics (FHE) who are part of a SMART Devices innovation cluster led by Team Northeast Ohio (NE), a regional economic development entity. Other partners include local employers and other local manufacturing intermediaries.

The positive impact of adopting an earn and learn model continues to be demonstrated both in terms of student and employer engagement. In Quarter 8, we increased the number of employer partners from 47 to 52 and increased the total number of work based learning opportunities from 36 to 43. Students have been successful in these roles and employers have been requesting additional resumes to meet their talent needs. Due to the success of the program, cohort 3 launched in fall of 2018 with 18 students. The class size was increased from 12 to 18 to allow more students into the program. There is currently a waitlist for fall of 2019 Introduction to MEMS course.

We are particularly delighted to have received additional interest in replicating the TRAIN OH program through a NSF grant with our partner, Columbus State Community

College, and from a local employer who has requested this program to run through the Automation Engineering degree. Companies such as Lincoln Electric designed an internship rotation solely around the TRAIN OH students due to the value they bring to the workplace.

The following employers have provided work-based learning opportunities to the TRAIN OH students.

- | | |
|--|---|
| 1. Bird Technologies | 10. Recognition Robotics |
| 2. Brighton Technology Group,
with the SBIR grant | 11. RBB |
| 3. Core Technology | 12. ScottCare Cardiovascular
Solutions |
| 4. IEC Infrared Systems | 13. SMART Microsystems |
| 5. Lincoln Electric | 14. Spectre Corporation |
| 6. Lorain County Community
College | 15. Synapse Biomedical |
| 7. NanoBio | 16. United Circuits |
| 8. NASA, with the SBIR grant | 17. Vexos |
| 9. Nordson MARCH | 18. Prime Instruments |

LCCC's Opportunity magazine issues quarterly publications for four (4) different surroundings cities. Issue 2 was released in November 2018 and 3 of the 4 issues included MEMS/TRAIN OH students on the cover. Links to these publications are provided below:

Opportunity, Elyria Edition – Corbet Keith, TRAIN OH Student:

https://issuu.com/lcccwebpubs/docs/lccc_opp_issue2_elyria_corbetkeith

Opportunity, Lorain Edition – Sherry Washington Keith, TRAIN OH Student:

https://issuu.com/lcccwebpubs/docs/lccc_opp_issue2_lorain_sherrywashin

Opportunity, Southern Townships Edition – Trey Brown, TRAIN OH Student:

https://issuu.com/lcccwebpubs/docs/lccc_opp_issue2_sotwps_treybrown

Quarter 8: Lorain County Community College's TRAIN OH for Microelectrical Mechanical Systems Project

PROJECT MILESTONES, TASKS AND DELIVERABLES

Project plan for Quarter 8 includes summary of completed tasks. **The project plan is also attached in Excel spreadsheet for easier viewing.**

Quarter 8: July 01, 2018 - September 30, 2018					
Activity	ID	Milestone	Assigned Resource	Deliverable	Quarterly Status Report
	1				<i>to be submitted with quarterly invoices</i>
Activity #1: Fill talent pipeline of small and medium businesses	1.1	Gather data of placement of cohort 1 after graduation	Courtney Tenhover, project team, Program Developer	Successful entrance into FT employment by cohort 1 at 90%	90% of cohort 1 has received a full-time position after graduation or is currently still enrolled in the program. Details of each student in Cohort 1 is listed within report
	2				
Activity #2: Increase enrollment in and completion of programs tied to in-demand careers	2.1	Final data gathering of cohort 2 students	Courtney Tenhover, project team	Gather final feedback survey	Cohort 2 contained 20 students. Of those 20 students, 17 have been offered and/or started an internship within the TRAIN OH program. Three (3) of these students worked in two (2) internships within the program. 1 of these students received a full-time position while completing the program. 85% of cohort 2 has been placed to date.
	4				
Activity #4: Increase interest in advanced manufacturing as a career	4.1	Final Report and Community Showcase	Courtney Tenhover, Terri Sandu, Bernie Gosky, Team NEO, project team, employers	Final report and presentation on approach and lessons	Replication guide and TRAIN OH white paper are attached in report submission and review the approach and lessons of the two-year project.
	5	Budget Tracking	Joe Martin		
	6	Quarterly Reporting	Courtney Tenhover		Due 11/30/2018
	7	Update project plan template	Courtney Tenhover		

TRAIN OH STUDENT SUMMARY

Summary of all the work-based learning opportunities to date for the TRAIN OH students.

Student	Employer			Notes	
Cohort 1	A	RBB		Student graduated (May 2017) and hired on full-time at RBB	
	B	RBB	NanoBio	Student still currently interning at NanoBio	
	C	LCCC		Student still currently interning at LCCC	
	D	SMART		Student still currently interning at SMART	
	E	Synapse Biomedical		Student graduated (May 2018) and hired on full-time at Synapse Biomedical	
	F	Synapse Biomedical		Student no longer in MEMS program	
	G	Nordson MARCH	NanoBio	Student graduated (May 2018) and hired on full-time at NanoBio	
	H	IEC Infrared Systems	SMART	ScottCare	Student graduated (May 2018) and hired on full-time at ScottCare
	I	Core Technology		Graduated May 2017. Continuing classes at LCCC, no longer at Core Technology.	
	J	SMART		Student is currently pursuing other internship opportunities, no longer at SMART	
Cohort 2	K	SMART	Lincoln Electric	Student was recently offered full-time position at Lincoln Electric, start date in May of 2018	
	L	BTG	Spectre Corporation	Student still currently interning at Spectre Corporation	
	M	BTG		Student interviewing with various companies.	
	N	BTG	Core Technology	Student started internship with Core Technology in May of 2018	
	O	BTG	Lincoln Electric	Student started internship at Lincoln Electric in May of 2018	
	P	BTG	Bird Technologies	Student was hired full-time role at Bird Technologies	
	Q	United Circuits		Student completed internship at United Circuits and is currently starting its own business in the business incubator space at LCCC	
	R	SMART		Student still currently interning at SMART	
	S	Lincoln Electric		Student recently offered position at Lincoln Electric, started May of 2018	
	T	United Circuits		Student started internship in May of 2018	
	U	Spectre Corporation		Student started internship in May of 2018	
	V	NASA with SBIR Grant	Recognition Robotics	Student started internship June 4, 2018 at NASA. Internship ended and internship at Recognition Robotics began in September 2018.	
	W	SMART		Student started internship in May of 2018	
	X	Lincoln Electric	Core Technology	Student started internship at Lincoln Electric in June of 2018 and Core Technology in October of 2018.	
Y	Vexos		Student started internship in June of 2018		
Z	Synapse Biomedical		Student started internship in June of 2018		
AA	SMART		Student started internship in June of 2018		
Cohort 3	BB	Core Technology		Student started internship in August 2018	
	DD	SMART	Core Technology	Student started internship at SMART in September 2018 and Core Technology in October 2018. Completing two internships at one time.	
	GG	Prime Instruments		Student started internship in October 2018.	
	HH	Lincoln Electric		Student started internship in November 2018.	

**New Internships that began in
July 2018 – November 2018.**

SUCCESS WITH LINCOLN ELECTRIC

In November of 2017, LCCC met with Geoff Lipnevicius, Lincoln Electric's Senior Manager, Organizational Effectiveness at a local event. Geoff expressed the company's strong interest in establishing a link to LCCC to generate a new pathway for students, including providing input to LCCC's expanding earn and learn pilot, and serving as an internship / full time employment destination for LCCC students. The company now has its own clean room and also a significant investment in commercial additive manufacturing as part of its own processes.

LCCC subsequently hosted a visit by Geoff in February of 2018. He spent a few hours at LCCC learning about LCCC Manufacturing programs and toured the Fab Lab and clean room lab. Of particular interest to Lincoln Electric are Engineering and Manufacturing programs such as: **Automation Engineering, Digital Fabrication, Electronic Engineering, Manufacturing Engineering, Mechatronics and Welding.** Immediate alignment was identified for the following programs:

- MEMS
- Digital Fabrication

Geoff felt that the TRAIN OH earn and learn model could be of interest to Lincoln Electric, given the outstanding training provided by LCCC.

Following Geoff's visit to LCCC, two of his colleagues from Lincoln Electric toured the MEMS lab with faculty member, Johnny Vanderford. This visit generated additional interest in the LCCC programs and Geoff invited LCCC to send students to Lincoln Electric for a tour. LCCC students attended a tour at Lincoln Electric on March 16, 2018.

On March 16, 2018, a bus of 20+ students left LCCC and went to Lincoln Electric in Euclid, OH. On the bus were students interested to see how their education and training can get them a job on Lincoln Electric's Printed Circuit Board (PCB) assembly lines. After two visits, Ben Young and Geoff Lipnevicius of Lincoln Electric stated that LCCC's MEMS degree and TRAIN OH program, along with the upcoming bachelor degree in Microelectronic Manufacturing were one of a kind and useful for bringing in trained talent to Lincoln Electric's PCB assembly lines. With over 3000 employees producing 50,000 PCB per month for welders and power supplies, they're in need of students who can operate equipment, solder components, electrically test, draft & design PCB. The MEMS degree has all of this and more as does the Bachelor's degree. Lincoln is happy to support this degree and welcomed students for a 3 hour tour and lunch. During this tour students found out Lincoln Electric has a fantastic pay rate that offers higher pay for higher worker output, they offer tuition reimbursement, and a constantly growing environment with positions to attain in engineering, design, R&D, and engineering management.

Twenty (20) LCCC students attended and response was very positive from both Lincoln Electric and the students. Geoff encouraged students to submit an online application while keeping him informed that an application has been submitted. After the tour and applications were submitted, 6 students were offered positions at Lincoln Electric.

Types of opportunities shared by the team at Lincoln Electric:

- Materials handlers (entry level)
- Machinists
- Welders
- Tool & Die
- Technologist positions:
 - Assemblers & Machine operators (entry level)
 - Tester
 - Quality assurance
 - Service technician
 - R&D technologist/technician

Lincoln Electric was impressed with the skills of the students that resulted from the tour. Due to this success, Lincoln Electric designed an internship structure specific to the MEMS students in September of 2018. The student's resumes are currently being reviewed and we hope to announce new LCCC interns at Lincoln Electric. The internship will be structured as follows:

MEMS Internship Rotations, (5) Interns needed and potentially 2 / Rotation = 10 Interns Needed

- Thru-Hole Part Soldering/Desoldering: Be able to remove soldered defective part and replace with a good part. **Personnel Needed (1)**
- Surface Mount Part Soldering/Desoldering: Be able to remove soldered part and replace with a good part. **Personnel Needed (1)**
- General PC board Inspection: Be able to detect nonconformities such as flatness, wrong part, reversed part, missing part, solder bridges, missing solder, etc. **Personnel Needed (1)**
- Conformal Coating Inspection: Be able to detect nonconformities on coated/potted assemblies such as missing coating, coated part, etc. **Personnel Needed (1)**
- X-Ray /Optical Inspection (AOI): Be able to inspect assemblies using X-Ray and AOI equipment to detect defects such as missing solder, Ball Grid Array issue, solder bridges, copper short/open, misaligned part etc. **Personnel Needed (1)**

POSTER BOARD DISPLAYS

Posters were created to be shared at local tours, events, and presentations. These posters provide an overview of the TRAIN OH model, success stories of the students, and overall statistics of the program.

EARN AND LEARN

Developing Talent for Innovation Companies

OVERVIEW

With a focus on pairing school with employment, Lorain County Community College's earn and learn program develops highly trained and educated talent to meet the increasing demand of workforce. It is the link between industry and education and combines a hands-on college degree with a paid internship to build the necessary skill sets for students to enter into the job market. The earn and learn program allows students to attend school full-time, two days a week and engage in a paid work-based learning opportunity aligned with their chosen degree program at a sponsoring company three days a week.

EARN AND LEARN

PROGRAM GOALS

FILL THE TALENT PIPELINE OF SMALL AND MEDIUM BUSINESSES	DECREASE EDUCATION-RELATED STUDENT DEBT	INCREASE ENROLLMENT IN AND COMPLETION OF PROGRAMS TIED TO IN-DEMAND CAREERS	INCREASE INTEREST IN ADVANCED MANUFACTURING AS A CAREER
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SUCCESS FACTORS

MARKET RESEARCH	EMPLOYER ENGAGEMENT	FACULTY SUPPORT	STUDENT RECRUITMENT	APPLICATION & ENROLLMENT	PLACEMENT & COMPLETION
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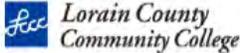
NEXT FLEX
Leading in Flexible Hybrid Education Manufacturing Solutions

Lorain County Community College

OhioTechNet
OhioHigherEd

TRAVEL INCENTIVE DOCUMENT

Students of the LCCC MEMS degree are required to have an internship in order to receive their degree. Several companies 30+ miles away from the student's home have listed workforce needs for TRAIN OH students. A travel incentive was designed in partnership with LCCC's Career Services department to assist students overcome the barrier of traveling to work and while providing an internship opportunity that they would not be able to fulfill without the incentive. This is funded through a state grant within Career Services. The incentive will help take students from the PROGRESS to COMPLETION step and remove any potential barriers or roadblocks the student faces. We want to ensure that each student has the greatest opportunity for success while also helping our manufacturing community grow.



**Lorain County
Community College**



**Center for Microelectronic
Sensor Fabrication and
Hybrid Board Assembly**



TRAIN OH
Training & Workforce Development Center of Excellence

Travel Incentive Request – LCCC MEMS Students

Students of the LCCC MEMS degree are required to have an internship in order to receive their degree. Several companies 30+ miles away from the student's home have requested workforce that students meet requirements for. A travel incentive is designed to assist students overcome the barrier of traveling to work and while providing an internship opportunity that they would not be able to fulfill without the incentive. The incentive will help take students from the PROGRESS to COMPLETION step and remove any potential barriers or roadblocks the student faces. We want to ensure that each student has the greatest opportunity for success while also helping our manufacturing community grow.



Award

A student is eligible to receive up to \$350 (\$50 per week for the first 150 hours of work-based learning) in travel assistance for internships that are further in distance from the student's home.

Recommended Process and Requirements

- ✓ Internship must be 30 miles or more from the student's home to be eligible for the incentive.
- ✓ Student is required to submit a short paragraph to declare their interest.
- ✓ Student must be enrolled in work-based learning to receive incentive.
- ✓ Incentive will be provided for the first 150 hours of internship.

Request for Pilot Year

Semester 1 (Aug 18 – Dec 18):
Incentive awarded to 2 MEMS students..... \$700

Semester 2 (Jan 19 – May 19):
Incentive awarded to 5 students..... \$1,750

Semester 3 (May 19 – August 19):
Incentive awarded to 7 students..... \$2,450

Employer Support

The following companies have expressed a need as of July 2018 for MEMS students and have requested resumes of these students. These employers are over 30 miles of LCCC.

<i>Company</i>	<i>Distance from LCCC</i>
Bird Technologies.....	40 miles
CO-AX Technology Inc.....	43 miles
COTSWORK.....	46 miles
Dan-Mar.....	30 miles
Interactive Engineering Corporation.....	40 miles
RBB.....	49 miles
TT Electronics.....	60 miles

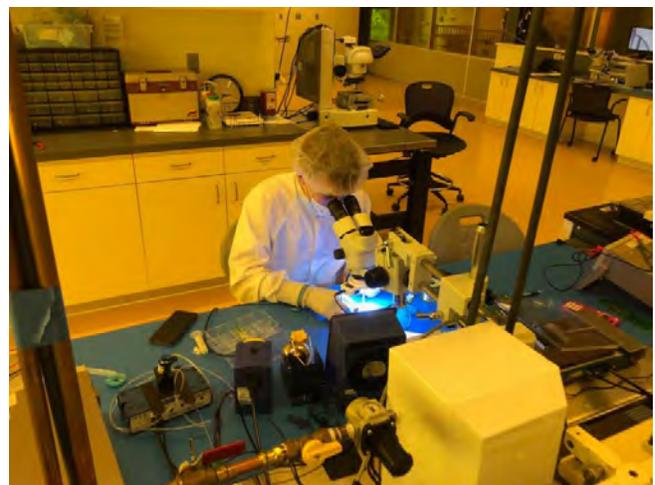
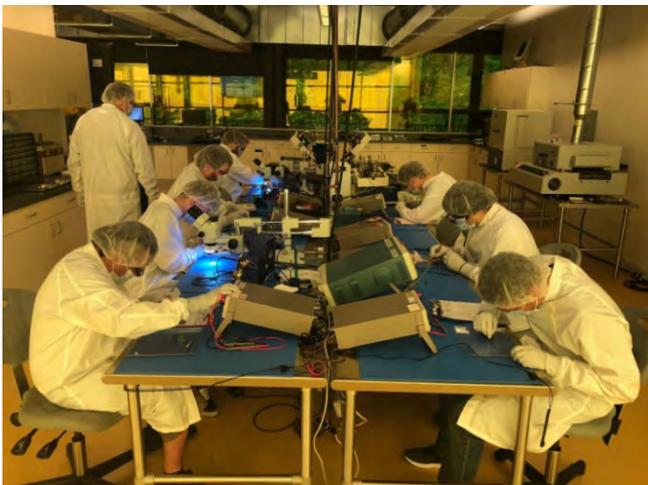
This incentive will allow LCCC to meet the talent needs of more employers in Ohio by removing the barriers students have in traveling to these employer sites and ensures LCCC continues to accelerate business and job growth.

STUDENT SUCCESS STORIES & STATEMENTS

- John Bukovac earned a NASA Scholarship award and was able to present his research findings at NASA in the spring of 2018. John was a current Lab Technician in the MEMS lab and earned his Associate Degree in MEMS in July of 2018. John was recently offered a full-time Lab position with LCCC and he will pursue the Applied Bachelor Degree in MEMS.
- Sarah Grimm, Brandon Filker, and Trevor Zitek graduated from the TRAIN OH – MEMS program in May of 2018 with an Associate Degree in MEMS. Each student was a part of TRAIN OH and earned a full-time position in the MEMS field after graduation. A video was created of the three graduates and it was shown at graduation. The video can be viewed here: [https://youtu.be/34uEPE- WOk](https://youtu.be/34uEPE-WOk)
- LCCC received sub-contracts through two (2) SBIR grants which provide work-based learning opportunities to the TRAIN OH students. These grants also allow LCCC to expand its geographic footprint in the field as the students are able to work for companies that are located outside of Northeast, Ohio
- LCCC became the first community college in Ohio to be approved to offer an Applied Bachelor Degree in Microelectronic Manufacturing and launched its first class in October of 2018. The TRAIN OH model will continue throughout the Bachelor Degree.
- A resident of Lorain County created a scholarship in his name and selected the MEMS degree to be the recipient. The award is intended to support Lorain County Community College/University Partnership students. Preference will be given to those students who meet the criteria of; student of Hispanic descent preferred, a Lorain High School graduate, enrolled or accepted into the LCCC MEMS program, and in the top 20% of their class. Six (6) students applied to this application and MEMS student, Brian Kachur, was awarded the first scholarship of \$1,000.
- Relaunched the SMTA student chapter at LCCC and designated a new officer team and members. The student chapter will help lead networking events, be the face of college students to the parent chapter, and help to increase interest in the field.
- SBIR grant student, Eleana Cintron, is currently interning at NASA for her project. A recent publication highlighted her success. A link to the article can be found here: <https://www.lorainccc.edu/stories/seizing-every-opportunity/>
- Student Quote: “I’ve been able to actually teach the people that trained me new things, and I think that’s very cool. I think I’m an actual asset to the company, rather than someone that they can just replace and expect the same from the replacement.” – Bryan Mencke, Intern at Vexos
- Student Quote: “I finished the design on the LED PCB this week and took them to Cleveland Circuits to discuss the fabrication. It was awesome to visit them and talk about my design and the MEMS program. Never really thought about how this program not only provides jobs but can improve the local economy with businesses supporting each other when the students are all aware of the local companies and services offered.” – Chris Mariner, Intern at Recognition Robotics

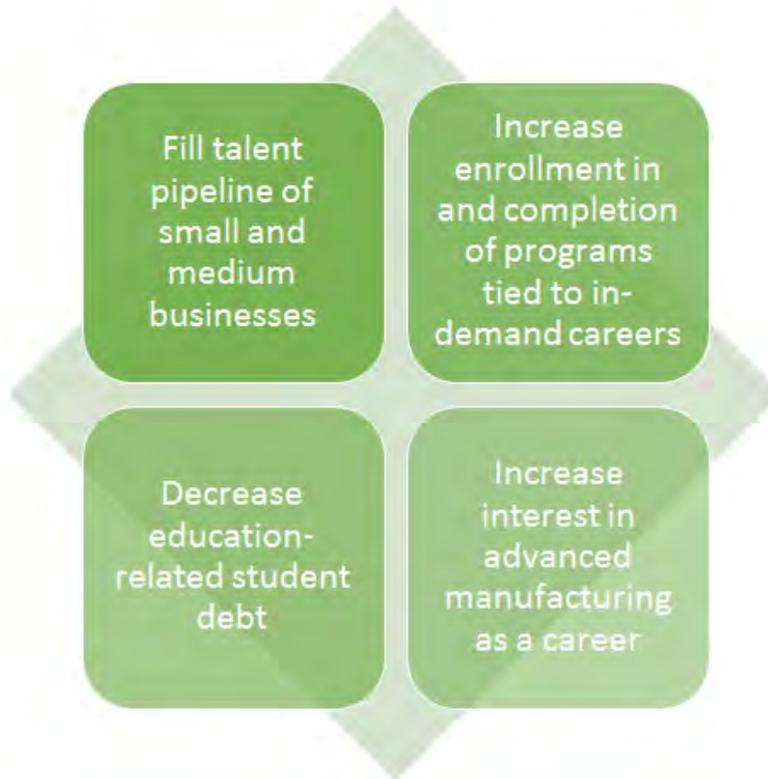
NEW SOLDERING EQUIPMENT

Purchasing the soldering equipment has helped tremendously over the past few months of in-class training. Our industry-tailored curriculum requires students to have an internship in order to receive their degree, to which, much of the training requires one-on-one skills-based training with equipment related to soldering, inspecting, and testing printed circuit boards such as what the student is using in one of the attached images. These students in the past few weeks have been hired at companies as manufacturing assemblers, electronic technicians, and quality assurance repair techs specifically using this equipment on their job. It has helped to create over 15 job opportunities in the past few weeks specifically geared around this equipment. Over 10 additional students are interviewing for job positions with companies in need of this skill-set and it can be found at Lorain County Community College now that we have the equipment for the hands-on training.



PROGRAM GOALS

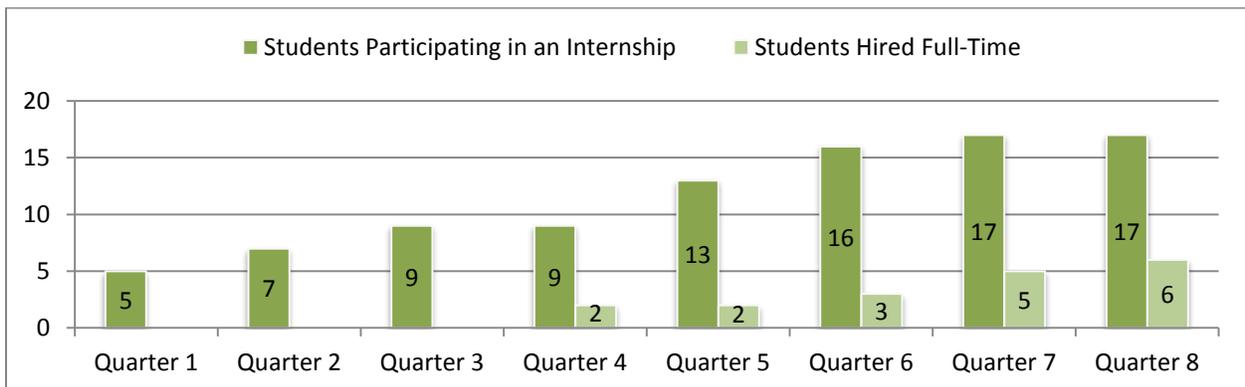
What problems were we solving at the start of this project?



Progress from Q1 to Q8 in solving these problems

Problem: Fill talent pipeline of small and medium businesses

Engaging Talent: Cohorts 1 & 2



Quarter 8: Lorain County Community College's TRAIN OH for Microelectrical Mechanical Systems Project

Problem: Fill talent pipeline of small and medium businesses & Increase interest in advanced manufacturing as a career

Course Enrollments:

**TRAIN OH
Began**

Course	Course Title	2015-16	2016-17	2017-18
MEMS 122	Introduction to MEMS	8	21	21
MEMS 132	MEMS Packaging	9	13	13
MEMS 211	Micro-Fabrication Processing	-	5	12
MEMS 211	Micro-System Capstone Project	-	5	9
MEMS 287	Work-Based Learning I – MEMS	2	7	10
MEMS 288	Work-Based Learning II - MEMS	1	2	7

Declared Majors:

Major Title	2015-16	2016-17	2017-18
Mechatronics Technology: Micro-Electromechanical Systems (MEMS) – Associate Degree	8	30	47
Mechatronics Technology: Micro-Electromechanical Systems (MEMS) – Short-Term Certificate	3	5	9
Mechatronics Technology: Micro-Electromechanical Systems (MEMS) – One-Year Certificate	1	4	4

Problem: Decrease education-related student

Average Earnings in TRAIN OH: \$11,520 - \$19,008

Cost of Associate Degree: \$8,042 - \$9,553 (depends on residency)

Calculations based on:

Student's Earnings: \$10.00/Hour - \$16.50/Hour

**Student's Schedule: 24 hours per week for 3 semesters
16 weeks per semester**

APPLIED BACHELOR DEGREE APPROVAL

The option for Ohio's community colleges to offer applied bachelor's degrees came as part of the state's fiscal year 2018-2019 operating budget. House Bill 49, signed into law by Gov. John Kasich at the end of June 2017, gives the state's chancellor of higher education the ability to allow community colleges to offer applied bachelor's degrees. The bill noted the chancellor will be able to approve programs that can provide data showing "specific workforce need" and evidence demonstrating sustainable demand. They must have partnerships with industry, so students can receive work-based training and get jobs after graduation. Also, the proposed programs can't already be offered by state or private colleges or universities.

The applied bachelor's degree that Lorain County Community College (LCCC) will offer — microelectronic manufacturing — combines "mechanical and electrical engineering technology with science, mathematics and communications" to embed sensors and micro electromechanical systems in their products. The college estimates that the degree will cost students less than \$15,000 and with the earn and learn model, students may be able to earn up to \$18,000 in the MEMS field while completing the degree.

The seeds for this applied bachelor's degree were sown in 2011 with the launch of SMART Microsystems which is designed to assist companies in bringing new MEMS sensor products to the market. With support from EDA, philanthropic and state funding, SMART Microsystems moved into LCCC's brand new Desich Center in 2013. In order to provide much-needed talent for the sensor industry, LCCC added an associate degree program in mechatronics technology with a focus in micro electromechanical systems (MEMS) in 2014. Also in 2014, the Ohio Department of Higher Education provided equipment to establish a clean lab for the MEMS degree. As with the launch of many high-tech degrees, enrollment was a challenge in the early semesters of the associate degree.

"We heard the needs of employers and responded. This program is developed with strong input and support of employers," LCCC president Marcia J. Ballinger said in the news release about the degree authorization. "This is all about advanced manufacturing and growing a talent base to help companies not only compete, but grow and thrive especially as new technologies emerge."

Below are news placements regarding this new degree:

Quarter 8: Lorain County Community College's TRAIN OH for Microelectrical Mechanical Systems Project

LCCC press release: <https://www.lorainccc.edu/newsroom/2018/03/20/lorain-county-community-college-named-one-three-community-colleges-lead-ohio-delivering-applied-bachelors-degrees/>

Ideastream (article and radio segment): <http://wcpn.ideastream.org/stateimpact/2018/04/02/three-ohio-schools-inch-toward-applied-bachelor%E2%80%99s-offering>

News Channel 5: <https://www.news5cleveland.com/news/local-news/oh-lorain/lorain-county-community-college-will-offer-bachelors-degree-in-growing-field-seeing-demand-for-jobs>

Cleveland.com:

http://www.cleveland.com/metro/index.ssf/2018/03/lorain_county_community_colleg_14.html

The Chronicle: <http://www.chroniclet.com/Local-News/2018/03/21/LCCC-to-offer-its-own-bachelor-39-s-degree-program.html>

Community College Daily: <http://www.ccdaily.com/2018/03/venturing-bachelors-degrees/>

Loraincounty.com: <https://www.loraincounty.com/education/feature.shtml?f=41429>

CRAIN's Cleveland Business:

<http://www.craincleveland.com/article/20180321/news/155661/lorain-county-community-college-gets-state-approval-pursue-applied>

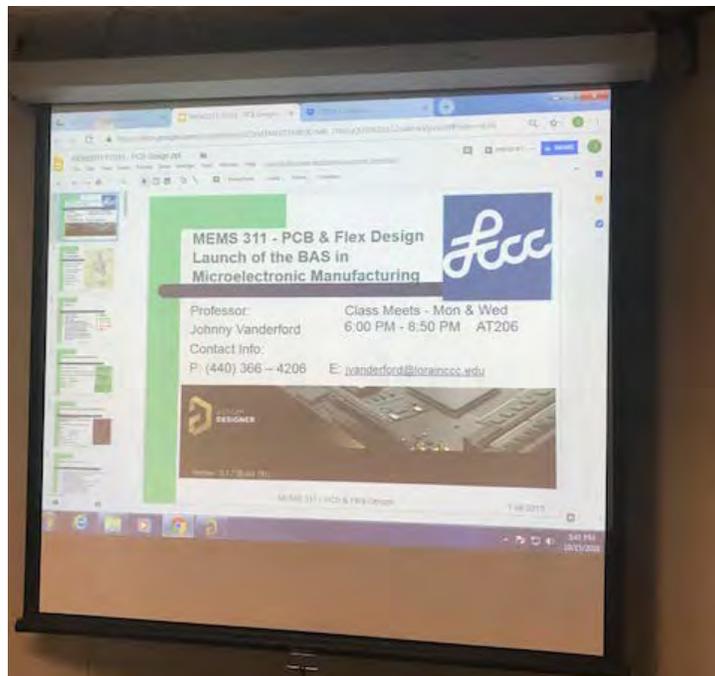
The Morning Journal: <http://www.morningjournal.com/article/MJ/20180320/NEWS/180329924>

PR Newswire: <http://markets.businessinsider.com/news/stocks/lorain-county-community-college-named-one-of-three-community-colleges-to-lead-ohio-in-delivering-applied-bachelor-s-degrees-1019034692>

LCCC IMPACT magazine (Page 5): https://issuu.com/lcccwebpubs/docs/lccc_impact_4/4

LAUNCH OF THE APPLIED BACHELOR DEGREE

The Bachelor Degree launched on Monday, October 15th. Below are pictures from the Printed Circuit Board Design course that uses Altium and other software to design and create a PCB applying schematic, bill of materials, and layout. 6 students enrolled in the fall 2018 course.



Quarter 8: Lorain County Community College's TRAIN OH for Microelectrical Mechanical Systems Project

FLEXFACTOR

Proud to be the 1st partner with NextFlex to launch FlexFactor outside Silicon Valley!

FlexFactor was launched on March 19, 2018 with Early College High School, which is located on the campus of Lorain County Community College. There were 13, ninth grade, students in the initial class that launched FlexFactor. Early College High School launched a 2nd iteration in October of 2018 and will be offered in four (4) different classes throughout the school year, impacting approximately 80 students. The 2nd iteration class started on October 29th with 17 students and the following three (3) classes will occur from January through May in 2019. A picture of the kickoff is below. Additional high schools have expressed interest in the program and meetings are underway to determine launch dates. These high schools include Oberlin High School, Clearview High School, and Firelands High School.

Employers that have supported this program, include; Technology Recovery Group (TRG), Blue Spark Technologies, NanoBio, NASA, and Beckett Gas. We have plans to introduce Hyland to this program in the spring of 2019, and early conversations are underway with NextFlex member, Lubrizol.



NOTABLE EMPLOYER ACTIVITY

Employer	Outcomes
Lincoln Electric	Developed internship rotation specific to LCCC MEMS students due to the success of past LCCC interns. Looking to hire 5-10 interns.
Pressco	New company that requested to learn more about the program and is in process of developing a job description that would be a fit for the TRAIN OH students.
Recognition Robotics	Hired their first intern from the MEMS program.
Prime Instruments	New company that requested resumes of students. Hired one intern in November of 2018.
Soraa	New company to the Northeast Ohio area and requested to review resumes of TRAIN OH students.

EMPLOYER FEEDBACK

I wish that this kind of program had existed during my college crash and burn times. I think you folks have put together a great program, and I'll look forward to following its progress.

– IEC Infrared Systems

As an employer, Hana strongly supports LCCC's proposed Applied Bachelor's Degree in Microelectronic Manufacturing because it meets a workforce need that isn't currently being addressed by other higher education institutions in the region. While northeast Ohio has a number of very strong engineering programs the degree LCCC is proposing is unique and complements existing degree programs versus duplicating them. LCCC's program specifically focuses on an emerging technology field of microelectronic manufacturing where students who emerge from the program have robust work-based learning experience, knowledge and experience of working in clean rooms, applied operator and design experience and industry recognized certifications that we value. The program is a necessity for northeast Ohio employers
- Hana Microdisplays

PARTNER ENGAGEMENT SUMMARY

<u>Committed Partnership:</u> Employer has committed to reviewing resumes of students and/or partnering with LCCC in ongoing program design	<u>Initial Outreach:</u> Outreach has been made to the employer.	<u>Future Outreach:</u> Plans have been made to contact these employers.
NueVue Solutions	Lumitex	Smartshape
Bird Technologies	RPC	Cubbison
RBB	NanoTech Innovations	Acense LCC
SMART Microsystems	CTI Sensors	PolyOne
NanoBio Systems	Flashtalk Tech	Singleton
Sierra Lobo	Orbital Research	Parker
Midwest MicroDevices	Hy-Ko	GE Lighting
Linear ASIC	First Solar	Eaton
Laird Technologies	Tabtronics	Bendix
Hana Microdisplays	Aligned NanoTech	Ohio Circuits
GenVac	First Solar	King Lumineer
First Power	PUI Audio	
Kent Displays	Spectre Sensors	
Sensor Development Corporation	Ferro Corp	
Rockwell Automation	Humanetics	
Valtronic	Lubrizol	
Vexos		
Quality ElectroDynamics (QED)		
Synapse BioMedical		
Nordson ASYMTEK		
Nordson MARCH		
Aatru Medical		
Libra Industries		
IEC Infrared Systems		
Core Technologies		
Recognition Robotics		
NASA Glenn Research		
Interactive Engineering Corp.		
Lorain County Community College		
BTG Labs		
Thogus		
Paragon Robotics		
Delta Systems		
Panasonic		
ZIN Technologies		

Lincoln Electric		
Materion Corporation		
LTI		
SD Miller & Associates		
Technology Recovery Group		
Spectre		
Q-Labs		
COTSWORKS		
Blue Spark Technologies		
7signal		
Cleveland Circuits		
TT Electronics		
Arrow International		
CO-AX Technologies		
Prime Instruments		
Soraa		
Pressco		

MILESTONES OUTLINED IN QUARTER 8 PROJECT PLAN

Activity 1: Fill talent pipeline of small and medium businesses

1.1: Gather data of placement of cohort 1 after graduation (Successful entrance into FT employment by cohort 1 at 90%)

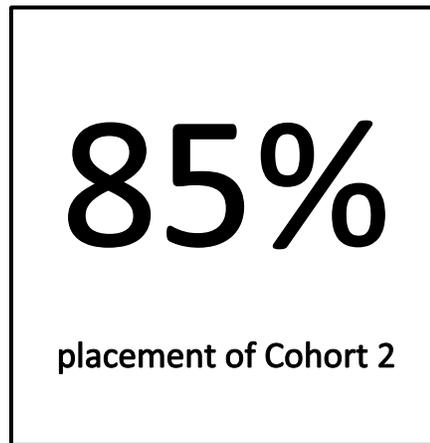
IMPACT: 90% of cohort 1 has received a full-time position after graduation or is currently still enrolled in the program.

Cohort 1: 10 Students	
Student	Status
A	Graduated with Associate Degree Hired full-time within MEMS field after graduation
B	Working as intern at NanoBio while pursuing Associate Degree
C	Working as Intern as Lab Technician at LCCC Completed Associate Degree in July 2018. Offered full-time position with LCCC as a Lab Instructional Aide and started full-time in November 2018.
D	Working as Intern at SMART Microsystems Will complete Associate Degree by May 2019
E	Graduated with Associate Degree Hired full-time within MEMS field after graduation
F	Worked as an Intern at Synapse Biomedical Removed self from program to pursue opportunities outside of the MEMS field
G	Graduated with Associate Degree Hired full-time within MEMS field after graduation
H	Graduated with Associate Degree Hired full-time within MEMS field after graduation
I	Graduated with Associate Degree Hired full-time within MEMS field after graduation
J	Completed internship in MEMS field Anticipated to earn Associate Degree in MEMS by December 2018

Activity 2: Increase enrollment in and completion of programs tied to in-demand careers

2.1 Final data gathering of cohort 2 students

Cohort 2 contains 20 students. Of those 20 students, 17 have been offered and/or started an internship within the TRAIN OH program. Three (3) of these students worked in two (2) internships within the program. 1 of these students received a full-time position while completing the program.



Activity 4: Increase interest in advanced manufacturing as a career

4.1: Final report and presentation on approach and lessons

Replication guide is included with final submission.

DETAILS OF OPEN ITEMS

Open items for Quarter 8 include the following:

All deliverables have been met at the conclusion of the project period. LCCC is completing work on a white paper about the TRAIN pilot in MEMS which will be shared when completed. The work for this was covered by the College and not charged to NextFlex.

RISKS AND MITIGATION

The following risks were identified in the original proposal and those that relate to Quarter 8 deliverables have been identified below and the impact on this quarter.

Risk	Mitigation	Impact on Quarter 8
Employers will choose to opt out of the program early (Can't afford, economy change, students not at level expected)	Have a continuous recruitment strategy of employers for students to work with.	- Employers found value in the TRAIN OH program and understand the skills and education the students were receiving was valuable and did not choose to opt out early, unless they could not afford to keep the student.

<p>Students won't enroll in the program</p>	<p>Outreach to several different outlets and follow the outreach strategy.</p> <p>Engage with students that haven't declared a degree.</p>	<ul style="list-style-type: none"> - Due to the success of cohort 1 and the level of attention the program has been getting in the media, there has been a positive impact on the program and helped to mitigate this risk. - The fall of 2018 Intro to MEMS course was at capacity and the class was increased from 12 to 18 students. - The fall of 2019 Intro to MEMS course currently has a waitlist.
<p>Students won't stay in the program</p>	<p>Explain the value of the program to the students and importance of maintaining the employment for future career paths.</p>	<ul style="list-style-type: none"> - Students have been highly engaged with program and see the value of staying with the program. - Since cohort 1 has been successful, students have been able to interview with more than one employer, which increases their engagement. - 90% of students that were in cohort 1 have either graduated or earned a full-time position, or are still TRAIN OH students continuing on with their degree. - The students in cohort 2 have found success in internships. Many cohort 2 students have had the opportunity to work with more than one employer. These students are staying within the MEMS field and can see their future career path. - Over the course of the two year project, only one student chose to leave the program. The remaining students either graduated and received a full-time position or were retained within the program.
<p>Financial cost to administer the program is more than expected</p>	<p>Outline the budget in the beginning to ensure all costs are captured and program is financially stable.</p>	<ul style="list-style-type: none"> - There were no issues in Quarter 8 with going over the anticipated budget, due to LCCC's ability to leverage Ohio TechNet and the financial management of the budget at LCCC.

<p>Replication does not occur elsewhere</p>	<p>Document the program so any other college could replicate.</p> <p>Find the upcoming markets for replication.</p>	<ul style="list-style-type: none"> - A replication event occurred in January of 2018 at Lakeland Community College to replicate the model within their Cybersecurity Degree. - Through the Ohio TechNet partnership, we are able to share the model with all 11 community colleges, and with state leaders in industry, workforce and education. - Conversations continue with Honda and Columbus State Community College about replication of their model and ours and we plan to meet with additional community colleges. - A joint proposal was submitted to the NSF towards this goal and LCCC received notification in Quarter 8 that LCCC was awarded the grant with Columbus State. - Began partnerships with a local employer to launch TRAIN OH within the Automation Engineering Degree. - LCCC leadership has expressed a goal to embed an earn and learn approach into all applied degrees.
<p>Education and training does not remain aligned to available careers as technology changes</p>	<p>Review target career pathway model with employers to ensure program meets its needs.</p> <p>Continually review workforce needs with employers and adjust program accordingly.</p>	<ul style="list-style-type: none"> - Johnny Vanderford continually sends updates to employers with updates about what the students are learning in class and working on, continual feedback is asked of employers. - The degree is still heavily driven by industry feedback.
<p>Employers want to hire on students before the program is over</p>	<p>Reiterate the education the students will have if they remain in the program.</p> <p>Work with employers on effective education assistance programs to continue the student's education.</p>	<ul style="list-style-type: none"> - Employers see the value in the full Associate Degree and want the students to gain the knowledge before hiring them on full-time. - The students that have been hired on full-time have the opportunity to take the MEMS classes in the evening in order to complete their education.