PROJECT TITLE: Data Analytics for Online Thermal Monitoring of 3D Printing

Jing Shi  
College of Engineering and Applied Science  
620R Old Chem  
shij3@ucmail.uc.edu  
Phone: (513) 556-2380

Project Description

3D Printing, or Additive Manufacturing, has the great potential to revolutionize the manufacturing industry, and thus make big impact on our economy. 3D printing usually follows a layer-wise building process, until the desired height is achieved. Therefore, products of arbitrary shape can be built without difficulty by using this innovative manufacturing method. On the other hand, there are still challenges facing 3D printing. For instance, the part quality produced by 3D printing is usually less consistent or even lower than the counterpart made by the traditional manufacturing processes. This is because the understanding on the defect formation in 3D printing is limited, and a large number of process parameters (such as moving speed of nozzle, printing temperature, etc.) need to be controlled and optimized.

To tackle the challenge, we are implementing a few sensing approaches to monitor the 3D printing processes, and attempting to develop connection between the sensing signals and the product quality. Among the approaches, thermal imaging and high speed imaging are relatively mature. The imaging approaches generates vast amount of data (often in gigabyte). The data needs to be efficiently processed and analyzed by data analytics methods, so that the trend can be discovered and the quality can become predictable.

Besides the WISE student, this project involves professors, postdocs, and Ph.D. students. This way, the WISE student will have the opportunity to interact with experienced researchers. We expect the candidate to have strong statistics and math background, and have the interest in participating challenging research tasks. Preferably, the candidate has already taken courses on data analytics, regression, decision models, etc.