

JUN LI

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EDUCATION

- **University of Illinois at Urbana-Champaign (UIUC)**, Champaign, IL Aug. 2016 – May 2020
Ph.D. in Mechanical Science and Engineering (MechSE)
with Computational Science and Engineering (CSE) graduate concentration
M.S. in MechSE
- **Shanghai Jiao Tong University (SJTU)**, Shanghai, China Aug. 2013 – Aug. 2016
Sep. 2009 – Jul. 2013
B.S. in Mechanical Engineering
- **Purdue University**, West Lafayette, IN Jan. 2013 – May 2013
Exchange student in Mechanical Engineering

CURRENT RESEARCH INTERESTS

Microfluidics, multiphase flow, thermodynamics, heat transfer, energy conversion systems
9 papers in refereed journals in the area of thermal fluids, 2 submitted, 13 papers in conference proceedings, 2 patents,
13 research presentations at international conferences. [Google scholar](#)

RESEARCH EXPERIENCE

- **Extraction in Headers to Improve Microchannel Condensers Using Zeotropic Mixtures** Apr. 2019 – Present
Ph.D., PostDoc. Co-PI with Prof. Pega Hrnjak Air Conditioning and Refrigeration Center (ACRC), UIUC
Supported by *ACRC project #441*
 - Optimization on pass circuitry for a 5-pass extraction condenser using R32/R1234ze(E)-50/50% mixture showed 8.9% increase on the heating capacity and 34.6% reduction on the pressure drop
 - Implemented a 4-pass extraction condenser onto a mobile air conditioning system. Measured the highest COP improvement to be 13% for the same cooling capacity of R134a
- **Separation and Extraction Headers** Aug. 2015 – Mar. 2020
Ph.D. Advisor: Prof. Pega Hrnjak ACRC, UIUC
Supported by *ACRC project #371* and *ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) Grant-in-Aid Fellowship*
 - Built an experimentally validated 1-D finite-volume model to predict the separation efficiency in the second header based on droplet and film dynamics and empirical correlations for pressure drop
 - 3-D CFD simulation of two-phase flow in the header and validated the results with experiments
 - Experimentally validated modeling for the separation condensers, which took into account two-phase separation and distribution
 - Used the model to optimize the pass circuitry and match air-side conditions. The maximum increase on the condensate flow rate was 18% for R134a
 - Proposed the method of creating flow passage in header baffles to extract condensate from upstream passes to improve microchannel condensers at almost no additional expense
 - Experimentally validated modeling for extraction condensers using both pure refrigerants and refrigerant mixtures. Optimization on only the pass circuitry for a 5-pass extraction condenser using R134a showed the heating capacity was increased by 9.1% while pressure drop was reduced by 53.5%
- **Separation in Headers to Improve Microchannel Heat Exchangers and Systems** Aug. 2013 – May 2015
M.S. Advisor: Prof. Pega Hrnjak ACRC, UIUC
Supported by *ACRC project #314*
 - Separation of vapor and liquid by gravity in the second header of microchannel condensers as a way to improve condensers at almost no additional cost. From experiments, the maximum increase of condensate flow rate of R134a in a 4-pass separation condenser was found to be 7.4%. Used infrared imaging to analyze the improvement
 - Experimentally quantified the thermodynamic benefit of separation condenser on a reversible energy conversion system for electric vehicles. The highest increase in Coefficient of Performance (COP) was found to be 6.6%
 - Novel visualization of two-phase flow in transparent headers using high-speed-video-processing techniques to study the two-phase fluid mechanics
 - Measurement and parametric study on phase separation efficiency and pressure drop in the second header
- **Fin-and-tube Evaporator in Transcritical CO₂ Refrigeration System** Jan. 2013 – May 2013
Undergraduate researcher. Advisor: Prof. Eckhard Groll Ray W. Herrick Laboratories, Purdue University

Supported by *Purdue-SJTU undergraduate GEARE exchange program*

- Simulation of a round-tube-and-fin evaporator for a commercial transcritical CO₂ refrigeration system based on 1-D finite volume method
- **Cryogenic Fluid Storage on Orbit** Sep. 2011 – Jul. 2013
Undergraduate researcher. Advisor: Prof. Yonghua Huang Institute Refrigeration & Cryogenic Engineering, SJTU
Supported by *Shanghai Aerospace Fund, Shanghai Academy of Spaceflight Technology*
 - Experimental and numerical investigation on cryogenic Multilayer Insulation (MLI). Optimized the distribution of insulation material categories and corresponding layer numbers along radial direction of a prototype fuel tank at cryogenic temperature
 - Theoretical study of Thermodynamic Vent System (TVS) and design of experiment setup
- **A Solar-powered Water Pump Based on Stirling Mechanics** Apr. 2011 – Apr. 2012
Undergraduate researcher. Advisor: Prof. Yonghua Huang School of Mechanical Engineering, SJTU
Supported by *Shanghai College Student Innovation Project*
 - Designed and built a prototype of solar-powered water pump with γ -type Stirling engine
 - Simulated the internal pressure and velocity field of the air cylinder of a γ -type Stirling engine using Fluent

TEACHING EXPERIENCE

- **Instruction in Research**
 - Mentored 1 senior undergraduate student and 2 visiting scholars on research of multiphase flows. Gave them basic lab training and actively engaged them in conducting experiments and data analysis
 - Mentored 1 Ph.D. candidate and 1 visiting scholar on research about condensers and air conditioning systems. Actively engaged them in experiment conduction, data analysis, and paper writing
- **Teaching Assistant**
TAM 335 *Introductory Fluid Mechanics* Spring 2017, Fall 2017, Spring 2018
ME 320 *Heat Transfer* Fall 2018
 - Taught *Fluid Mechanics* labs for nearly 50 students each semester and *Heat Transfer* labs for 25 students
 - Hold office hours for homework, lab reports, and past exams
 - Graded lab reports and exam papers, gave formative feedbacks to student, and led students in active learning
- **Mavis Future Faculty Fellow (MF3) Program** 2018 – 2019
 - Mentored the senior undergraduate student for his course of ME 497 Independent Study. The student successfully finished the course of ME 497 *Independent Study* and received an A grade
 - Received training on how to prepare research proposals/white papers and how to deal with mentor-mentee relationship, e.g. setting student expectations for the mentor and planning workflow timeline for students, and review on professional ethics in college teaching
- **Attended ENG 598 Teaching & Leadership** Fall 2017
 - Practical training in classroom management. Reviewed pedagogy and theory of learning
 - Applied knowledge learned to design learning objectives for labs of TAM 335 and ME 320 and evaluative rubrics for lab reports

INDUSTRIAL EXPERIENCE

- **Mitsubishi Electric Corporation**, Amagasaki-shi, Hyogo, Japan May 2015 – Aug. 2015
Research Intern at the Thermal and Fluid Systems Department, Advanced Technology R&D Center
- Collaborative research project with **Mitsubishi Advanced Technology R&D Center**, Urbana, IL, USA
May 2014 – Aug. 2014

AWARDS AND PRESS RELEASE

1. David Hinde Award, MechSE Department 2019
2. American Physical Society FGSA Travel Award 2018
3. Graduate Student Grant-In-Aid, ASHRAE 2018
(<https://mechanical.illinois.edu/news/li-receives-prestigious-ashrae-fellowship>)
4. Mavis Future Faculty Fellow (MF3), College of Engineering 2018
(<http://mechanical.illinois.edu/news/four-mechse-selected-mavis-fellows;>
<https://dailyillini.com/news/2018/11/12/fellowship-encourages-future-faculty/>)
5. James O. Smith Outstanding TA Award, MechSE Department 2018
6. Scholarship in Air Quality Research and Study, Air & Waste Management Association 2017

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| 7. MechSE Department Exceptional Publications
(https://mechanical.illinois.edu/news/jacobi-honors-graduate-students-top-publication-activity) | 2017 |
| 8. Central Illinois ASHRAE Scholarship, 1st place | 2017 |
| 9. Featured in the “List of Teachers Ranked as Excellent by Their Students” for all four TA semesters | 2017-2018 |
| 10. SJTU Academic Excellence Scholarship, three successive times | 2010-2012 |
| 11. Team leader of “ <i>A self-steering solar-powered Stirling mechanical water pump</i> ”:
Outstanding Shanghai College Student Innovation Project | 2012 |
| Second prize of the 4 th National University Students Science Contest on Energy Saving and Emission Reduction | 2011 |
| 12. Tyco International Scholarship of SJTU | 2011 |
| 13. SJTU Merit Student | 2011 |
| 14. Chinese Physics Olympiad (CPhO), Second Prize in Heilongjiang Province | 2008 |

SERVICE

- Technical reviewer: 27 papers in *International Journal of Heat and Mass Transfer*, *Applied Thermal Engineering*, *International Journal of Refrigeration*, *Science and Technology for the Built Environment*, SAE journals and conferences, ASHRAE Transactions and conferences, etc.
- Technical session chair: TS-221 – Evaporators, Condensers and other Heat Exchangers: Design, Analysis and Performance, the 25th IIR International Congress of Refrigeration, Aug 24-30, 2019, Montreal, QC, Canada
- Corresponding member: ASHRAE Technical Committee 8.4 (Air-to-Refrigerant Heat Transfer Equipment); Technical Committee 8.5 (Liquid-to-Refrigerant Heat Exchangers)
- Associate Member: American Society of Mechanical Engineers (ASME), American Physical Society (APS), ASHRAE, International Institute of Refrigeration (IIR)
- Student President: ASHRAE UIUC Student Branch Aug. 2017 – Aug. 2018
Student Treasurer: ASHRAE UIUC Student Branch Jan. 2017 – Aug. 2017
 - Applied for funding from the MechSE department and the university Student Organization Resource
 - Assisted in holding a seminar given by ASHRAE president elect then Sheila Haytor to UIUC students
 - Planned and held field trips for UIUC members to 2018 ASHRAE Winter Conference & AHR Expo and Bergstrom Inc. in Chicago area
 - Coordinated and gave presentations on HVAC technology to local middle/high school students during the annual UIUC Engineering Open House