

Viswanath Meenakshisundaram

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SUMMARY

Mechanical Engineer with expertise in process development and machine design for high-performance photopolymerizable polymers for Additive Manufacturing

EDUCATION

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|-----------------------------|---|------------|-------------------|
| PhD, Mechanical Engineering | Virginia Tech, Blacksburg, VA, USA | 4.00/4.00 | Aug '15- Present |
| B.E, Mechanical Engineering | P.E.S Institute of Technology, Bangalore, India | 9,21/10.00 | Jul '08 – May '12 |

EXPERIENCE

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| Graduate Research Assistant | DREAMS Lab, Virginia Tech | Aug '15 – present |
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Process and Machine Development for Vat-Photopolymerization

- **Design and Construction of a Scanning Mask Projection Vat-Photopolymerization System for materials research**

- Invented a novel scanning technique for the fabrication of high-resolution and large area parts
- Successfully designed and constructed a Scanning Mask Projection VP system which can handle polymers with harsh solvents i.e. NMP, NVP, Toluene.
- Developed the process model for determination of printing parameters, which enabled the fabrication of 3D structures with high-performance polymers such as Kapton and ULTEM.
- Developed a novel computational model for understanding the interaction of 2D patterned light and photopolymer system
- Developed algorithms and machine code for real-time rendering and projection of high-speed movies.
- Successfully developed artificial intelligence for efficient handling of high-resolution Bitmap images, reducing the computation time and part fabrication time by over 400%
- Developed a novel resin recoating architecture, enabling the fabrication of resins with viscosity over 20 Pa.s

- **Notable Contributions:**

- The designed S-MPVP machine was instrumental in the fabrication and processing of unprocessable polymers such as Kapton, ULTEM, Styrene Butadiene Rubber, Polysiloxanes and Hydrogenated Polybutadienes due to its ability to handle high viscosity and harsh chemicals

- **Design and Construction of a High-Temperature Vat-Photopolymerization system for exploration of novel photopolymers**

- Designed the first high-temperature SLA system, capable of printing in environments upto 250°C.
- Successfully constructed the printer by hacking a commercial printer and re-packaging it with custom-designed frame design and electronics packaging.
- Developed a custom bridge code and hardware to interface commercial software and control packages with the mechatronic devices for complete process control.

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| Project Assistant | M2D2 Lab, Indian Institute of Science | Jul '14– Jul '15 |
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Design and modeling of a self-powered soil moisture sensor

- Designed a self-powered soil moisture sensor by exploiting the electrochemical potential of active metals
- Designed a low-power energy harvesting circuit for data collection and transmission
- Successfully deployed the sensor for commercial use.

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| Design Engineer | Mercedes Benz Research and Development, Bangalore. | Jul '12 – Jun '14 |
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Wiring Harness design for Daimler and Fuso Trucks

- Responsible for the design of wiring harness for concept trucks – APAC and Europe Trucks
- Responsible for requirement analysis and design implementation at production facility.
- Successfully designed and deployed wiring diagrams for multi-component harnesses for FUSO trucks.

Managing Director

AutoVate, Bangalore, India

Jun '10 – Jul '15

Consultant for industrial automation

- Designed and developed automatic cutting machines with fault detection for polymer-woven bag manufacturing facility
- Developed control systems for active monitoring and control of thickness of extruded polypropylene tapes.
- Developed automatic sorting machine for recycling of damaged polypropylene woven fabric.

Intern

Sansera Engineering, Bangalore, India

May '10 – Jul '10

Operations research and line optimization

- Responsible for the monitoring and collection of fabrication time for various automobile components
- Presented a manufacturing line utilization report to the board members which resulted in the merging of two manufacturing lines for increased productivity at lower manufacturing costs.

SKILLS AND TOOLS

Technical Skills: Additive Manufacturing, Vat-Photopolymerization, Process Engineering, Analysis of Variance (ANOVA), Design of Experiments (DOE), Product Development, Finite Element Analysis, Design for Additive Manufacturing, Topology Optimization, Mechatronics, Digital Signal Processing, Polymer Morphology, Polymer processing and handling, computer Vision, Artificial Intelligence

Software Skills: Inventor, SolidWorks, NX 10, ABAQUS, MATLAB, Minitab, Mathematica, Python, LabVIEW, C, C++, OpenCV.

Intellectual Property

- [PCT/US2017/030316]: Scanning Vat Photopolymerization – Additive Manufacturing of layerless textured surfaces
- [PCT/US2017/047426]: Compositions and Methods of Additive Manufacturing of Aromatic Thermoplastics and Articles Made Therefrom
- [VTIP-17-076]: Apparatus for high-temperature Stereolithography
- [VTIP-18-011]: 3D Printing of Polyamic Acid Salts using SLA and Conversion into Polyimides and Polybenzoxazoles

Publications

- M. Hegde, V. Meenakshisundaram, N. Chartrain, S. Sekhar, D. Tafti, C. B. Williams, T. E. Long, Adv. Mater. 2017, 29, 1701240. 3D Printing All-Aromatic Polyimides using Mask-Projection Stereolithography: Processing the Nonprocessable.
- Sirrine, J. M., Meenakshisundaram, V., Moon, N. G., Scott, P. J., Mondschein, R. J., Weiseman, T. F., ... & Long, T. E. (2018). Functional siloxanes with photo-activated, simultaneous chain extension and crosslinking for lithography-based 3D printing. Polymer.
- Herzberger, J., Meenakshisundaram, V., Williams, C. B., & Long, T. E. (2018). 3D Printing All-Aromatic Polyimides Using Stereolithographic 3D Printing of Polyamic Acid Salts. ACS Macro Letters, 7, 493-497.

CONFERENCE PRESENTATIONS

- Additive Manufacturing of Elastomers with Scanning-Mask Projection Vat-Photopolymerization. Solid Freeform Fabrication Symposium, August 2017, Austin-TX.
- Printing the Unprintable: Vat Photopolymerization of High-Temperature Polyimides. Smart Manufacturing Experience, May 2018, Boston-MA.

LEADERSHIP AND OUTREACH ACTIVITIES

- Graduate Mentor: Project Source Form, ICAT, Virginia Tech.
- Graduate Advisor: Senior Design Team: Multi-tool Additive Manufacturing Machine, ME 2017.
- Currently mentoring two volunteers in the DREAMS lab for the construction of new Vat-Photopolymerization systems.
- Global Team Leader for innovation and collaboration – PACE SUT Challenge, 2011.
- Active volunteer for giving lab-tours to industry visitors (Evonic, Nike, Michelin, ARL, P&G) and outreach programs like Virginia Science Festival, TSA Students, Fall Family Tours, BLAST Camp.

AWARDS

- At the Nexus Award, ICAT Creativity and Innovation Day, 2018.
- Sir M Visvesvaraya Young Achiever Award, September 2012.
- Seventh Rank in the Mechanical Engineering Department, PES Institute of Technology.
- PACE Global Annual Forum, 2011
 - First Place- Design
 - First Place- Market Research
 - Second Place- Product Engineering
 - Second Place – Manufacturing
 - Award for the Best Collaboration
- Professor MR Doreswamy Scholarship Award, January 2012.
- Distinction Awards for all semesters.