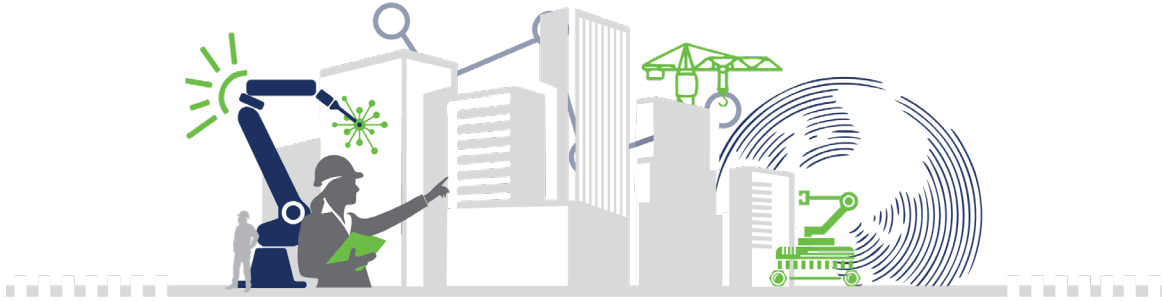




Preparing the Future Workforce of Architecture, Engineering, and Construction for Automation and Robotic Processes

Funded by the National Science Foundation Convergence Accelerator Grant Program





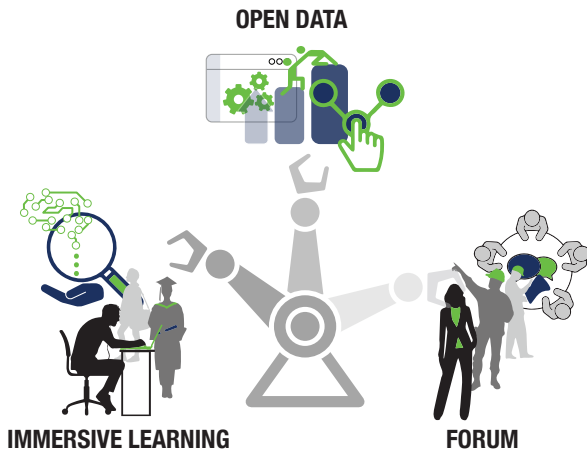
Project Summary

A team of researchers from Florida International University (FIU) have been awarded a \$1 million grant by the National Science Foundation to assess the employment impacts of adopting automation and robotic technologies in the building industry, evaluate how businesses can prepare for a robotic-driven future, and develop a training program to prepare the workforce for the adoption of advanced technologies.

Artificial Intelligence (AI) is being widely used to create intelligent software applications and robotic machines that learn from experience, process vast amounts of data to reach independent conclusions, and interact with other machines and humans using common language. Automation and machine intelligence promise to fuel economic growth, produce new occupations, and free humans from dangerous and mundane jobs. However, it is also expected that these technologies will lead to massive job displacement, alter skill profiles for existing jobs, and change how people work. Thus, understanding the impacts of automation on the economy and developing progressive training and educational programs is essential to capturing the opportunities and minimizing the adverse impacts of increasing automation.

The project, *Preparing the Future Workforce of Architecture, Engineering, and Construction for Automation and Robotic Processes* proposes to study changes due to automation and develop innovative training tools and educational resources for the Architecture, Engineering, and Construction (AEC) industries cluster. The AEC industries drive the design, construction and operation of the built environment activities that impact and influence nearly every other industry, trade, labor, employment, and commodities market across the global economy. The AEC industries are apt for efficiency improvements made possible by the application of automation and AI.

We believe that AEC professionals, business owners, and workers can be prepared to compete in a changing automated economy. Our vision is to design, build, and launch the *Robotics Academy*, a cloud-based set of resources to support AEC workers, educators, business owners, business leaders, and economic development policy makers to drive the transition to an inclusive and prosperous robotic and AI automation economy of the future.



Leveraging the advances in immersive technologies and AI, the Robotics Academy will be comprised of:

- 1) Immersive Training for Automation and Robotic Processes - a package of immersive simulation software that include:
 - a) A real time responsive interface to teach the fundamentals of existing and new design and construction software, accommodating different skill levels.
 - b) An AI-Based virtual and augmented reality training environment, where users learn by engaging with robotic processes while receiving real-time assistance.
- 2) the AEC Collaborative Online Knowledge Repository, an expert and user driven exchange platform to disseminate information, facilitate redistribution of technological advancements, as well as sharing knowledge in design and development of new automation and software systems.
- 3) the AEC Automation Forum, a knowledgebase, networking, and information exchange providing crucial information to and between AEC professionals, business leaders, and policy makers who are invested in implementing automated technology processes in the AEC industry cluster.

The Automation Forum will also include an AEC Industry Cluster Economic Analysis, the AEC Technology Adoption Evaluation Study, and an AEC AI/Automation National Economic Impact Study. The Project's economic impact analysis will utilize four approaches to build a complete picture of the impact of AI and automation within the AEC Industry Cluster.

First, we will collect detailed data through survey, interviews, and focus group research with a statistically significant cohort of AEC business firms - including those that have already adopted and are using AI and automated technologies, and those that have not. We will detail the changes that adopting firms have made, including job shifts, wage changes, training needs, additional costs, investments, financing, revenues, productivity, and profitability.

Second, we will use regional level industry analysis, detailing AEC employment share, AEC employment intensity, wage rates, productivity, revenues, location quotients, and growth forecasts for the US's 150 largest Metro Areas.

Third, the firm data will be modeled into adoption profiles which can then be used to forecast employment, labor, and business changes, including expected technology adoption rates for each Metro Area. Last, the regional employment change data will be input into an IMPLAN economic impact model to measure final comprehensive regional economic impacts. This approach is fundamentally "bottom-up", compiling changes at the firm level, and then modeling those impacts to regional economies. Measuring impacts at the Metropolitan Area level has a greater value for developing specific and accurate economic development policy.

The first phase of the project, which will be completed in the next nine months, is focused on researching and planning the training program. If selected for a continuation grant of \$5 million, the team will work on completing The Robotics Academy with plans to have it adopted by industry.