



October 3, 2018

Enterprise Florida
800 N. Magnolia Ave
Suite 1100
Orlando, FL 32803

RE: Submission to the 2018-19 Florida Job Growth Grant Fund-Workforce Training

Dear Program Manager,

On behalf of The University of Central Florida Board of Trustees (UCF), we are pleased to endorse the proposal entitled, "*Training and Education in Advanced Manufacturing Using Internet of Things (TEAM-IT)*", by Dr. Ranganathan Kumar, Department of Mechanical and Aerospace Engineering, partnered with Seminole State College, Lake Sumter State College, Lake Technical Collee, Pineridge High School, and Machining Training School.

Enclosed you will find the statement of work and its budget. In the event this proposal is awarded, UCF expressly reserves the right to negotiate applicable terms and conditions at the time of award. In no case will UCF be bound by any terms or conditions that are in violation of applicable laws or regulations. Additionally, we are committed to administer this project with the understanding the UCF will receive a 30% indirect rate.

If you have any questions concerning the technical content of this proposal, please contact Dr. Kumar at (407) 823-4389 or via e-mail at Ranganathan.Kumar@ucf.edu. For budgetary or administrative questions, please contact me. Contractual questions and award documents should be addressed to OSP@ucf.edu.

Sincerely,

A handwritten signature in blue ink that reads "Emily Bennett" with a horizontal line extending to the right.

Emily Bennett
Sr. Proposal Manager
Phone: (407) 882-0066
Email: Emily.Bennett@ucf.edu



2018-2019 Florida Job Growth Grant Fund Workforce Training Grant Proposal

Proposal Instructions: The Florida Job Growth Grant Fund Proposal (this document) must be completed and signed by an authorized representative of the entity applying for the grant. Please read the proposal carefully as some questions may require a separate narrative to be completed. If additional space is needed, attach a word document with your entire answer.

Entity Information

Name of Entity: The University of Central Florida Board of Trustees
Partners:
Seminole State College
Lake-Sumter State College
Lake Technical College
Pineridge High School, Volusia county
Machining Training Solutions

Federal Employer Identification Number (if applicable): [REDACTED]

Contact Information:
Primary Contact Name: Ranganathan Kumar
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Secondary Contact Name: Emily Bennett
Title: Proposal Manager
Phone Number: 407-882-0066

Workforce Training Grant Eligibility

Pursuant to 288.101, F.S., The Florida Job Growth Grant Fund was created to promote economic opportunity by improving public infrastructure and enhancing workforce training. This includes workforce training grants to support programs offered at state colleges and state technical centers.

Eligible entities must submit proposals that:



- Support programs and associated equipment at state colleges and state technical centers.
- Provide participants with transferable and sustainable workforce skills applicable to more than a single employer.
- Are offered to the public.
- Are based on criteria established by the state colleges and state technical centers.
- Prohibit the exclusion of applicants who are unemployed or underemployed.

1. Program Requirements:

Each proposal must include the following information describing how the program satisfies the eligibility requirements listed on page 1.

A. Provide the title and a detailed description of the proposed workforce training.

TRAINING AND EDUCATION IN ADVANCED MANUFACTURING USING INTERNET OF THINGS (TEAM-IT)

A Central Florida consortium consisting of Lake Technical College, Lake-Sumter State College, Seminole State College, Pineridge High School in Volusia county, Machining Training Solutions (MTS) and several manufacturing companies, in partnership with the University of Central Florida, proposes a three-year customized training program for 765 trainees in advanced manufacturing called “Training and Education in Advanced Manufacturing using Internet of Things (TEAM-IT) to create a skillful technical workforce that will meet the State’s current and future needs. The existence of a talent supply chain is often a critical decision factor for companies to select a site for establishing a manufacturing facility. Therefore, it is essential that we develop a unique workforce training program that includes modern intelligent manufacturing technologies such as 3D printing and IOT (Internet of Things)-enabled manufacturing. TEAM-IT will cater to the diverse student groups in high school technical centers and state colleges, and the public at large interested in continuing education to develop special skills in modern manufacturing practices.

University of Central Florida is the #1 workforce supplier to the aerospace and defense industry¹. With programs such as DirectConnect that guarantee student admission to UCF with associate degree in partner colleges, UCF is in a unique position to provide the leadership in manufacturing to create the proposed TEAMIT consortium with the surrounding state and technical colleges, small and large manufacturing companies. Florida employs 328,000 people in its 21 manufacturing sub-industries with average compensation significantly higher than Florida average². However, there is a shortage of workforce with technical skills in advanced manufacturing processes. It has been assessed that 1) more than 50% of the small and large manufacturers would have invested \$70B in industrial IOT to reduce product development and assembly costs, and 2) there will be 2 million unfilled jobs in manufacturing in the US by 2025.

¹ Aviation Week, 2015, 2016, 2017.

² National Association of Manufacturers, 2014 www.nam.org

Work plan for the proposed training program

TEAM-IT proposes a multi-target manufacturing education/training certificate program to train a total of **765 trainees over three years**, which includes university students, state/community college instructors, community college students, and unemployed/underemployed people and high school students/graduates. The courses will be offered in: a) Blueprint reading, b) Geometric dimensioning and tolerancing, c) Computer-Aided design and d) Computer-Aided Manufacturing. These courses will include hands-on training in CNC (Computer Numeric Control) simulation of multichannel lathes, machining on lathes and mill-turn centers, programming and simulation of multi-spindle CNC machine tools, and universal machining cycles for turning and milling. The program also includes hands-on training in industrial IOT and manufacturing using additive manufacturing (3D printing) of both polymer and metallic products using the software SolidWorks. Depending upon their educational background, all trainees will receive training for 80-460 hours in CNC machines, IOT operation, and 3D printing. Upon completion of this training, the trainees will earn a certificate in manufacturing. In addition to Universal Studios' 120 apprenticeships (see below under student training and support letter from SSC), four manufacturing companies in Central Florida will provide 20 internships in the second and third years of this program. The number of trainees for the three years will be selected as follows.

1) Instructor Training:

- 15 instructors (teachers, adjunct professors and lecturers) will be trained from participating institutions. The instructors will be prepared for future IHK instructor certification.

2) Student Training:

- 180 students from **UCF** with credits given towards graduation in engineering. UCF will serve as one of the TEAM-IT hands-on training facilities for polymer and metal 3D printers.
- 120 students from **Seminole State College (SSC)**. SSC offers industry-focused 4-year Engineering Technology degree program, and will be one of the principal partners in TEAM-IT. Through partnership between SSC and Universal Studios, 120 students will be trained and offered multi-year apprenticeships at the end of the program. CNC 5-axis machine will be housed at SSC in the Robert and Jane Lee Campus at Oviedo to increase accessibility to SSC and UCF students. Five of the faculty instructors to be trained on the CNC and 3D printers will come from SSC. SSC partners with high schools and trains hundreds of dual enrolled students in engineering technology labs such as mechatronics. Mechatronics skills are central to the technician jobs crossing multiple industry sectors and will be well-aligned with the CNC and 3D printer training in TEAM-IT.
- 90 students from **Lake Technical College**. Lake Tech Center for Advanced Manufacturing offers training in CNC machining.
- 90 students from **Pineridge High School**. CTE (Career and Technical Education) at Pineridge can take career preparation programs which can earn them industry certifications. Pineridge will receive a metal printer through another program, and will serve as one of the TEAM-IT hands-on training facilities on 3D metal printing.
- 90 students from the **Lake-Sumter State College (LSSC)**. LSSC offers an associate degree and a certificate program in engineering technology. Students will be trained in Internet of Things (IOT) in remote device monitoring and control. LSSC will also serve as one of the TEAM-IT hands-on training facilities for 3D polymer printer.



- 180 unemployed/underemployed individuals from the general public will be trained by *MTS*. These students will be recruited through Career Source and other organizations. *MTS* will serve as one of the hands-on training facilities for CNC machining.

Training Program

This state-of-the-art TEAM-IT Program will use *on-line* learning with a simulation software in CNC training that is highly engaging for the new generation mindset of learning. The program is highly flexible and provides broad exposure to a wide range of equipment, controls and tooling options. The simulation software significantly shortens the learning curve given the built-in proprietary learning assist features while allowing multiple students to be trained at the same time. Software support for CAMWorks will be provided to schools and colleges for the duration of the program with software updates and technical support. The support program insures that the participating schools and colleges will be able to remain abreast of the latest innovations in CNC technology. CAMWorks uses the same SolidWorks geometry to generate toolpaths and feature recognition, and makes it easier to learn and fun for students to design parts.

Introductory classes will acquaint students with the basic manufacturing operations such as safety, shop math, blue print reading and metrology. Students then transition into performing tasks encountered in a manufacturing environment in a virtual CNC simulator. Tasks include selecting tools, raw materials, work holding, and the steps involved in preparing CNC equipment for operation. Also, CAD/CAM software is provided as part of the turnkey package to introduce students to software that is used by industry in the design and CNC programming process. After a successful simulation, students will perform tasks associated with running production on an Industry 4.0 IOT-enabled vertical milling machine, housed at the *MTS* facility.

In addition, the students will receive training in 3D printing at the UCF and Pineridge facilities. 3D printing is a manufacturing process where a computer-aided-design (CAD) model is sliced into a series of 2D images and then built by adding materials in a layer-by-layer fashion. Thus, the part is built by using additive methods (e.g., binding and sintering) instead of subtractive methods (e.g., cutting, drilling, and shearing). This enables on-demand manufacturing without the need for tooling, greatly reduces manufacturing time and cost, and makes possible the fabrication of parts with complex structures that are not achievable using traditional manufacturing.

For this project, we propose to acquire a HAAS 5-axis CNC vertical machine and an Optomec Lens 450 model 3D printer. The CNC machine is Industry 4.0 certified and will teach students how to make smart decisions through real-time communication with machines. The metal 3D printer is based on the LENS (Laser Engineered Net Shaping) technology which uses nozzles to spray metal powders onto target position and uses a laser beam to melt the powders to build fully dense parts. The lessons on 3D printing will vary depending on the students' background. For example, engineering students will hear lectures on the key elements of LENS, such as powder spraying mechanisms, laser induced thermal transfer, and metal cooling processes. They will relate their learning from the courses in machine design and CAD/CAM to the physical processes taking place in the machine. Other students will be provided hands-on experience with this machine to become proficient in the basic operation of a metal 3D printer, including tool path planning, powder feeding, atmosphere control, laser parameter setting, online monitoring, and post-processing. The



training will conclude with presentations by the trainees showcasing what they have learned and the parts they have built.

B. Describe how this proposal supports programs at state colleges or state technical centers.

This project, TEAM-IT, partners with Lake Technical College, Lake-Sumter State College, Seminole State College and Pineridge High School in Volusia county. These schools and technical centers provide their own manufacturing programs to their students. Our training partner, MTS, has trained instructors in Lake Technical College to create a 600-hour manufacturing program that is approved by FLDoE and qualifies for PELL funding.

TEAM-IT will train 15 instructors (teachers and adjuncts) who can train many more students in their respective schools, state colleges, technical centers. This will sustain the Career and Technical Education (CTE) programs at Pineridge, Lake Technical College, and the certificate and degree programs at Lake-Sumter State College and Seminole State College. CTE programs are a vital component of college and career readiness efforts to prepare high school students. TEAM-IT will support these programs in the state and provide a pathway to advanced degrees in a state university like UCF.

TEAM-IT will complement these efforts by partnering with them and providing special training in 3D printing and Internet of Things (IOT), which are not offered currently in any program, and will place a high priority in hands-on industry training. Following are two examples of how this program supports state colleges.

- 1) Lake-Sumter State College offers the Substation and Relay Technician specialization and the manufacturing component of that degree is minimal. LSSC has shown a great deal of interest in this project since it will provide a mechanism for them and Lake Technical College to advance their partnership and to provide another means of training students in IOT (see attached letters). LSSC and LTC, through their relationship with an IOT company, will be training students in remote device monitoring and control.
 - 2) Seminole State College offers associate degrees, Engineering Technology degree, and provides vocational training to 300 dual-enrolled students from area high schools (e.g., Lyman High). Their NSF-funded programs in mechatronics provides interns to students at Universal. SSC can train these students in advanced manufacturing through partnership with Universal Studios who will provide apprenticeships to these students (see attached letter).
 - 3) Pineridge High School will receive a 3D metal printer (see attached letter from Rep. Santiago). UCF personnel will provide industry-based hands-on training to the instructors and students on the basics and complexities of metal printing.
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C. Describe how this proposal provides participants transferable, sustainable workforce skills applicable to more than a single employer.

Transferable skills:

Advanced manufacturing is embraced by both small and large industries such as aerospace, automotive, medical, defense, nanotechnology and consumer products. Therefore, our unique and comprehensive training program is specifically designed so that the skills are transferable. The hands-on training that is proposed for the workforce here on Computer Aided Design/Computer Aided Manufacturing (CAD/CAM), CNC simulation of complete machining on lathes and mill-turn centers and 3D printers will be tailored to the needs of machine operators, welders, assemblers, inspectors, and maintenance professionals. The machine operations learned in this program are transferrable to multiple industries in Florida provided in Section 2B of the solicitation. Since additive manufacturing is capable of fabricating high value-added parts with complex geometry, there is also potential for sustainable long-term employment for workers. 3D printing reduces production, labor costs and scrap metal. IOT-enabled CNC machine training is unique in Florida and training in this area will not only provide transferrable skills to the workforce but will also make the program sustainable.

Program sustainability:

Fifteen teachers and adjunct faculty will be trained from the participating schools and state colleges that have their own manufacturing program, making the program sustainable for the foreseeable future. Our program will provide all software, curriculum and tools for the courses, and an online web portal where students can attend classes and use the Learning Management System (LMS) for course work. The program will also provide each student an account for an encrypted VPN (Virtual Private Network) access, CAMWorks software best suited for coding in CNC machines, access to training manuals and online certification tests. These internet-based procedures will make the program sustainable. UCF is currently developing an undergraduate manufacturing program in which engineering students will be recruited. Through Direct Connect agreement, Seminole State College students and Lake-Sumter State College students with an associate degree can enroll at UCF in any of the engineering programs.

Through TEAM-IT, manufacturing equipment will be kept in different shared facilities around Central Florida as given below. This would provide a basis for sustainability for future training in advanced manufacturing.

Seminole State College: HAAS 5-axis CNC vertical milling machine Industry 4.0 (IOT)

Lake-Sumter State College: 3D polymer printer

Pineridge High: 3D metal printer

UCF: Polymer and Metal (Optomec Lens 450) 3D printer

MTS: Several existing 3-axis milling machines and lathes.

In addition, the standards of the apprenticeship program were recently approved for several manufacturing companies in Central Florida who have written support letters for this program (see attached). The 3.5-year apprenticeship provides the workforce with national certifications that will attract more workers to join these manufacturing training programs and thus will sustain the program.



D. Does this proposal support a program(s) that is offered to the public?

Yes No

Yes. TEAM-IT will offer this program to the general public. MTS is part of this proposal that offers the only unique curriculum that includes advanced conventional manufacturing techniques using CNC with Industry 4.0 standard. UCF and our partner schools and state colleges along with MTS already offer courses and training in different manufacturing skills that the companies need. This proposal will unify existing operations and add IOT-enabled and additive manufacturing as special skills to the workforce.

This project will also target 180 (60 per year) high school graduates or anyone in the general public wanting to make a career transformation. They may hold associate degrees or other degrees, and may want to make a career change facilitated by the certificate program. Appropriate advertising and pre-screening tests will be used for admission to the training program.

Pre-screening tests and ACT scores will be used for admission to the training program. These students and those enrolled in this program will receive a certificate in manufacturing training upon completion. In addition, they will be pre-screened for the Apprenticeship program that several Central Florida companies recently received approval to provide paid apprenticeship to 7200 hours including national certifications [IHK CNC Production Specialist, IHK BZ001 and MSFC-CPT].

E. Describe how this proposal is based on criteria established by the state colleges and state technical centers.

The state colleges and technical centers offer short-term certificate programs in different manufacturing technologies for promising careers. The criteria and curriculum for manufacturing in Lake Technical College were established in partnership with MTS which has trained instructors. These criteria are developed such that the in-class programming is aligned with industry standards and is developed with the guidance and support of manufacturers in Florida. The web-based and in-class programs and hands-on training, as proposed here, are well aligned with the criteria established by the state colleges, state technical centers and Florida Manufacturers' Association. TEAM-IT proposal is based on the criteria established by the state colleges and technical centers in that it provides a pathway for students to complete their training and earn certificates. It follows their curricula which provide appropriate credits to the students. It also enables the state colleges to create a distributed manufacturing network similar to the industry environment which the trainees will enter upon completion of training.

The program listed here leads to 2 industry certifications (these certifications are on the state CAPE funding list: IHK CNC Production Specialist, IHK BZ001 and MSFC-CPT).



F. Does this proposal support a program(s) that will not exclude unemployed or underemployed individuals?

Yes No

Offering manufacturing training to the general public, in particular to the unemployed or underemployed individuals with a desire to make career transformation is the hallmark of the TEAM-IT program. Appropriate marketing will be done for the program with the help of CareerSource, and the unemployed and underemployed individuals will be sought after, trained and given apprenticeship. The budget reflects supporting 180 such individuals including veterans needing to transition into the workforce.

G. Describe how this proposal will promote economic opportunity by enhancing workforce training. Please include the number of jobs anticipated to be created from the proposed training. Further, please include the economic impact on the community, region, or state and the associated metrics used to measure the success of the proposed training.

Economic Opportunity:

Advanced intelligent manufacturing helps maintain a diverse economy, and creates and sustains high-paying jobs. The training we provide in this project will promote economic opportunity for the young workforce as well as individuals in mid-career transformation. It also promotes investment in capital equipment because of the need to move into advanced methods such as additive manufacturing, research & development. The top 5 companies in Central Florida employ 1000 manufacturing technicians. TEAM-IT will promote economic opportunity to 765 by enhancing workforce training and maintaining a high quality of life.

Number of jobs anticipated:

In 3 years, 765 trainees will be trained, and all are expected to get jobs. Out of these, 120 are already guaranteed jobs at Universal Studios. In addition, this project will provide 30 more internships in five different companies (see attached letters). The TEAMIT program will create a multiplicative effect on the number of students trained per year in the future. By training at least 15 instructors, with each instructor training 60 students in advanced manufacturing at his/her respective institution, this project has the potential to produce 900 additional manufacturing trainees per year after the program is over. This could be a conservative estimate since additional instructors can be trained in other institutions by the currently trained instructors. This will sustain the program well beyond the 3 years of this program, creating high-paying manufacturing jobs in Florida.

Economic impact on the community:

TEAM-IT is a unique program that will prepare skillful workforce in modern manufacturing involving additive manufacturing and IOT to make the State of Florida competitive in retaining its existing companies and attracting new companies to the State. This program will place a high priority in technical education and hands-on industry training to maintain global leadership of the Florida industries. The associated



apprenticeship program and the national certifications will prepare these students for high salary jobs. The Florida Manufacturing (e.g., Metal Essence, GWS Tools) has received approval from the State to administer the Apprenticeship Program (Registration 2017-FL-68555) to provide extensive manufacturing training which will last 7200 hours or 3.5 years. Hence, TEAM-IT program can result in 2 industry certifications (these certifications are on the state CAPE funding list), and will be able to feed the workforce through the Apprenticeship program as well. The apprenticeship program along with national certifications will get these students ready for job search at higher salaries.

3D printing of metal parts is the fastest growing segment of the \$1.3B market rising from 4% in 2003 to 20% in 2010 and has continued to expand further. Firms that sold just 10 AM machines per year are now selling hundreds of machines as multiple industries are beginning to adopt 3D printing to manufacture key parts. 3D-printed parts can be produced on demand without the need for tooling, which helps with supply chain management. This type of manufacturing is also environmentally sustainable since it contributes to energy savings of nearly 50% compared to the old methods of casting, molding, etc. TEAM-IT training program includes both advanced conventional methods for large-scale production and modern additive manufacturing (3D printing) methods.

Thus, TEAMIT will contribute to the *Florida Higher Education Coordinating Council's* (HECC) goal of 55% of Florida's population ages 25 to 64 attaining a postsecondary certificate or degree by the year 2025. The proposed workforce development is needed to give workers the right skills for advancement opportunities in manufacturing to drive innovation, increase productivity and to maintain global leadership of the Florida industries.

Metrics to measure success:

The metrics for measuring the success of the proposed TEAMIT project are: 1) total students enrolled each year; 2) students retained in the program till completion; 3) students trained in advanced equipment; 4) students receiving at least one CAPE (Career and Professional Education) certification among the two certifications [CNC Production Specialist (IHK BZ001) and MSFC-CPT] they will be trained for; 5) students' placement in Florida's manufacturing companies. Apprenticeship will be considered an important metric for further training for multiple high-paying manufacturing jobs.

2. Additional Information:

A. Is this an expansion of an existing training program? Yes No

If yes, please provide an explanation for how the funds from this grant will be used to enhance the existing program.



B. Does the proposal align with Florida's Targeted Industries? (View Florida's Targeted Industries here.)

Yes No

If yes, please indicate the targeted industries with which the proposal aligns.

The proposal is aligned with Florida's Targeted Industries such as life sciences, biotechnology, medical device, pharmaceutical manufacturing, photonics, microelectronics and defense & aerospace industries. UCF already has the reputation of being this nation's #1 workforce supplier to the aerospace and defense industry. Through this program, UCF and our partner companies will strive to move the needle up to reaffirm Florida as the top State for advanced manufacturing.

C. Does the proposal align with an occupation(s) on the Statewide Demand Occupations List and/or the Regional Demand Occupations List? (View Florida's Demand Occupation Lists here.)

Yes No

If yes, please indicate the occupation(s) with which the proposal aligns.

493011	HSHW	Aircraft Mechanics and Service Technicians
493021		Automotive Body and Related Repairers
491011	HSHW	First-Line Supervisor of Mechanics, Installers, and Repairers
499041	HSHW	Industrial Machinery Mechanics
514041		Machinists
173023	HSHW	Electrical and Electronics Engineering Technicians
172071	HSHW	Electrical Engineers
499051	HSHW	Electrical Power-Line Installers and Repairers
472111	HSHW	Electricians
172072	HSHW	Electronics Engineers, Except Computer
172112	HSHW	Industrial Engineers
172141	HSHW	Mechanical Engineers

Note 1: Workforce selection Criteria: FLDOE Training Code 3 (PSAV Certificate), 4 (Community College Credit/Degree), or 5 (Bachelor's Degree)

Note 2: HSHW indicates High Skill, High Wage



D. Indicate how the training will be delivered (e.g., classroom-based, computer-based, other).

If in-person, identify the location(s) (e.g., city, campus, etc.) where the training will be available.

If computer-based, identify the targeted location(s) (e.g. city, county, statewide) where the training will be available.

The training will be both in-class and web-based with hands-on training. Since the proposal contains different student categories, the training will be held in different locations as follows.

1. UCF students will undergo course training as per schedule on UCF campus and earn credits for a technical elective toward graduation from an engineering program. The training is expected to last a semester. Having taken courses such as CAD/CAM, Machine Design courses, these students will undergo hands-on training in the 5-axis CNC machine at the Seminole State College Oviedo campus. Training on 3D printing will be provided on campus.
2. State college and high school instructors will receive instruction in class, web-based and hands-on training at MTS and 3D printing on UCF campus. This training is expected to last 160 hours and can be fast-paced depending on the instructor's requirements.
3. State college students at LSSC and SSC will receive 160 hours of training. These can be translated to several credits toward their course work, certification or associate degree. The instructions can last a semester.
4. Qualified high school students (LTC, Pineridge) will receive 600 hours of in-class training that will last an academic year. Individuals from general public can opt to receive web-based instruction and hands-on training at MTS and 3D printing on UCF campus.

Learning Management System (LMS): A cloud-based curricula and student management system with full manufacturing content will be ready to be used as both teaching aid and self-paced learning platform. Students will have access to video, reading, presentation and test resources. The LMS gives the teacher complete visibility of their students' progress throughout the duration of their learning path.

Virtual Private Network (VPN): The MTS VPN access is designed to provide students with 24/7 access to the simulation software CAMWorks. In situations where the school is not at liberty to grant the students access to the school's network outside of the school day, VPN can fill the need. Students are given a password and setup instructions that will allow them to read the licenses on the server wherever they have internet access to use the CAD, CAM and simulation tools.



E. Indicate the number of anticipated enrolled students and completers.

The number of anticipated enrolled students from UCF, state colleges, high schools and general public is 765. All are expected to complete the program as the program is free for them with the possibility of paid internship or multi-year paid apprenticeship which will qualify them for high paying jobs in the State.

F. Indicate the length of program (e.g., quarters, semesters, weeks, etc.), including anticipated beginning and ending dates.

Begin Date: June 1, 2019 End Date: May 31, 2022

- UCF students: Every semester beginning Fall, 2019.
- Instructors: 160 hours web-based and in-class. Start date is flexible.
- LSSC students: 160 hours of training in-class. Every semester beginning Fall, 2019.
- Qualified high school students (LTC, Pineridge): 600 hours of in-class that will last an academic year beginning Fall, 2019.
- General public: 160 hours of training web-based or in-class on a flexible basis, every quarter starting in March, June, September and December from 2019.

G. Describe the plan to support the sustainability of the proposal.

The program is sustainable since it is a unique combination of conventional and modern training in advanced and additive manufacturing. Most of the funds will be used to blend the existing programs with the new courses, and ensure high quality of manufacturing training in Florida which will attract hundreds of individuals in the future to take this training program.

The main plan to support the sustainability of the proposal is to train 15 instructors from participating institutions, who will go back to their respective schools and colleges to train more students and instructors in future years. In addition, UCF's Mechanical Engineering Department will create a 3-credit hour course for a technical elective toward graduation from an engineering program at UCF to provide hand-on training in modern manufacturing technology that will sustain the workforce development program.

The on-the-job training upon completion of the certificate program through internship or multi-year apprenticeship will provide incentive to attract and retain highly qualified workforce in manufacturing and improve productivity in Florida and US. All the trainees would be encouraged to seek national certifications in manufacturing [IHK CNC Production Specialist (IHK BZ001) and MSFC-CPT] which can be earned through this registered apprenticeship. Support letters are attached from companies willing to offer internships and apprenticeships to qualified individuals.

The CAMWorks software license provided to the students is also the one that is used in the industry. Due to this on-the-job training, the students will be motivated to learn in this program that features direct engagement with both companies and schools. The schools can give an opportunity to the digitally-literate



current younger generation to see the drastic changes in technology that make machinists and manufacturing techniques more reliant on computer systems and high precision instruments. This type of training in digital age of smart manufacturing will make the course popular and sustainable.

H. Identify any certifications, degrees, etc. that will result from the completion of the program. Please include the Classification of Instructional Programs (CIP) code if applicable.

The students from UCF will receive a Bachelors' degree in engineering (either Mechanical or Industrial engineering) along with a certificate from the proposed program. This certificate will be given upon completion of the required in-class, web-based courses and hands-on training.

The students from state and technical colleges, high school students and unemployed/ underemployed individuals will also receive a certificate upon completion of the required in-class and web-based courses.

In addition, the students will have enough training to opt for two national CAPE certifications, *IHK CNC Production Specialist (IHK BZ001)* and *MSFC-CPT*.

I. Does this project have a local match amount?

Yes No

If yes, please describe the entity providing the match and the amount.

Salary match from UCF for faculty and students of \$398,567 will be cost-shared. This includes support letters from 5 manufacturing companies (see attachment) that they would accept at least 20 interns in the second and third years. In addition, all 120 TEAM-IT students in our partner institution, Seminole State College, are guaranteed to receive multi-year apprenticeships at Universal Studios (see support letter).

J. Provide any additional information or attachments to be considered for the proposal.

PROJECT PERSONNEL

Dr. Ranganathan Kumar will serve as the PI of this project and coordinate the efforts between UCF and our partnering institutions and companies in providing manufacturing training to students from UCF, high schools, state colleges and public at large in several of the counties in Central Florida.

Dr. Kumar currently serves as the Associate Dean for Research and Administration in the College of Engineering and Computer Science (2012-now) and Pegasus Professor of Mechanical and Aerospace Engineering. Previously, he also served as Chair of the MAE department (2003-2008). He has coordinated manufacturing efforts in his department and the college, and has directed large nationally funded centers



such as Research Experience for Undergraduates (2007-10), Research Experience for Teachers (2004-08), Industry-University Cooperative Research Center (2005-08). He has written over 200 technical articles. Dr. Kumar is a Fellow of the American Society of Mechanical Engineers, and currently serves as the Associate Editor of ASME Thermal and Sciences and Engineering Applications and also on the Editorial Board of Scientific Reports, a Nature publication.

Dr. Aravinda Kar leads the Laser Advanced Manufacturing and Materials Processing (LAMMP) laboratory in CREOL, The College of Optics and Photonics at the University of Central Florida. He will oversee the training programs and apprenticeship programs of all the students selected by a Selection Committee in this project. He will serve as a **co-PI** of this project in charge of the 3D printer installation, maintenance and training. He will work towards expanding existing courses in mechanical engineering, in particular CAD/CAM and manufacturing labs. Dr. Kar has been working on various aspects of laser materials processing and manufacturing for more than 30 years, and published over 100 technical journal papers, over 150 conference papers and received over 25 patents. He is a Fellow of the Laser Institute of America. He has written a book entitled, Theory and Application of Laser Chemical Vapor Deposition.

Mr. Al Stimac is President & CEO, Metal Essence, Inc. and Machining Training Solutions, LLC and President, Manufacturers Association of Florida, and will serve as the industry liaison for this project. The standards for Mr. Stimac's Advanced Manufacturing Apprenticeship program were recently approved and registered by the Florida Department of Education. Mr. Stimac has founded companies that specialize in training workforce and in the production of high volume, high tech parts used in the automotive, aerospace and electronics industries. He has served as President of the Board of the Manufacturing Association of Central Florida (MACF) and continues to serve as a board member. To help fill the growing need for skilled manufacturers, Mr. Stimac resides on the Higher Education Coordination Council (HECC) representing the Florida Senate, to which he was appointed by President of the Senate.

Participant Recruitment and Selection

A selection panel including the PI, Co-PIs, and representatives from the partnering institutions will be established to determine applicant selection. An application deadline at the end of each semester will be maintained for UCF students, and the selection procedure will be concluded by the beginning of Fall semester. We will maintain a rank list of the next 10 applications in the event vacancies are created due to unforeseen circumstances. The same selection panel will select trainees from community college instructors, state/community college students, and unemployed/underemployed individuals with deadlines at the beginning of every quarter, i.e., December 1, March 1, June 1 and September 1. The program will be flexible to accommodate these trainees at different times so that they can complete the training program and begin their Internship program. The Internship program will start immediately following the courses in batches for 10 weeks. Students from this program will be encouraged to apply for the State Apprentice program which was approved in July 2017. The program will run 7200 hours (3.5 years) with strict guidelines which will result in two national certifications *IHK CNC Production Specialist (IHK BZ001)* and *MSFC-CPT*. The jurisdictional areas covered by the Apprentice program are Brevard, Marion, Lake, Orange, Osceola, Palm Beach and Seminole counties. The companies and partnering institutions reside in these counties. Although the Apprenticeship program itself has county restrictions, the proposed program will solicit applications from all over Florida.



A one-page solicitation will be drafted to include details on the program, the web address, and contact information from which potential applicants can obtain additional details. Clearly stated within the solicitation will be wording that assures the potential applicant that prior manufacturing/machining experience is not a prerequisite of the program, although such details might determine which courses the trainees will attend.

Minority Recruitment

The historical under-representation of women and minority groups in machining provides an additional impetus for their inclusion. It will be essential to the success of the project to ensure that there is active recruitment of women and minorities. That these under-represented groups are part of the project will be one of the essential indicators of community outreach as they in turn will be mentors and role models to the large number of students who will ultimately benefit from the project, providing program sustainability.

Data Collection

Diagnostic, operational, and critical-juncture data collection will establish baseline and outcome measurements. Data will be periodically collected from questionnaires, surveys, structured interviews, focus groups, observations, and counts of substantive activities. Data analysis will be ongoing, generating information to be provided to the appropriate stakeholders on a timely basis. An essential outcome of this program is to increase the workforce and hence the PIs and the companies will be working towards placement of our trainees in many manufacturing facilities around Florida.



3. Program Budget -

Estimated Costs and Sources of Funding: Include all applicable workforce training costs and other funding sources available to support the proposal.

1) Total Amount Requested \$2,493,722*

2) Other Workforce Training Project Funding Sources:

City/County	\$
Private Sources	\$
Other (grants, etc.)	\$ 398,567
Total Other Funding	\$ 398,567

Please Specify: UCF contribution;

See letters of support estimated to be 20 internships worth \$120,000. Additionally, 120 apprenticeships are provided to Seminole State College trainees from Universal Studios.

3) Workforce Training Project Costs:

Equipment	\$ 528,510
Personnel	\$ 679,111
Facilities	\$
Tuition	\$ 43,844
Training Materials	\$ 65,000
Other	\$ 1,177,257
Total Project Costs	\$2,892,289

Please Specify: MTS, SSC, PHS, LTC, LSSC, travel, Internships and Overhead

Note: The total amount requested must equal the difference between the workforce training project costs in 3.A. and the other workforce training project funding sources in 3.B.

**Details of the budget and budget justification are provided in attachment.*



4. Approvals and Authority

A. If entity is awarded grant funds based on this proposal, what approvals must be obtained before it can execute a grant agreement with the Florida Department of Economic Opportunity (e.g., approval of a board, commission or council)?

None.

B. If approval of a board, commission, council or other group is needed prior to execution of an agreement between the entity and the Florida Department of Economic Opportunity:

i. Provide the schedule of upcoming meetings for the group for a period of at least six months.

N/A _____

ii. State whether that group can hold special meetings, and if so, upon how many days' notice.

N/A _____

C. Attach evidence that the undersigned has all necessary authority to execute this proposal on behalf of the entity. This evidence may take a variety of forms, including but not limited to: a delegation of authority, citation to relevant laws or codes, policy documents, etc.

I, the undersigned, do hereby certify that I have express authority to sign this proposal on behalf of the above-described entity.

Name of Entity: The University of Central Florida Board of Trustees

Name and Title of Authorized Representative: Emily Bennett Proposal Manager

Representative Signature: Emily Bennett

Signature Date: 10/3/18



Delegation of Authority Form

*All delegations of authority governed by this policy are considered in effect for a period of three years unless otherwise specified and may be revoked or modified at any time by the delegator.

Date

Delegating Authority

Who is Delegating the Authority? Elizabeth A. Klonoff, Ph.D.

What is the title of the person delegating authority? VP of Research and Dean of the College of Graduate Studies

Information about the Delegate

Employee Name: Emily Bennett

Title: Proposal Manager

Department: Office of Research & Commercialization

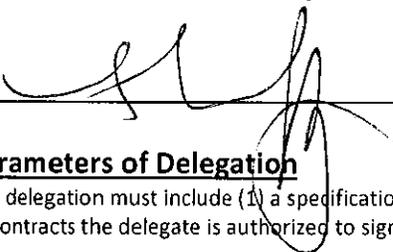
Division: Contracts & Grants

College: Academic Affairs

Phone: 407-882-0066

Email: emily.bennett@ucf.edu

Signature of Delegating Authority



Parameters of Delegation

The delegation must include (1) a specification of the scope, terms, and limitations of the delegation; (2) the contract or types of contracts the delegate is authorized to sign; and (3) the duration of the delegation, up to three years.

Signature Authority on behalf of the University of Central Florida Board of Trustees to sign Representations and Certification documents, proposals, and collaboration agreements. This delegation is effective for a three (3) year period from the date of signature.

Please submit this form to the Office of General Counsel at gcounsel@ucf.edu

The department is required to maintain the original copy of this form and to update authorities as required by

UCF Policy 2-107.3.