Seiji Engelkemier

https://seijiengelkemier.net | seijieng@mit.edu

EDUCATION

MS & PhD in Mechanical Engineering, Expected 2019 - 2022/2025
Massachusetts Institute of Technology. GPA : 4.7/5.0
Advisor: Robert Armstrong (MS), Asegun Henry (PhD)
Fellowship: Society of Energy Fellows, 2021 - 2022

BS in Mechanical Engineering 2015 - 2019
Massachusetts Institute of Technology. GPA : 4.8/5.0
Minor in Energy Studies
Member of Pi Tau Sigma

EXPERIENCE

Atomistic Simulation and Energy Research Group Cambridge, MA
Research Assistant 2021 - Present

- Designing and testing multi-phase separation methods to enable CO_2-free hydrogen production from methane and other hydrocarbons
- Successfully proposed a re-designed reactor for higher thermal efficiency and lower cost
- Organizing parts, tools, and equipment in the lab for more efficient work with $2000 budget

MIT Energy Initiative Cambridge, MA
Research Assistant 2019 - 2021

- Authored chapters on thermal and compressed air energy storage for *Future of Storage* report
- Assessed strategic design trade-offs and conducted techno-economic analysis of proposed energy storage systems
- Co-authored publication in Journal of Cleaner Production, listed below
- Co-organized and ran weekly MITei research meetings

Undergraduate Researcher Sep 2018 - May 2019

- Assisted in development of U.S. electricity grid analysis to study effects of renewable energy on thermal power plants
- Improved performance >50x by rewriting MATLAB script cross-referencing power plant information from various federal agency databases
- Co-authored paper in Environmental Research Communications, listed below

Global Engineering (Senior Capstone) Cambridge, MA
Team Member Sept - Dec 2018

- Worked in a team of six and with SunCulture, Kenya-based project sponsor, to provide more affordable solar powered drip irrigation systems
- Co-designed patented control algorithm to operate pump energy-efficiently with drip irrigation
- Co-authored ASME conference paper, listed below

Ecovative Design Troy, NY
Core Research Intern June - Aug 2018

- Designed, built, & operated lab scale solid-state fermentation reactor with temperature and airflow control to advance fundamental knowledge of mycelium
- Experimented with mycelial growth and strength, quantified with mechanical testing
- Developed cost models to explore opportunities with potential clients and new markets

Mediated Matter (MIT Media Lab) Cambridge, MA
Undergraduate Researcher Jan - May 2018

- Built an actively controlled string tensioning mechanism to extend the design capability for tensegrity structures
- Designed and 3D-printed a liquid applicator to selectively apply ink or other fluids to string during the fabrication process
- Explored water and laser based thermal systems to influence silkworm behavior

Laboratory for Biologically Inspired Photonic Engineering Cambridge, MA
Undergraduate Researcher Oct 2017 - May 2018

- Fabricated specialized plastic optical fibers to improve yield and energy efficiency of commercial algae production
- Used microscope and image analysis to quantify the effects of laser cutting on surface roughness and light output along optical fibers
- Built a model to select parameters and achieve uniform light output along the length of a fiber

Soft Matter Lab (Technion - Israel Institute of Technology) Haifa, Israel
Research Intern Jun - Aug 2017

- Designed and 3D-printed multi-material "hand" with four independent fingers attached to a uniaxial wrist
- 2nd author of publication listed below

Laboratory for Advanced Biopolymers Cambridge, MA
Undergraduate Researcher Sep - Dec 2016

- Assisted PhD student in early stage development of silk nanoparticles as chemical delivery vehicles for metabolic control of crops
- Made silk fibroin solution as precursor to silk nanoparticles
- Built SolidWorks model of nanoparticle fabrication device

Singapore-MIT Alliance for Research and Technology (SMART) Singapore
Undergraduate Research Fellow June - July 2016

- Searched for off-the-shelf components to expand water quality sensing capabilities to swarming buoys
- Initiated integration of purchased sensor to Raspberry Pi
- Assisted with field tests to collect spatiotemporal water quality data of a lake

PUBLICATIONS

H. Yu, S. Engelkemier, and E. Gençer, "Process improvements and multi-objective optimization of compressed air energy storage (CAES) system," Journal of Cleaner Production, Feb. 2022, doi: 10.1016/j.jclepro.2021.130081.

E. Kasseris et al., "Highlighting and overcoming data barriers: creating open data for retrospective analysis of US electric power systems by consolidating publicly available sources," Environ. Res. Commun., Nov. 2020, doi: 10.1088/2515-7620/abc86d.

S. Engelkemier et al., "Feasibility of Pairing a Low-Cost Positive Displacement Pump With Low-Energy Pressure Compensating Drip Irrigation Emitters for Smallholder Farms in Africa," in Volume 2B: 45th Design Automation Conference, Anaheim, California, USA, Aug. 2019. doi: 10.1115/DETC2019-98128.

V. Slesarenko, S. Engelkemier, P. I. Galich, D. Vladimirsky, G. Klein, and S. Rudykh, "Strategies to Control Performance of 3D-Printed, Cable-Driven Soft Polymer Actuators: From Simple Architectures to Gripper Prototype," Polymers, Aug. 2018, doi: 10.3390/polym10080846.

PATENTS

"Drip irrigation system, method and controller," WO2020243630A1, 2020

COURSEWORK

Mechanical	Energy	Computational
Thermal-Fluids	Adv. Energy Conversion	Artificial Intelligence
Design & Manufacturing	Energy: Politics, Markets, and Policy	Numerical Computation
Measurement & Instrumentation	Urban Energy Systems and Policy	Intro to Modeling & Simulation

SKILLS

Computational	MATLAB, Python, SolidWorks, C++ (Arduino)
Physical	Lathe, Mill, Laser Cutter, 3D Print, Injection Mold, Microcontroller, Bench tools
Langauges	English (native), Japanese (beginner)

ACTIVITIES

Cata Cooling — Co-Founder, MIT Sandbox project/company providing heat safety solutions to workers. Raised angel investment, co-authored 2 prov. patents, ran field trials. (Jan - Sept 2020)

Committee on Guidelines for Outside Engagements — Elected student representative, voice for graduate students by crafting recommendations on better policies for how MIT engages with external entities. (Nov 2019 - July 2020)

Hydrogen Airship — Lead, MIT Sandbox project to decarbonize overseas freight shipping with airships filled and powered by hydrogen. (Jan - Dec 2019)

Data Visualization — Project Lead, visualizing MIT's sponsored research funding sources and sinks for financial transparency tool. (Jan 2018 - Present)

MIT MakerWorkshop — Mentor, as part of the lathe machine team, provide user training as well as hold weekly shop hours. (Sep 2018 - May 2019)

Biology Tutor — Tutored students and graded exams for an introductory biology class with a focus on ecology. (Feb - May 2017, 2018)

MakeMIT Hackathon — Team Member, led brainstorming process and built a mock-up of a smart closet concept. (Feb 2018)

Designed and prototyped a concept medical stretcher to handle stairs for better patient transport and emergency responder safety. (Feb 2017)

StartLabs — VP of Internal Relations (Sep - Dec 2017), organize events for group of students building an undergraduate entrepreneurial community. (Sep 2016 - Dec 2017)

Design for America — Project Team Member, designed visualizations and user interactions to raise awareness of MIT's on campus energy and water usage. (Sep 2015 - May 2016)