

# JOSEPH KUBALAK

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## EDUCATION

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**Virginia Polytechnic Institute and State University**  
*PhD in Mechanical Engineering*

May 2014 - January 2021  
Overall GPA: 3.9

- Thesis: “Optimizing Topology and Toolpath through Layer-less Multi-Axis Material Extrusion of Composites”
- Improved mechanical strength of printed parts by aligning material depositions to anticipated load paths in 3D using a robotic manipulator

**Virginia Polytechnic Institute and State University**  
*B.S. in Mechanical Engineering*

May 2014  
Overall GPA: 3.69

## WORK EXPERIENCE

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**DREAMS Lab**

August 2014 - Present

*Graduate Research Assistant*

- Designed and fabricated an instrumented and actuatable airfoil using material jetting additive manufacturing and in-situ embedding of non-printed components (1st place in America Makes Smart Structure Challenge)
- Led undergraduate students in the design, fabrication, and integration of a 2-axis trunnion and tool head for multi-axis deposition
- Ran production print queue service for other research labs and senior capstone projects

**CREATE Studio**

August 2016 - August 2020

*Graduate Research Assistant*

- Managed student design studio/maker space; lead trainings for laser cutter, 3D printers, and soldering equipment
- Collaborated on projects including: a virtual reality motion tracking device, a handheld controller for gesture-based music creation, and SourceForm, a stereolithography printer that creates models through crowdsourced images and photogrammetry
- Exhibited at outreach events including Virginia Tech Science Festival, ICAT Day, and ACCelerate Festival

**System for Large Additive Manufacturing with Robotics**

August 2015 - May 2016

*Senior Capstone Project Mentor*

- System design and integration of robotic-based material extrusion printer
- Software architecture and workflow to enable both XY-planar printing and multi-axis deposition

**Additive Manufacturing Vehicle Design Competition**

February 2015 - April 2015

*Graduate Teaching Assistant*

- Designed competition rules for printed vehicle (both driving and flying) design challenge
- Lead competition down-selection process and served as teams’ primary point of contact

## PUBLICATIONS

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### Papers

- Kubalak, J. R., Wicks, A. L., & Williams, C. B. (2020). “Investigation of Parameter Spaces for Topology Optimization with Three-Dimensional Orientation Fields for Multi-Axis Additive Manufacturing,” *Journal of Mechanical Design*.
- Kubalak, J. R., Wicks, A. L., & Williams, C. B. (2019). “Exploring multi-axis material extrusion additive manufacturing for improving mechanical properties of printed parts,” *Rapid Prototyping Journal*.
- Kubalak, J. R., Wicks, A. L., & Williams, C. B. (2017). “Using multi-axis material extrusion to improve mechanical properties through surface reinforcement,” *Virtual and Physical Prototyping*.

### Papers in Progress

- Kubalak, J. R., Wicks, A. L., & Williams, C. B. (2020). “Workflow for Layer-less Multi-Axis Material Extrusion of Arbitrary Geometries.”