



# INTELLIGENT SYSTEMS ENGINEERING

INDIANA UNIVERSITY  
School of Informatics and Computing

## Ph.D. Scholar Positions at Fibers & Additive Manufacturing Enabled Systems Laboratory (ISE FAMES Lab)

### The Indiana University ISE FAMES Lab

Although unprecedented on the level of individual nano-device fabrication, nanotechnology can often fail to deliver a viable product on a macro-scale—the scale we live on. This is due to an absence of a uniform approach to scalability in quantity and an orderly integration of nanodevices into macroscopic matrices while keeping the individual addressability of each nanodevice.

Multimaterial fibers are an intuitive solution to this problem. The fiber-device cross-sectional features are nanometric, they span the entire fiber length (sometimes kilometers) bridging the Nano and the Macro realms.

Our newly formed Fibers & Additive Manufacturing Enabled Systems (FAMES) Lab focuses on revolutionizing fiber devices and systems through an additive manufacturing approach. Rapidly developing, freeform fabrication techniques enable monolithic packaging of semiconductors, metals, and insulators into the fiber preform with a high degree of complexity, boosting the functional flexibility of the resulting fiber device. The fiber preform—the scaled-up macroscopic replica of the final fiber—is then thermally drawn into a multi-kilometer device in a viscous flow process. Taking a “Recursive Manufacturing” path, the fiber device itself is later used as a feedstock for 3D printing of functional freeform structures, such as active biomimetic scaffolds, health-monitoring biomedical implants, and neuro-cyber interfaces. Smart fabrics and nets of fiber devices are promising for global environmental sensing as well as for general big data collection and communication frameworks, such as the Internet of Things. Indiana University's advanced cyberinfrastructure, including supercomputing systems, is used for the processing of the collected big data as well as for basic research of fluid dynamics processes in the fiber device draw and post-processing.

### Ph.D. Scholar qualifications

The eligible candidates should hold B.Sc., B.Eng., M.Sc., or M.Eng. degree in Applied Physics, Electrical, Biomedical or Nano Engineering, or in another relevant discipline, and have a proven record of hands-on experience in experimental research.

### Application procedure

- 1) If you are not a current student, you must first apply to the ISE Ph.D. program at <http://bit.ly/ISEapply>.
- 2) In addition, please email the following materials to Prof. Alexander Gumennik, Director of ISE FAMES Lab, at [gumennik@iu.edu](mailto:gumennik@iu.edu).
  - A complete Curriculum Vitae
  - Electronic copies of journal publications
  - Three reference letters from related faculty at accredited institutions



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*The department of Intelligent Systems Engineering is an innovative new program that focuses on the engineering of systems of smaller-scale, often mobile devices that draw upon modern information technology techniques including intelligent systems, big data, and user interface design. Its foundation also includes computer engineering, cyber-physical systems, sensor and detector technologies, signal processing, and information and control theory.*

*The SolC is the first of its kind and among the largest in the country, with unsurpassed breadth. Its mission is to excel and lead in education, research, and outreach spanning and integrating the full breadth of computing and information technology. It includes Computer Science, Informatics, Information and Library Science, and Intelligent Systems Engineering with over 100 faculty, 1,000 graduate students, and 1,400 undergraduate majors on the Bloomington Campus. It offers Ph.D.'s in Computer Science, Informatics, Information Science and Intelligent Systems Engineering.*

*Indiana University, Bloomington is an equal opportunity employer, and all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin, disability status, protected veteran status, or any other characteristic protected by law.*