1. NAME AND CONTACT INFORMATION

Amit H. Varma, 3322 Crawford Street, West Lafayette, IN 47906,
Cell: (517) 974 0936, Email: ahvarma@purdue.edu

2. ACADEMIC QUALIFICATIONS

Ph.D. in Civil Engineering (Structures)	January 2001	Lehigh University, Bethlehem, PA
M.S. in Civil Engineering (Structures)	August 1996	University of Oklahoma, Norman, OK
B.Tech in Civil Engineering	July 1994	Indian Institute of Technology, Mumbai, India

3. RELATED WORK EXPERIENCE

Purdue University, West Lafayette, IN, Lyles School of Civil Engineering	2023 – present	Executive Director, Purdue Infrastructure & Innovation Lab (PIIL), Purdue Applied Research Institute (PARI)
	2018 – present	Karl H. Kettelhut Professor
	2017 – present	Director, Bowen Laboratory for Large-Scale Civil Engineering Research
	2014 – 2018	Full Professor
	2008 – 2014	Associate Professor
	2004 – 2008	Assistant Professor
Michigan State University, East Lansing, MI, Department of Civil and Environmental Engineering	2001 – 2004	Assistant Professor

4. SIGNIFICANT AWARDS

ASCE[1] Charles Pankow Innovation Award	2026	Established by the Civil Engineering Research Foundation (CERF), this award recognizes contributions of organizations working collaboratively to advance the design and construction industry by introducing innovation into practice. In 2026, it was awarded to team of practitioners, academics (including Prof. Varma), foundations and trade organizations that led the development, acceptance, and deployment of SpeedCore for high-rise buildings.
OU CEES Academy	2026	The purpose of the CEES Academy is to honor OU alumni and affiliates of CEES for professional activities and service.
AISC[2] Lifetime Achievement Award	2025	Honors individuals whose continued outstanding service has made a difference in the success of AISC, the structural steel industry, and the structural steel design, construction, and academic communities.
Bechtel Innovation of Year Award	2023	Prof. Varma was recognized for his contribution to develop innovative solutions for protective structures for national defense and security applications.
ASCE Stephen D. Bechtel, Jr. Energy Award	2021	ASCE's Energy Division gives the Stephen D. Bechtel, Jr. Energy Award to recognize outstanding achievement in the energy field by a civil engineer. Prof. Varma received this award for his "seminal contributions as a preeminent researcher, leading code/standard developer, educator, and invaluable consultant to the nuclear industry in the fields of steel-plate composite and reinforced concrete structures"
ASCE Alfred Noble Prize	2021	This inter-society award is selected by a committee with representation from ASCE, ASME, IEEE, AIMMP, and WISE. This award is given for a technical paper of exceptional merit published in ANY of these society's technical publications. Prof. Varma and his former PhD student Prof. Lai received this award in 2021 for their paper, "High Strength Rectangular CFT Members: Database, Modeling, and Design of Short Columns."
AISC T. R. Higgins Lectureship Award	2021	Each year, AISC recognizes an outstanding lecturer and author whose technical papers are considered an outstanding contribution to the engineering literature on fabricated structural steel. Prof. Varma was selected on the basis of his several papers on concrete-filled composite plate shear walls, and in recognition of his outstanding reputation as a researcher, Professor, and lecturer.

[1] American Society of Civil Engineers (ASCE)
[2] American Institute of Steel Construction (AISC)

AISC Special Achievement Award	*2020*	Prof. Varma is recognized for his groundbreaking work in developing and promoting SpeedCore, a concrete-filled composite plate shear wall system that is revolutionizing the speed at which steel-framed buildings are constructed. His research and lab tests on tall shear walls significantly contributed to the successful implementation of the system.
ASCE Shortridge Hardesty Award	*2019*	ASCE Structural Engineering Institute gives this award annually. Prof. Varma received this award for "research contributions to the stability and design of steel and composite members and service to the profession as the chair of the ASCE-SEI Metals TAC and chair of the SEI/ACI joint committee on Composite Construction"
AISC Special Achievement Award	*2017*	Prof. Amit H. Varma received this award for facilitating the development, design, and licensing of the next generation of nuclear power plants in the US and around the world by developing fundamental knowledge in terms of experimental data, numerical models, and design specifications for steel-concrete composite (SC) walls and connections.
University Faculty Scholar	*2011 -to- 2016*	The Office of the Provost recognizes outstanding faculty members who are on an accelerated path for academic distinction by the University Faculty Scholars Program.
Seeds for Success ACORN Award	*2010, 2012* *2022, 2024*	The Office of the Vice President for Research gives this award in recognition of the accomplishments of single investigators and teams of investigators for their efforts in obtaining a $1 million dollar or more research grant.
AISC Milek Faculty Fellowship Award	*2003*	The American Institute of Steel Construction gives this award annually to a faculty member involved in steel design research, education and testing. Prof. Varma was the inaugural recipient of this award for the research and development of innovative long-span composite floor systems for residential construction.

5. LEADERSHIP & SERVICE

5.1 Executive Director - Purdue Applied Research Institute (PARI, LLC)

In 2021, the Purdue Board of Trustees (BOT) along with then Purdue President (Mitch Daniels) established the Purdue Applied Research Institute (PARI), which is a tax-exempt, fully owned subsidiary of Purdue University. PARI was founded as part of the *Purdue Moves* initiative funded by the State of Indiana Legislature. PARI was established to enable and facilitate applied research activities in the domains of national security and defense and the energy sector, which usually require security clearances (CUI / Secret / Top Secret). PARI has its own corporate structure including a Board of Managers (BOM), which is chaired by Purdue President (Mung Chiang) and includes other members of the Purdue BOT. PARI has its own CEO (reporting directly to BOM), COO, CFO, and Legal Counsel (reporting to the Purdue Legal Counsel).

PARI is comprised of four labs. Since its inception, Prof. Varma has been leading PIIL (Infrastructure Innovation Lab) as its Executive Director (reporting to the EVPR initially, and to the CEO upon arrival). This is approximately a 45% FTE appointment for Dr. Varma. Dr. Varma's responsibilities for PIIL include:

(i) Developing and maintaining the operational budget and financial goals,
(ii) Business development and strategic partnerships,
(iii) Recruiting and retaining excellent research and administrative staff,
(iv) Providing monthly reports to the Executive Leadership in PARI and quarterly reports to the Purdue BOM & Trustees,
(v) Supporting other Executive Directors and advising PARI Leadership Team with the setup of pre-award (proposal, budgeting, contracting), post-award (time tracking, invoicing, change orders), and other support operations (purchasing, recruiting etc.).

Since Dr. Varma is the only Purdue University faculty member serving on the PARI Leadership Team, he brings unique and insightful perspectives to help with operations, planning, and vision casting. Dr. Varma built his team in PARI from scratch, recruiting high achievers from industry, national labs, and academia to Purdue. His team includes:

(i) Sr. Director of Technology (industry stalwart with 30+ years of experience),
(ii) Exec. Dir. of Business Development and Strategic Partnerships (industry leader with 20+ years of experience),
(iii) 2 Sr. Principal Research Engineers (from national lab and academia with 5-10 years of experience),
(iv) 2 Research Engineers (from academia with 1-5 years of experience),
(v) 1 Project Manager (from industry / military complex with 10+ years of experience), and
(vi) Several Project Engineers (Grad. Students) and Jr. Project Engineers (Undergrad Students).

Dr. Varma's entire team is funded from research projects that were developed, solicited, and contracted with PARI, and funded partially by the Purdue Moves investment. PARI projects include those funded by: (i) the US Air Force through Northrup Grumman through Bechtel National, (ii) Los Alamos National Lab, (iii) Holtec International, (iv) Idaho National Lab through

National Reactor Innovation in Construction program, (v) GE-Vernova, (vi) TerraPower, (vii) X-Energy, (viii) Orano IKE, etc. Over the past 3 years, Dr. Varma's research expenditure in PARI has exceeded approximately $10 million.

5.2 Director - Bowen Laboratory for Large-Scale Civil Engineering Research

Prof. Varma was the Associate Director of the Bowen laboratory for large-scale civil engineering research from 2015-17. He has been serving as the Director of the laboratory from 2017 onwards. Bowen Lab is one of the largest civil engineering testing laboratories in the US, and the flagship research facility of the Lyles School of Civil Engineering and the College of Engineering. It is an off-campus facility with its own operating budget that is funded primarily through research grants and contracts and the annual disbursements from the Kettelhut and Pankow Foundation endowments.

As the Bowen Lab Director, Dr. Varma's responsibilities include:

(i) Developing and maintaining laboratory budget and financials,
(ii) Developing and implementing policies for safe operations,
(iii) Developing quality procedures and plan for specific projects as needed,
(iv) Developing and implementing policies for sharing laboratory resources including laboratory space, technician time, testing equipment, etc.
(v) Interacting with Bowen Advisory Committee (comprised of industry stalwarts and well-wishers) and the Bowen Students Advisory Council (BSAC),
(vi) Working with the School Head and College Dean to develop and implement plans for sustainability, global visibility, and future growth.

Over the past several years with Dr. Varma as the Lab Director:

(i) Bowen Lab has grown significantly to include: 4 research technicians, 1 lab manager, 5 research engineers / scientists, and 1 administration specialist.
(ii) Bowen Lab financials have always been in surplus with indirect costs obtained from research grants and contracts growing steadily, while operating expenses being managed responsibly
(iii) Bowen Lab resources and large-scale testing equipment including test setups, hydraulic equipment, testing machines, data acquisition systems, calibrated sensors, etc. have grown significantly
(iv) Bowen Lab remained fully operational through the difficult times of the pandemic and has been indemnified successfully each year after review by OSHA and the University EHS (Environment, Health, and Safety).
(v) Bowen Lab has developed a strong safety culture with weekly safety briefings with all students and staff, and quarterly safety meetings to review near-miss and incident reports, and develop strategies for further improved operations

In any given semester, there are 40+ graduate students, and 10+ undergraduate students actively working at the lab. Bowen Lab provides the facility and resources for these young minds to develop, create, innovate, execute, and evolve into leaders. Undergraduate students gain hands-on exposure to engineering practice, safety culture, and mentorship from graduate students in a team-based learning environment. Dr. Varma has also helped recruit junior faculty and worked with their research staff to integrate their individual and collaborative research programs into Bowen Lab.

The School and College have recognized the value and impact that Bowen Lab brings to the Profession and the world. The University has recently invested funds to get ISO 9001 quality certification for Bowen Lab. This is based on the years of work done by Dr. Varma's team to develop detailed quality procedures and manual for specific Bowen Lab projects. These quality procedures have been invoked by industrial sponsors to conduct tests with required 'nuclear quality assurance' requirements. The implementation of these quality procedures has been audited successfully by the Nuclear Regulatory Commission (NRC). Receiving the ISO 9001 certification formally is the logical next step in the evolution of Bowen Lab as the world's premier testing lab with excellent quality and safety pedigree.

Bowen Lab completed its 20-year anniversary in 2024. Dr. Varma led the staff and students to organize the 20-year anniversary celebration on a huge scale with guest lectures for future vision casting from academia, industry, and major donors. In an ever-changing, complex world of research funding, contracts, further accentuated by the pandemic, Bowen Lab has been a beacon of stability, growth, success, and tremendous impact on the Profession. Bowen Lab was recognized with the 2020 Charles S. Whitney Medal by the American Concrete Institute Board of Directors specifically "*In recognition for its large-scale civil engineering research in systems, materials, and technologies, for its consistent contributions to the safety and economy of the infrastructure*."

5.3 Editorial Services

2014 – current	Associate Editor: ASCE *Journal of Structural Engineering*
2014 – 2017	Associate Editor: ASCE *Journal of Bridge Engineering*
2014 – 2015	Guest Editor: Elsevier's *Nuclear Engineering and Design*
2012 – current	*Steel and Composite Structures*: An Internal Journal from Techno Press, Korea
2023 – current	Guest Editor: Elsevier's *Engineering Structures*

5.4 Professional organizations

Prof. Varma is a member of several national level committees drafting codes / specifications for the design of steel, concrete, and composite structures. He is a voting member of the AISC committee of specifications (COS), which is the pinnacle committee responsible for all the AISC codes / specifications. He is the Chair of Task Committee 8 on Fire Design, and member of Task Committee 5 on Composite Construction. He was the Vice Chair (2007-16) of the ad-hoc subcommittee on modular composite construction for nuclear facilities.

Prof. Varma is also a member and Vice-Chair of the ACI 349 committee for the design of safety-related nuclear facilities. He is a member of the ASME Section III, Div. 2 – Concrete Containment committee (2023 – present) and the chair of the Task Group on Steel-Plate Composite Containment Vessel (SCCV). He is also Chair of the Modernization Workgroup for containment design.

Prof. Varma is voting member of the ASCE 7 main committee of minimum design loads for buildings and other structures, member of the seismic provisions sub-committee, and the Chair of the General Requirements sub-committee of ASCE 7. He is a member of the Building Seismic Safety Council's (BSSC) Provisions Update Committee (PUC), and the Chair of Issue Team 2 on interfaces between structural components.

Prof. Varma is the past chair of the Structural Engineering Institute (SEI) Metals Technical Administrative Committee (TAC), which in charge of all the metals technical committees in SEI. Prof. Varma is the past chair (2010 – 2016) of the ASCE SEI/ACI committee of composite construction.

American Society of Civil Engineers (ASCE)

2001 – present	Member
2010 – 2016	Chair of Committee on Composite Construction
2003 – 2009	Member of Committee on Composite Construction (control group)
2017 – 2020	Chair, Metals Technical Activities Committee
2018 – present	Member, Main Committee: ASCE/SEI 7 – Minimum Design Loads and Associated Criteria for Buildings and Other Structures
2023 – present	Chair, General Requirements Sub-Committee of ASCE / SEI 7 – Minimum Design Loads…
2023 – present	Member, Seismic Sub-Committee of ASCE / SEI 7 – Minimum Design Loads …

American Institute of Steel Construction (AISC)

2001 – present	Member and AISC Milek Faculty Fellow.
2014 – present	Member of AISC *Committee of Specification (CoS)*
2016 – present	Chair of AISC/AISI Task Committee 8 – Fire Design of Steel Structures
2004 – present	Member of Task Committee 5 – Composite Construction
2014 – 2016	Member of Task Committee 12 – Nuclear Structures
2007 – 2016	Vice-Chair of Sub-committee on Modular Composite Construction for Task Committee 12 – Design of Steel Structures for Nuclear Facilities
2007 – 2016	Member of Sub-committee (SC6) on Composite Structures for Task Committee 9 – Seismic Design Provisions for Steel Structures.
2011 – 2016	Member of Sub-committee (SC5) on the Seismic Design Manual for the AISC Committee on Manuals

American Concrete Institute (ACI)

2020 – present	Vice-Chair of ACI Committee 349 – Safety-Related Nuclear Facilities
2014 – present	Member of ACI Committee 349 – Safety-Related Nuclear Facilities Task Leader for ACI 349.1R *Thermal Design*
2015 – 2016	Chair of SEI/ACI Committee 335 – Composite and Hybrid Systems
2009 – 2015	Member of ACI Committee 335 – Composite and Hybrid Systems
2004 – current	Member of ACI Committee 216 – Fire Protection Engineering

American Society of Mechanical Engineers (ASME)

2020 – 2024 2024 – present	Member of ASME Section III, Div. 2, Modernization Work Group for Containment Design Chair of ASME Section III, Div. 2, Modernization Work Group for Containment Design
2023 – present	Chair of ASME Section III, Div. 2. Task Group on Steel-Plate Composite Vessel (SCCV)
2023 – present	Member of ASME Section III, Div. 2, Concrete Containment

5.5 Lyles School of Civil and Construction Engineering

Prof. Varma has been actively serving on committees in the Lyles School of Civil and Construction Engineering. He was a member of the strategic hiring committee (2006-08), and the chair of the computational mechanics faculty search committee (2008-10). He has been a member of the internal awards committee from 2009-2020, and a member of the structures area graduate admissions committee from 2012-15.

The Lyles School of Civil and Construction Engineering conducted an external review in 2018, and Prof. Varma was a member of the internal review committee (2017) preparing for the visit. He was a member of the faculty search committee in 2019 for the structures area, and the Chair of the faculty search committee in 2022-23. He was a member of the affordable online MS committee from 2020-25.

He is a member of the School's Named Professor Committee (NPC), the College of Engineering Named Professor Committee (ENPC) and the Engineering Leadership Team (ELT)

Committee	Date	Membership
Strategic Hiring Committee	2006 – 2008	Member
Computational Mechanics Faculty Search Committee	2008 – 2010	Chair
CE Internal Awards Committee	2009 – 2020	Member
CE Structures Area Graduate Admissions Committee	2012 – 2015	Chair
Internal Review Committee	2017	Member
Structures Faculty Search Committee	2019	Member
Affordable Online MS Committee	2020 – 2025	Member
Structures Faculty Search Committee	2022 – 23	Chair
Named Professor Committee	2018 – present	Member
Engineering Named Professor Committee	2025 – present	Member
Engineering Leadership Team	2024 – present	Member

6. PUBLICATIONS

6.1 Articles in refereed publications

J1.	Varma, A.H., Wallace, B., and Russell, B. W. (1997). "Large Scale Rotating Bending Fatigue Tests for Offshore Pipe Connections," Experimental Mechanics, SEM, Volume 37, No. 2., pp. 147 – 153. http://dx.doi.org/10.1007/BF02317851
J2.	Varma, A.H., Ricles, J.M., Sause, R., Hull, B., and Lu, L.W. (2000). "An Experimental Evaluation of High Strength Square CFT Columns," ACI SP-196: Composite and Hybrid Systems, Eds. Aboutaha, R.S., and Bracci, J.M., Amer. Conc. Inst., Farmington Hills, MI, pp. 51-86. https://www.concrete.org/publications/internationalconcreteabstractsportal/m/details/id/10005
J3.	Varma, A.H., Salecha, A.K., Wallace, B., and Russell, B.W. (2002). "Flexural Fatigue Behavior of Threaded Connections for Large Diameter Pipes," Experimental Mechanics, SEM, Volume 42, No. 1, pp. 1-7. http://dx.doi.org/10.1177/0018512002042001783
J4.	Varma, A.H., Ricles, J.M, Sause, R., and Lu, L.W. (2002). "Experimental Behavior of High Strength Square Concrete Filled Steel Tube (CFT) Columns," Journal of Structural Engineering, ASCE, Volume 128, No. 3, pp. 309-318. http://dx.doi.org/10.1061/(ASCE)0733-9445(2002)128:3(309)
J5.	Varma, A.H., Ricles, J.M., Sause, R., and Lu, L.W. (2002). "Seismic Behavior and Modeling of High Strength Composite Concrete Filled Steel Tube Beam-Columns," Journal of Constructional Steel Research, Elsevier Applied Science, Volume 58, Issue 5-8, pp. 725-758. http://dx.doi.org/10.1016/S0143-974X(01)00099-2
J6.	Varma, A.H., Ricles, J.M., Sause, R., and Ream, A. (2004). "Seismic Behavior and Design of High Strength Square Concrete Filled Steel Tube Beam-Columns," Journal of Structural Engineering, ASCE, Volume 130, Issue 2, pp. 169-179. http://dx.doi.org/10.1061/(ASCE)0733-9445(2004)130:2(169)
J7.	Varma, A.H., Sause, R., Ricles, J.M., and Qinggang, L. (2005). "Development and Validation of Fiber Models for High Strength Square CFT Beam-Columns," ACI Structural Journal, American Concrete Institute, Vol. 102, Issue 1, pp. 73-85, Farmington Hills, MI. https://www.concrete.org/publications/internationalconcreteabstractsportal/m/details/id/13532
J8.	Kowalkowski, K. and Varma, A. H. (2005). "Experimental Investigations of the Effects of Multiple Damage-Heat Straightening Repair Cycles on the Structural Properties of Bridge Steels," Transportation Research Record: Journal of the Transportation Research Board, Issue 1907, pp. 67-77, TRB, Washington, D.C. http://dx.doi.org/10.3141/1907-08
J9.	Prabhu, M., Varma, A.H., Buch, N., and Thandavesvara, D. (2006). "Experimental Investigation of Effects of Dowel Misalignment on Joint Pullout Behavior," Transportation Research Record: Journal of the Transportation Research Board, Issue 1947, pp. 15-27, TRB, Washington, D.C. http://dx.doi.org/10.3141/1947-02
J10.	Kowalkowski, K. and Varma, A.H. (2006). "Structural Properties of Steels Subjected Multiple Cycles of Damage Followed by Heating Repair," Journal of Structural Engineering, ASCE, Vol. 133, No. 2, pp. 283-296. http://dx.doi.org/10.1061/(ASCE)0733-9445(2007)133:2(283)
J11.	Prabhu, M., Varma, A.H., and Buch, N. (2007). "Experimental and Analytical Investigations of the Mechanistic Effects of Dowel Misalignment in Concrete Pavement Joints," Transportation Research Record: Journal of the Transportation Research Board, Issue 2037, pp. 12-29, TRB, Washington, D.C. http://dx.doi.org/10.3141/2037-02
J12.	Kowalkowski, K., and Varma, A. H. (2007). "Effects of Multiple Heat Straightening Repairs on Steel Beams," Journal of the Transportation Research Board, Issue 2028, pp. 67-77, TRB, Washington, D.C. http://dx.doi.org/10.3141/2028-08
J13.	Prabhu, M., Varma, A.H., Buch, N. (2009). "Analytical Investigation of the Effects of Dowel Misalignment on Concrete Pavement Joint Opening Behavior," International Journal of Pavement Engineering, Volume 10, Issue 1, Feb. 2009, pp. 49-62, Taylor and Francis Group. http://dx.doi.org/10.1080/10298430802342708
J14.	Hong, S. and Varma, A.H. (2009). "Analytical Modeling of the Standard Fire Behavior of Loaded CFT Columns," Journal of Constructional Steel Research, Volume 65, pp. 54-69, Elsevier. http://dx.doi.org/10.1016/j.jcsr.2008.04.008
J15.	Choe, L., Wheeler, E., and Varma, A.H. (2009). "Validation of Prestressed Concrete Bridge LRFD Software Using NCHRP Process 12-50." Journal of the Transportation Research Record, Issue 2131, pp. 34-46, TRB, Washington, DC, 24 pp. http://dx.doi.org/10.3141/2131-04
J16.	Hong, S. and Varma, A.H. (2010). "Predicting Column Buckling Under Fire Loading Using Fundamental Section Behavior." Journal of ASTM International, ASTM, Volume 7, Issue 1, 23 pp. http://dx.doi.org/10.1520/JAI102311
J17.	Wellman, E., Varma, A.H., Fike, R., and Kodur, V., (2011). "Experimental Evaluation of Thin Composite Floor Assemblies under Fire Loading." Journal of Structural Engineering, Special 9/11 Commemorative Issue, ASCE, Vol. 37, No. 9, pp. 1002-1016. http://dx.doi.org/10.1061/(ASCE)ST.1943-541X.0000451
J18.	Choe, L., Varma, A.H., Agarwal, A., and Surovek, A. (2011). "Fundamental Behavior of Steel Beam-Columns and Columns Under Fire Loading: Experimental Evaluation" Journal of Structural Engineering, Special 9/11 Commemorative Issue, ASCE, Vol. 37, No. 9, pp. 954-966. http://dx.doi.org/10.1061/(ASCE)ST.1943-541X.0000446
J19.	Agarwal A., and Varma, A.H. (2011). "Design of Steel Columns for Fire Loading Including Effects of Rotational Restraints." *Engineering Journal*, Vol. 48, No.4, pp. 297-314, AISC. https://doi.org/10.62913/engj.v48i4.1018
J20.	Kodur, V.K.R., Naser, M., Pakala, P., and Varma, A.H. (2013). "Modeling the response of beam-column assemblies exposed to Fire." *Journal of Constructional Steel Research*, Elsevier Science, Vol. 80, pp. 163-173. http://dx.doi.org/10.1016/j.jcsr.2012.09.005

J21.	Varma, A.H., Hong, S., and Choe, L. (2013). "Fundamental Behavior of CFT Beam-Columns Under Fire Loading." *Steel and Composite Structures – An International Journal*, Vol. 15, No. 6, pp. 679-703, Techno-Press, Taejon Korea, http://dx.doi.org/10.12989/scs.2013.15.6.679
J22.	Varma, A.H., Malushte, S., Sener, K., and Lai, Z., (2014). "Steel-Plate Composite (SC) Walls for Safety Related Nuclear Facilities: Design for In-Plane Force and Out-of-Plane Moments." *Nuclear Engineering and Design*, Special Issue on SMiRT-21 Conference, Vol. 269, pp. 240-249, Elsevier Science, http://dx.doi.org/10.1016/j.nucengdes.2013.09.019
J23.	Zhang, K., Varma, A.H., Malushte, S., and Gallocher, S. (2014). "Effects of Shear Connectors on the Local Buckling and Composite Action in Steel Concrete Composite Walls." *Nuclear Engineering and Design*, Special Issue on SmiRT-21 Conference, Vol. 269, pp. 231-239, Elsevier Science, http://dx.doi.org/10.1016/j.nucengdes.2013.08.035
J24.	Agarwal, A., Selden, K., and Varma A.H. (2014). "Stability Behavior of Steel Building Structures in Fire Conditions: Role of Composite Floor System with Shear-Tab Connections." *Journal of Structural Fire Engineering*, Special Issue on Structures in Fire-2012 Conference, Vol. 5. No. 2. June. http://dx.doi.org/10.1260/2040-2317.5.2.77 ,
J25.	Agarwal, A., and Varma, A.H. (2014). "Fire Induced Progressive Collapse of Steel Building Structures: The Role of Interior Gravity Columns." *Engineering Structures*, Special Issue on Fire Analysis of Structures, Vol. 58, pp. 129-140, Elsevier Science. http://dx.doi.org/10.1016/j.engstruct.2013.09.020 .
J26.	Agarwal, A., Choe, L., and Varma, A.H. (2014). "Fire Design of Steel Columns: Effects of Thermal Gradients." *Journal of Constructional Steel Research*, Elsevier Science, Vol. 93, pp. 107-118, http://dx.doi.org/10.1016/j.jcsr.2013.10.023 .
J27.	Walz, J., Choe, L., Surovek, A., and Varma, A.H. (2014). "Section Characterization of Wide-flange Steel Sections Subjected to Combined Thermal and Mechanical Loading." *Journal of Structural Engineering*, ASCE, http://dx.doi.org/10.1061/(ASCE)ST.1943-541X.0001089 , Vol. 141, No. 6, 04014162
J28.	Cha, H., Diggleman, L., Connor, R., and Varma, A.H. (2014). "Experimental and Numerical Evaluation of the Post-Fracture Redundancy of a Simple Span Truss Bridge." Journal of Bridge Engineering, Vol. 19, No. 11, 04014048, ASCE, http://dx.doi.org/10.1061/(ASCE)BE.1943-5592.0000622
J29.	Sener, K., and Varma, A.H. (2014). "Steel-Plate Composite SC Walls: Experimental Database and Design for Out-of-Plane Shear." *Journal of Constructional Steel Research*, Elsevier Science, Vol. 100, pp. 197-210, http://dx.doi.org/10.1016/j.jcsr.2014.04.014
J30.	Lai, Z., Varma, A.H., and Zhang, K. (2014). "Noncompact or Slender Rectangular CFT Members: Experimental Database, Analysis and Design." *Journal of Constructional Steel Research*, Vol. 101, October 2014, pp. 455-468, http://dx.doi.org/10.1016/j.jcsr.2014.06.004 , Elsevier Science,
J31.	Sohn, Y., and Varma, A.H. (2014). "Effects Of Realistic Heat Straightening Repair On Damaged Steel Beams." *Transportation Research Record: Journal of the Transportation Research Board*, Vol. 2406, Structures 2014, No. 1, pp. 68 – 78, http://dx.doi.org/10.3141/2406-08
J32.	Epackachi, S., Nguyen, N., Kurt, E., Whittaker, A. and Varma, A.H. (2014). "In-Plane Behavior of Rectangular Steel-Plate Composite Shear Walls." *Journal of Structural Engineering*, ASCE, Vol. 141, Issue 7, http://dx.doi.org/10.1061/(ASCE)ST.1943-541X.0001148
J33.	Bruhl, J., Varma, A.H., and Johnson, W.H. (2014). "Design of Composite SC Walls to Prevent Perforation from Missile Impact." International Journal of Impact Engineering, Vol. 75, Jan., pp. 75 – 87, Elsevier Science, http://dx.doi.org/10.1016/j.ijimpeng.2014.07.015
J34.	Cha, H., Liu, B., Prakash, A., and Varma, A.H. (2014), "Effect of local damage caused by overweight trucks on the durability of steel bridges." Journal of Performance of Constructed Facilities, ASCE, http://dx.doi.org/10.1061/(ASCE)CF.1943-5509.0000685 , 04014183
J35.	Fischer, E., Varma, A.H. (2014). "Design of Split-Tee Connections for Special Composite Moment Resisting Frames." Engineering Journal, AISC, Vol. 52, No. 3, pp. 185-201, AISC, https://doi.org/10.62913/engj.v52i3.1085
J36.	Lai, Z., and Varma, A.H. (2014). "Noncompact or Slender Circular CFT Members: Experimental Database, Analysis, and Design." *Journal of Constructional Steel Research*, Elsevier Science, Vol. 106, pp. 220 – 233 http://dx.doi.org/10.1016/j.jcsr.2014.11.005
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R29.	Tarasova, A., Kananamedala, D., Seo, J., Varma, A.H., and Connor, R.J. (2024). *New Repair Strategies for Life-Cycle Extension of Corroded Steel Girder Bridges.* Joint Transportation Research Program, Publication No. FHWA/IN/JTRP-2024/13. West Lafayette, IN: Purdue University. https://doi.org/10.5703/1288284317746
R30.	Connor, R.J., Korkmaz, C., Varma, A., Kiefer III, C.J., Ebert, A. (2024). *Evaluating the Potential Benefits of Implementing AASHTO Guide Specifications for the Analysis and Identification of Fracture Critical and System Redundant Members.* Joint Transportation Research Program, Publication No. FHWA/IN/JTRP-2023/11. West Lafayette, IN: Purdue University. https://doi.org/10.5703/1288284317746
R31.	Varma, A., Choe, L., Anvari, A., Vora, B., and Jain, N. (2024). *Introduction to Performance-Based Structural Fire Design (PBSFD) for Authority Having Jurisdiction (AHJ) Officials.* Final Report, CPF Grant #05-22, Prepared for the Charles Pankow Foundation and MKA Foundation, Link to PDF file in Dropbox
R32.	Alasiri, M., Anvari, A., Jain, N., and Varma, A. (2024). *Composite Floor-to-SpeedCore Wall Systems: Performance-based Fire Resistance and Design.* Final Report, CPF Grant #03-20, Prepared for the Charles Pankow Foundation and American Institute of Steel Construction, Link to PDF File in Dropbox
R33.	Kang, K., Xiao, J., Hu, J., Kanakamedala, D. S. C., Seo, J., & Varma, A. (2025). *Feasibility of 3D scanning technology for bridge inspection and management* (Joint Transportation Research Program Publication No. FHWA/IN/JTRP-2025/16). West Lafayette, IN: Purdue University. https://doi.org/10.5703/1288284317880

6.6 Invited colloquium / seminar series presentations

1	Varma, A.H. (2006). "Fundamental Behavior of Steel-Concrete Composite Structures Under Fire Loading," *Building and Fire Research Seminar*, Invited Presentation, Building and Fire Research Laboratory, NIST, Gaithersburg, Maryland.
2	Varma, A.H. (2008). "Fire Behavior and Design of Composite Structures: Recent Research and New Developments." Invited Presentation, *Virginia Tech*, Blacksburg, VA.
3	Hong, S., Varma, A.H., and Agarwal, A. (2008). "Predicting the Standard Fire Behavior of Composite CFT Columns Using Fundamental Section Behavior." *Symposium on Advances in State of the Art in Fire Testing*, ASTM E05 Committee on Standard Fire Testing. Invited presentation and publication in Special Technical Publication (STP) resulting from the Symposium.
4	Varma, A.H., (2009). "Scaling in Experimental Investigations." *Presentation to the Nuclear Regulatory Commission (NRC)*, Public Meeting http://pbadupws.nrc.gov/docs/ML0918/ML091800241.pdf
5	Varma, A.H., and Malushte, S.R. (2009). "Modular Composite Walls Subjected to Combined Thermal and Mechanical Loading." *Presentation to the Nuclear Regulatory Commission (NRC)*, Public Meeting. http://pbadupws.nrc.gov/docs/ML0918/ML091800255.pdf
6	Malushte, S.R., and Varma, A.H. (2011). "Background and Development of AISC N690 Draft Code Specifications for SC Walls for Safety-Related Nuclear Facilities." *Presentation to the Nuclear Regulatory Commission (NRC),* Public Meeting. http://pbadupws.nrc.gov/docs/ML1125/ML112500005.pdf
7	Varma A.H. (2012). "Specification for Steel-Concrete Composite Structures for Safety Related Nuclear Facilities: Development and Current Progress." *NRC Regulators Information Conference (RIC)*-2012, Special Panel on Challenges and Lessons Learned in the Design and Analysis of Civil Structures for New Reactors. http://www.nrc.gov/public-involve/conference-symposia/ric/past/2012/docs/abstracts/sessionabstract-8.html
8	Varma, A.H. (2013). "Research Progress in Composite or Steel Construction." *Presentation to the Xi'an University of Architecture and Technology*, Xi'an, Shaanxi, China, September 12, 2013.
9	Varma, A.H. (2013). "Heat Straightening: Research and Applications" *Presentation to the Chang'an University*, China, September 13, 2013.
10	Varma, A.H. (2013). "Research Progress in Composite or Steel Construction." *Presentation to Tongji University*, Shanghai, China, September 17, 2013.
11	Varma, A.H. (2014). "Draft Provisions on Modular Composite Construction Under Consideration by AISC N690, Appendix N9." *Presentation to the Nuclear Regulatory Commission (NRC)*, Public Meeting. http://meetings.nrc.gov/pmns/mtg?do=details&Code=20132234 http:// pbadupws.nrc.gov/docs/ML1334/ML13340A018.pdf
12	Varma, A.H. (2014). "Research Progress in Steel-Concrete Composite Structures." *Presentation to Fuzhou University*, Fujian Province, China, June 2014.
13	Varma, A.H.* (2015). "Composite Shear Walls for Nuclear Facilities." *Pacific Rim Forum, PEER Berkeley, June 2015, Invited Presentation*

14	Varma, A.H.* (2015). "Modularity and Innovation Using Steel Plate Composite (SC) Walls for Nuclear and Commercial Construction." *Keynote Lecture, 11th International Conference on Advances in Steel and Concrete Composite Structures*, Tsinghua University, Beijing, Dec. 3-5
15	Varma, A.H. (2015). "Modularization and Innovation Using Steel Plate Composite (SC) Walls." *Keynote Lecture, China National Conference on Steel Concrete Composite Structures*, Chongqing University, October 2015
16	Varma, A.H. (2015). "Design of Steel Plate Composite Walls for Missile Impactive and Impulsive Loading." *ISSS Conference, Jeju Island*, S. Korea, Nov. 2015
17	Varma, A.H. (2016). "Modeling and Design of Steel-Concrete Composite Structural Systems." *Global Initiative for Academic Networks, GIAN Workshop*, May 2016, IIT-Hyderabad, India.
18	Varma, A.H. (2016). "Modularization, Innovation, and Resilience Using Steel-Plate Composite Walls for Nuclear Facilities." *Keynote Lecture*, TINCE Conference, Paris, France, Aug. 2016
19	Varma, A.H. (2017). "AISC Specification N690-12s1: Appendix N9 – Design of Steel Plate Composite (SC) Walls." *Presentation to Korea Institute of Nuclear Safety*, KINS, S. Korea.
20	Varma, A.H. (2017). "Summary of Missile Impact Tests on Steel-Plate Composite (SC) Walls." *ISSS Conference*, Jeju Island, S. Korea, Nov. 2017.
21	Varma, A.H. (2018). "Steel-Concrete Composite Construction: The Best of Both Worlds." *Invited Seminar*, Dept. of Civil and Env. Eng., Johns Hopkins University, Baltimore, Maryland, Nov. 29, 2018
22	Varma, A.H. (2018). "Steel-Concrete Composite Construction: The Best of Both Worlds." *Invited* Seminar, Tongji University, Shanghai, China, Dec. 9, 2018
23	Varma, A.H. (2019). "Steel-Concrete Composite Construction: The Best of Both Worlds." Keynote Presentation, VII International Steel Construction Conference, ICCA, Colombian Institute of Steel Construction, June 17-22
24	Varma, A.H. (2019). "Composite Steel Plate Shear Walls Research." Los Angeles Tall Buildings Structural Design Council, Annual Conference, May 3
25	Varma, A.H. (2019). "Deformed Rebar Anchorage in Concrete Construction." *Tongji University*, and SNERDI, Oct. 2019.
26	Varma, A.H. (2019). "Design of Steel-Plate Composite Walls for Safety-Related Nucelar Facilities." Office of Nuclear Regulation (ONR), United Kingdom, Bootle, Invited Seminar
27	Varma, A.H. (2020). "Steeling the Future." Keynote Presentation, AISC Steel Flash Conference, Oct. 21, 2020
28	Varma, A.H., (2021). "SpeedCore and Steel-Concrete Composite Construction: The Best of Both Worlds." T.R. Higgins Lecture, Keynote Presentation, AISC NASCC, April 2021 Varma's T.R. Higgins Lecture tour covered: (a) University of California, Davis (b) Structural Engineers Association of Phoenix (c) University of Minnesota, Minneapolis (d) Oregon State University (e) Structural Engineers Association of Chicago (f) Structural Engineers Association of Massachusetts (g) Structural Engineers Association of Denver (h) Structural Engineers Association of Pittsburgh (i) Structural Engineers Association of Michigan (j) Structural Engineers Association of San Diego
29	Varma. A.H. (2021). "SpeedCore" Swedish National Steel Construction Conference, Keynote Presentation, Oct. 2021
30	Varma, A.H. (2021). "Fire Design of SpeedCore" Keynote Presentation, ISSS Conference, Jeju Island, S. Korea, Nov. 2021
31	Varma A.H. and Klemencic, R. (2022). "Design and Construction of the Rainier Square Redevelopment Project." *2022 Paul Zia Distinguished Lecture*, North Carolina State University, Raleigh, NC
32	Varma, A.H., (2024). "SC Structures for SMRs." Korea Electric Power Industry Codes (KEPIC) Week, Jeju Island, 2024, Nov. 1 – 4, KHNP
33	Varma, A.H. (2025). "Recent Developments in Steel-Plate Composite (SC) Construction in the US." *Yokohama Steel*, Yokohama, Japan. May 28, 2025
34	Varma, A.H. (2025). "AISC N690-24: Revisions and Improvement to SC Nuclear Design." Korea Electric Power Industry Codes (KEPIC) Week, Jeju Island, 2025, Sept. 2-6, KHNP

7. GRADUATED STUDENTS, THESES / DISSERTATIONS, CURRENT EMPLOYMENT

Prof. Varma has graduated 29 M.S. thesis students and 39 Ph.D. students. Prof. Varma's students have co-authored several research articles (journal papers and conference proceedings) with him over the years. They have also presented their research at national and international conferences. Several of Dr. Varma's students have gone into research, academia, practice, and consulting. Several of his former students have reached leadership / influential positions as their careers advanced.

7.1 MS Thesis Completed

	Name	Degree	Year	Co-chair	Title	Current Status
1	Antonio Cordero-Domenech	M.S.	07/02	Ronald Harichandran	Development of a Modified Fiber Element for DRAIN-2DX	Senior Cost Estimator, RIB US Cost
2	Eric Wheeler	M.S.	08/07		Evaluation and Verification of Bridge LRFD Software	Structural Engineer, Thornton-Tomasetti
3	Peter Booth	M.S.	12/08		Behavior of Steel Plate Reinforced Concrete Modular Walls Subjected to Combined Thermal and Mechanical Loads	Structural Engineer, US Army Corps of Engineers
4	Jungil Seo	M.S.	08/09		Evaluation of Composite Steel I-Girder Bridge Design Software Using NCHRP Process 12-50	Research Asst. Prof. Purdue University
5	Emily Wellman	M.S.	07/10		Experimental Evaluation of Composite Floor Assemblies Under Fire Loading	Bridge Engineer Osborn Engineering
6	Tom Bradt	M.S.	07/11		Effects of Fire Damage on the Structural Properties of Steel Bridge Elements	Research Engineer, Purdue University
7	Nam Ngyuen	M.S.	11/11	Mark Bowman	Shear Yielding Strength of Gusset Plates in Lap Splice Joints	Senior Engineer, Thornton-Tomasetti
8	Qiaqia Zhu	M.S.	12/14		Fire Behavior of Bolted Connections	Design Engineer KPFF Consulting
9	Dhrubajyoti Dutta	M.S.	5/16	Vikas Tomar (AE)	Microstructural Fracture Modeling of Ductilte-Brittle Bimaterial Interfaces	Ph.D. Student, Purdue University
10	April Wang	M.S.	5/18		Design of High Rise Buildings with Composite SC Walls	Practitioner
11	Hassan Anwar	M.S.	5/18		Reinforced Concrete Squat Walls Under Combined Seismic and Accident Thermal Loading	Ph.D. Student, Purdue
12	Sijia Wang	M.S.	5/19		Fire Behavior of Reinforced Concrete Deck for Bridges	KPFF
13	Jacob Witte	M.S.	5/19		Local Web Buckling in Steel Beams Subjected to Concentrated Distributed Forces	
14	Shubham Agarwal	M.S.	2/20		Seismic Design Coefficients for Composite-Plate Shear Wall / Concrete Filled	WPM
15	Atta Ur Rehman	M.S.	1/21	Jungil Seo	Tension Strength of Embed Plates With Welded Deformed Bars Governed by Concrete Breakout	PhD. Purdue
16	Preshit Wazalwar	M.S.	7/20		Fire Resistance and Design of Composite Columns and Walls	Saiful Bouquet
17	Cecelia Germann	M.S.	5/23		Pushout and Pullout Testing of Steel-Concrete Composite Structure	Thornton Tomasetti
18	Amanda Lefebvre	M.S.	5/23		Blast Resistant Design of Steel-Plate Composite L-Joint Connection	WJE
19	Himanshu Khandelwal	M.S.	7/23		Predicting Fracture and Loss in Ductility due to Flaws in the CJP Weld	Modjeski and Masters Inc.
20	Grant Davis	M.S.	12/23		Ultimate Strength and Rotation Capacity of Steel-Plate Composite (SC) Beams in One-Way Bending	USAF
21	Anna Pukha	M.S.	12/23		On the Design of Bolted Splices for Composite Plate Shear Wall – Concrete Filled	Walter P. Moore
22	Anna Tarasova	M.S.	12/23	Jungil Seo	Innovative Repair Methods for Corrosion-Damaged Steel Bridges	HNTB
23	Nimisha Jain	M.S.	6/24		Fire Design by Advanced Analysis of Archetype Steel-Composite Structure	Thornton Tomasetti
24	Nikhil Mittal	M.S.	6/24	Jungil Seo	Numerical Analysis of In-Plane Shear	Modjeski and

					Behavior of SC Wall Under Combined Loading	Masters Inc.
25	Owen Spangler	M.S.	5/25		Design of Blast Resistant Steel Plate Composite Systems (SC): Establishing a UFC Equivalency Framework	SGH
26	Sean Dankoski	M.S.	5/25		Design and Behavior of Steel-Plate Composite (SC) Modular Slab-to-Wall Connections	WJE
27	Akshi Karmoory	M.S.	7/25	Jungil Seo	Steel Modules of Steel-Plate Composite Slabs with Diaphragm Plates- Behavior, Analysis and Design	Holtec International
28	Sydney Davis	M.S.	5/26	Joshua Harmon	Evaluation of the Missile Impact Response of Steel-Plate Composite (SC) Walls Using an Artificial Neural Network	USAF
29	Kayla Turner	M.S.	5/26	Joshua Harmon	Single-Sided Welded Connections for Steel-Plate Composite (SC) Members	Offers pending

7.2 Ph.D. Dissertation Completed

	Name	Degree	Year	Co-chair	Title	Current Status
1	Zhihui Huang	Ph.D.	2005		Seismic Behavior, Analysis, and Design of High Strength CFT Moment Resisting Frames	Structural Engineer, Structus Inc.
2	Milind L. Prabhu	Ph.D.	2007	Neeraj Buch	Experimental and Analytical Investigations of the Mechanistic Effects of Dowel Misalignments in Jointed Concrete Pavements	Structural Engineer Chevron Inc.
3	Keith J. Kowalkowski	Ph.D.	2005		Effects of Multiple Damage-Heat Straightening Repair Cycles on the Structural Properties and Serviceability of Steel Beam Bridges	Associate Professor, Lawrence Technological University
4	Sangdo Hong	Ph.D.	2007		Fundamental Behavior and Stability of CFT Columns Under Fire Loading	Bridge Engineer, Virginia Department of Transportation
5	Devin Huber	Ph.D.	2008		Development and Validation of Long-Span Floor Systems for Multi-story Residential Structures.	Director of Research AISC
6	Anil Agarwal	Ph.D.	2011		Stability Behavior of Steel Building Structures in Fire Conditions	Associate Professor, IIT – Hyderabad
7	Lisa Choe	Ph.D.	2011		Structural Mechanics and Behavior of Steel Members Under Fire Loading	Sr. Prin. Research Engineer, PARI, LLC
8	Young-Moo Sohn	Ph.D.	2012		Effects of Realistic Heat Straightening Repair on Damaged Steel Beam Bridges	Associate Professor, Central Connecticut State University
9	Kai Zhang	Ph.D.	2014		Slenderness Limits and Compression Behavior of Composite SC Walls for Safety-Related Nuclear Facilities	Senior Structural Engineer, Bechtel
10	Jungil Seo	Ph.D.	2014		Behavior and Design of SC Wall-to-Wall Connections in Safety-Related Nuclear Facilities	Sr. Princ. Research Engineer, Purdue University
11	Kadir Sener	Ph.D.	2014		Out-of-Plane Shear Behavior and Strength of Composite SC Walls for Safety-Related Nuclear Facilities	Assistant Professor Auburn University
12	Hun Cha	Ph.D.	2014	Arun Prakash	Life Cycle Damage Modeling of Indiana Bridges Due to Overweight Trucks	Regulator, Korea Institute of Nuclear Safety
13	Kristi Selden	Ph.D.	2014		Fire Behavior and Design of Composite Beams and Floors	University Relations AISC
14	Zhichao Lai	Ph.D.	2014		Behavior and Design of Noncompact and Slender CFT Members	Professor, Fuzhou University, China 1000 Youth Plan
15	Jakob Bruhl	Ph.D.	2015		Blast Performance and Design of Steel-Plate Composite Walls	Associate Professor, US Military Academy, West Point

16	Yuxin Yang	Ph.D.	2015	Michael Kreger	Shear Strength and Behavior of RC Structures with T-Headed Bars in Safety Related Nuclear Facilities	Assistant Professor, Fuzhou Univ. Fujian, China
17	Erica Fischer	Ph.D.	2015		Fire Behavior of Simple (Shear) Connections in Steel-Frame Buildings	Associate Professor, Oregon State University
18	Efe Kurt	Ph.D.	2016		Seismic Behavior and Design of SC Walls and Anchorage Connections	Post-Doctoral RA, Idaho National Lab
19	Peter Booth	Ph.D.	2016		Lateral Load Behavior and Capacity of Structures Composed of Steel-Plate Composite (SC) Walls	Structural Engineer, US Army Corps of Engineers
20	Rachel Chicchi	Ph.D.	2017		Multi-Hazard Resilience of Steel MRF Buildings	Assistant Professor Univ. of Cincinnati
21	Saahas Bhardwaj	Ph.D.	2018		Combined In-Plane and Out-of-Plane Shear Behavior and Design of Composite Walls	Purdue Applied Research Institute, LLC
22	Cem Korkmaz	Ph.D.	2018	Rob Connor	Collapse Analysis of Fracture Critical Tub Girder Steel Bridges	Post-Doctoral RA, Purdue University
23	Joo Min Kim	Ph.D.	2018		Behavior and Design of SC Walls Subjected to Missile Impact	KAERI S. Korea, Samsung
24	Dhrubajyoti Datta	Ph.D.	2019		Effect of Nonlinear Soil-Structure Interaction on the Seismic Response of Critical Infrastructure	Walter P. Moore, Houston, USA
25	Carlos Madera	Ph.D.	2020		Design Approach for RC Panels (Shells) for Industrial Facilities Using ACI Codes	Professor EICG, Univalle, Colombia
26	Soheil Shafaei	Ph.D.	2020		Seismic and Wind Behavior and Design of Planar Composite-Plate Shear Walls / Concrete Filled	Assistant Professor, Utah State University
27	Abdullah Alghossoon	Ph.D.	2021		Analysis and Design of High-Strength Steel and Composite Members	Professor, Hashemite University, Jordan
28	Tzu-Chun Tseng	Ph.D.	2021		Post-Fire Assessment of Prestressed Concrete Bridges	Sr. Structural Engineer, KPFF
29	Ataollah T. Anvari	Ph.D.	2022		Behavior and Design of Composite Plate Shear Walls / Concrete Filled (C-PSW/CF) Under Fire Loading	Sr. Structural Engineer, WJE
30	Morgan Broberg	Ph.D.	2022		Seismic Behavior and Design of Coupled and Uncoupled C-PSW/CF Systems	Assistant Professor, University of Arkansas
31	Mubashshir Ahmad	Ph.D.	2023		Design and Behavior of Composite Coupling Beam-to-Composite Plate Shear Wall Connections	Sr. Structural Engineer WJE
32	Muhannad Alasiri	Ph.D.	2023		Fire Resistant Design of Floor-to-SC Wall Connections	Assistant Professor University of Kingdom of Saudi Arabia
33	Joshua Harmon	Ph.D.	2023		Blast Resistant Design of Two-Way Steel-Concrete Composite (SC) Panels	Research Engineer Purdue Applied Research Institute, LLC
34	Ata Ur Rehman	Ph.D.	2024	Jungil Seo	Effect of Construction Flaws in Steel-Plate Composite (SC) Structures	Assistant Professor, National University of Science and Technology, Pakistan
35	Deven Kanakamedala	Ph.D.	2024	Jungil Seo	Inspection and Assessment of Corroded Steel Girders	Bridge Engineer, Modjeski and Masters, Inc.
36	Margaret Perlman	Ph.D.	2025		Direct Shear in Blast-Resistant Steel-Plate Composite (SC) Structures	Thornton Tomasetti
37	Omair Bin Saleem	Ph.D.	2025	Jungil Seo	Dynamic Behavior, Analysis and Design of Steel and Concrete Composite Structural Elements	Assistant Professor, National University of Science and Technology, Pakistan
38	Shivam Sharma	Ph.D.	2025	Jungil Seo	Design and Behavior of SpeedCore Splices and Wall-to-Base Connections	Visiting Professor, Purdue University
39	Mirnes Mustafic	Ph.D.	2025	Jungil Seo	Out-of-Plane Behavior and Capacity of Steel-Plate Composite with Diaphragm Plates	Structural Engineer, Exponent Inc.

7.3 Post-Docs and Research Engineers

Most of the post-doctoral research associates working with Prof. Varma are former students who obtained their Ph.D. from Purdue University. Prof. Varma mentors these post-doctoral associates and advises them about: (i) writing research proposals, (ii) managing grants, (iii) working with graduate students, (iv) writing research papers and responding to review comments, (v) applying for faculty positions, (vi) preparing for phone and site interviews, (vii) negotiating offers and requesting startup funds.

	Name	Degree & Date	Prior Affiliation	Position Title / Dates	Project Title	Current Status
1	Sergei Filatyev	Ph.D. 2003	U. of Michigan,	Post-Doctoral 2006-2007	Stability of Steel Structures Under Fire	Lead Data Scientist at Cox Automotive Inc.
2	Sangdo Hong	Ph.D. 2007	Purdue University	Post-Doctoral 2007-08	Stability of Steel Structures Under Fire	Virginia Department of Transportation
3	Hoseok Chi	Ph.D. 2009	Purdue University	Post-Doctoral 2009-10	Experimental Evaluation Of AP1000 SC Structures	Korea Institute of Nuclear Safety (KINS)
4	Youngmoo Sohn	Ph.D. 2012	Purdue University	Post-Doctoral 2012-2014	Experimental Evaluation of SC Structures for Nuclear Power Plants	Associate Professor Central Connecticut State University
5	S. Ramesh	Ph.D. 2013	Purdue University	Post-Doctoral 2013-2017	Shear Strength of RC Beams with T-Headed Shear Reinforcement	Research Engineer, National Institute of Standards & Testing
6	Zhichao Lai	Ph.D. 2014	Purdue University	Post-Doctoral 2014 – 2017	Fracture Critical Bridge Analysis: Tub Girders and Steel Girder Bridges	Professor, Fuzhou University, China 1000 Plan Award – 2018
7	Kadir Sener	Ph.D. 2014	Purdue University	Post-Doctoral 2014-2020	Effects of Accident Thermal Conditions on Seismic Behavior and Design of Power Plants	Assistant Professor Auburn University
8	Saahas Bhardwaj	Ph.D. 2018	Purdue University	Research Engineer 2018 – 2021	Performance-based Structural Fire Engineering of Composite Walls	Purdue Applied Research Institute, LLC
9	Tzu-Chun Tseng	Ph.D. 2021	Purdue University	Post-doctoral Researcher 2021 – 2023	Beyond Design Performance of SCCV – Testing and Analysis	KPFF, Seattle
10	Ataollah T. Anvari	Ph.D. 2022	Purdue University	Post-doctoral Researcher 2022 – 2023	Performance-based Structural Fire Design for Authorities Having Jurisdiction	WJE, Chicago
11	Jungil Seo	Ph.D. 2014	Purdue University	Sr. Principal Research Scientist 2014 - present	Behavior and Design of Modular Connections for SC Walls	Research Assistant Professor, Purdue University
12	Tom Bradt	M.S. 2011	Purdue University	Sr. Research Engineer 2012-present	Large-scale Experimental Evaluations and Innovative Testing	Full-time employee at Purdue University. Research Engineer
13	Soheil Shafaei	Ph.D. 2020	Purdue University	Sr. Research Scientist 2020 – 2024	SpeedCore Design, Analysis, and Testing for Seismic and Wind Loading	Assistant Professor, Utah State University
14	Lisa Choe	Ph.D. 2011	Purdue University	Sr. Research Scientist 2022 - present	Blast Resistant Design, Analysis, and Testing of Structural Systems	Purdue Applied Research Institute, LLC
15	Sanj Malushte	Ph.D. 1988	Virginia Tech	Sr. Director of Technology 2022 – present	Infrastructure Research and Innovative Solutions	Purdue Applied Research Institute, LLC
16	Josh Harmon	Ph.D. 2023	Purdue University	Research Scientist 2022 – present	Blast Resistant Design, Analysis, and Testing of Structural Components and Systems	Purdue Applied Research Institute, LLC
17	Morgan Broberg	Ph.D. 2022	Purdue University	Research Scientist 2022 – 2025	Blast Resistant Design, Analysis, and Testing of Structural Systems	Assistant Professor, University of Arkansas
18	Tom Welch	B.S. 2022	Purdue University	Research Engineer 2022 - present	Structural Testing Engineer	Purdue Applied Research Institute, LLC

19	Saahas Bhardwaj	Ph.D. 2018	University of Alabama	Research Engineer 2024-present	Behavior, Analysis, Testing, and Design of Nuclear Structures	Purdue Applied Research Institute, LLC
20	Shivam Sharma	Ph.D. 2025	Purdue University	Visiting Asst. Prof. 2025 - present	Fire Behavior, Testing and Design of FastFloor Systems	
21	Aditya Jhunjhunwala	Ph.D. 2025	Univ. of California, Davis	Visiting Asst. Prof. 2025 - present	High Strength Steel Columns: Testing and Design	

8. GRANT RESEARCH ACTIVITY

Prof. Varma has received about $40 million of total research funding, of which he is directly responsible for about $33 million. He has received funding from a variety of sources including federal agencies, state agencies, structural steel industry, concrete research foundations, and power industry.

The federal agencies include: (i) the National Science Foundation (NSF), (ii) the National Institute of Standards and Technology (NIST) through the U.S. Department of Commerce, (iii) the U.S. Department of Energy (DOE), (iv) the National Academy of Sciences through the National Cooperative Highway Research Program (NCHRP), (v) Los Alamos National Laboratory (LANL).

The state agencies include the: (i) Michigan Department of Transportation (MDOT), (ii) Indiana Department of Transportation (INDOT), and (iii) Pennsylvania Department of Transportation (PennDOT).

The steel industry sources include: (i) the American Institute of Steel Construction (AISC), (ii) the American Iron and Steel Institute (AISI), (iii) Consolidated Systems, Inc. (iv) HDR Inc., (v) Steel Institute of New York, and (vi) Hardesty and Hanover, Inc. The concrete research foundations include the Charles Pankow Foundation.

The power industry sources include: (i) Bechtel Power, (ii) Westinghouse Electric Company, (iii) GE Hitachi, (iv) Holtec International, (v) X-Energy, (vi) TerraPower, (vi) URS (now AECOM), (vii) Mitsubishi Heavy Industries from Japan, (viii) Korea Hydro Nuclear Power, (ix) Korea Electric Power Company from S. Korea.

Prof. Varma has received research funding from federal regulatory agencies including: (i) US Nuclear Regulatory Commission (NRC), (ii) the Canadian Nuclear Safety Commission (CNSC), and (iii) Federal Energy Regulatory Commission (FERC)

Grant Activity

P1.	
Agency / Title of Grant:	Michigan State University - Intramural Research Grants Program Fire Behavior and Design of Composite Structures
Duration of Funding (Dates):	Jan 2002 – July 2003
Total Amount of Award:	$43,500
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P2.	
Agency / Title of Grant:	Michigan Department of Transportation / The Effects of Multiple Heat Straightening on Structural Properties of Steel Bridge Beams Impacted by High Loads
Duration of Funding (Dates):	May 2002 - Nov. 2004
Total Amount of Award:	$175,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P3.	
Agency / Title of Grant:	National Science Foundation / Experimental and Analytical Investigations of the Fire Behavior of CFT Beam-Columns
Duration of Funding (Dates):	May 2003 - May 2006
Total Amount of Award:	$114,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P4.	
Agency / Title of Grant:	American Institute of Steel Construction / Development of Innovative Long Span Floor Systems for Multi Story Residential Steel Construction
Duration of Funding (Dates):	August 2003 - August 2007
Total Amount of Award:	$120,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P5.	
Agency / Title of Grant:	Michigan Department of Transportation / Evaluation of Alignment Tolerances for Dowel Bars and their Effects on Joint Opening Behavior
Duration of Funding (Dates):	Jan. 2004 - Dec. 2006
Total Amount of Award:	$232,000
Your Role and Responsibility:	Co-Principal Investigator (50% responsibility)
Co-Investigators:	Prof. Neeraj Buch, Michigan State University

P6.	
Agency / Title of Grant:	Bechtel Power / Analysis of Modular Composite Sandwich Panel Walls for Nuclear Facilities
Duration of Funding (Dates):	Aug. 2005 - Dec. 2005
Total Amount of Award:	$4,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P7.	
Agency / Title of Grant:	Purdue Research Foundation / Realistic Fire Behavior of Structural Columns
Duration of Funding (Dates):	Aug. 2005 - Aug. 2006
Total Amount of Award:	$14,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P8.	
Agency / Title of Grant:	Indiana Department of Transportation / Synthesis study: Heat Treatment of Steel and its Applications for Rehabilitating Steel Bridges
Duration of Funding (Dates):	Jan. 2006 - July 2007
Total Amount of Award:	$35,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
Agency / Title of Grant:	
P9.	
Agency / Title of Grant:	Indiana Department of Transportation / Evaluation and Verification of Bridge LRFD Design Software
Duration of Funding (Dates):	Jan. 2006 - July 2008
Total Amount of Award:	$150,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P10.	
Agency / Title of Grant:	Bechtel Power / Behavior and Design of Modular Steel Plated Composite Walls for Nuclear Facilities
Duration of Funding (Dates):	May 2006 - May 2007
Total Amount of Award:	$43,500
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P11.	
Agency / Title of Grant:	National Science Foundation / Realistic Fire Behavior and Stability of Steel Building Structures and Sub-systems
Duration of Funding (Dates):	August 2006 - August 2009
Total Amount of Award:	$149,000
Your Role and Responsibility:	Principal Investigator (85% responsibility)
Co-Investigators:	Prof. Jay Gore, Purdue University, School of Mechanical Engineering
P12.	
Agency / Title of Grant:	National Institute of Standards and Technology through the U.S. Department of Commerce / Realistic Fire Behavior and Stability of Steel Building Structures and Sub-systems
Duration of Funding (Dates):	August 2006 - August 2009
Total Amount of Award:	$149,000
Your Role and Responsibility:	Principal Investigator (85% responsibility)
Co-Investigators:	Prof. Jay Gore, Purdue University, School of Mechanical Engineering
P13.	
Agency / Title of Grant:	Indiana Department of Transportation / Effects of Realistic Heat Straightening Repair on the Properties and Serviceability of Damaged Steel Bridges
Duration of Funding (Dates):	Jan. 2007 - August 2009
Total Amount of Award:	$172,500
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P14.	
Agency / Title of Grant:	Purdue Research Foundation (PRF) / Realistic Fire Behavior of Building Structures
Duration of Funding (Dates):	Jan. 2008 - Dec. 2008
Total Amount of Award:	$15,500
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA

P15.	
Agency / Title of Grant:	American Institute of Steel Construction (AISC) / Unrestricted Gift for Continuing Research of the Fire Behavior of Steel Structures
Duration of Funding (Dates):	Jan. 2008 - no limit
Total Amount of Award:	$45,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P16.	
Agency / Title of Grant:	American Iron and Steel Institute (AISI) / Unrestricted Gift for Continuing Research of the Fire Behavior of Steel Structures
Duration of Funding (Dates):	Jan. 2008 - no limit
Total Amount of Award:	$45,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P17.	
Agency / Title of Grant:	National Science Foundation (NSF) / Collaborative Research: Behavior and Design of Composite Floor Systems Under Fire Loading
Duration of Funding (Dates):	Aug. 2008 - Aug. 2011
Total Amount of Award:	$300,000
Your Role and Responsibility:	Principal Investigator (60% responsibility)
Co-Investigators:	Prof. Venkatesh Kodur, Michigan State University
P18.	
Agency / Title of Grant:	National Science Foundation (NSF) / Collaborative Research: Structural Mechanics of Steel Columns and Beam-Columns Under Fire Loading
Duration of Funding (Dates):	Jan. 2009 - Dec. 2011
Total Amount of Award:	$140,000
Your Role and Responsibility:	Principal Investigator (50% responsibility)
Co-Investigators:	Prof. Andrea Surovek, South Dakota School of Mines and Technology
P19.	
Agency / Title of Grant:	Consolidated Systems Inc. and W&W Steel Co./ Experimental Evaluation of a Patented Innovative Composite Beam and Floor System
Duration of Funding (Dates):	July 2008 - Mar. 2009
Total Amount of Award:	$90,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P20.	
Agency / Title of Grant:	Indiana Department of Transportation/ Feasibility Evaluation of Standardization of Bridge Elements in Indiana
Duration of Funding (Dates):	May 2009 - April 2010
Total Amount of Award:	$55,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P21.	
Agency / Title of Grant:	U.S. Department of Energy through the Westinghouse Electric Company/Large-Scale Experimental Evaluation of SC Shield Building For AP1000
Duration of Funding (Dates):	May 2009 - December 2010
Total Amount of Award:	$2,490,547
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P22.	
Agency / Title of Grant:	U.S. Department of Energy through the Westinghouse Electric Company/ Combined Operating and Licensing Agreement (COLA) Design Evaluation for AP1000 Containment Internal Structures
Duration of Funding (Dates):	Oct 2010 - December 2011
Total Amount of Award:	$500,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P23.	
Agency / Title of Grant:	Indiana Dept. of Transportation/ Fire Damage Evaluation of I465 Bridge in Indianapolis
Duration of Funding (Dates):	Oct 2009 - April 2011
Total Amount of Award:	$100,000
Your Role and Responsibility:	co-Principal Investigator (50% responsibility)
Co-Investigators:	Prof. Robert Connor, Purdue University

P24.	
Agency / Title of Grant:	Pennsylvania Dept. of Transportation through the University of Pittsburgh / Evaluation of Fire Damaged Steel Bridges
Duration of Funding (Dates):	Jan. 2010 - April 2011
Total Amount of Award:	$50,000
Your Role and Responsibility:	Principal Investigator (50% responsibility)
Co-Investigators:	Prof. Robert Connor, Purdue University
P25.	
Agency / Title of Grant:	URS / Mitsubishi Heavy Industries Ltd. (prime sponsor)/ Benchmarking Analysis of SC Walls and Connections for US-APWR CIS
Duration of Funding (Dates):	Aug. 2011 - Aug. 2013
Total Amount of Award:	$400,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P26.	
Agency / Title of Grant:	Indiana Department of Transportation / Efficient Load Rating and Life-Cycle Costing of Indiana Bridges for Overweight Loads
Duration of Funding (Dates):	Jan. 2012 - Dec. 2013
Total Amount of Award:	$173,059
Your Role and Responsibility:	co-Principal Investigator (50% responsibility)
Co-Investigators:	Prof. Arun Prakash, Purdue University
P27.	
Agency / Title of Grant:	URS / Mitsubishi Heavy Industries Ltd. (prime sponsor) / Experimental Evaluation of SC Composite Walls and Connections for the US-APWR CIS
Duration of Funding (Dates):	May 2012 - Dec. 2013
Total Amount of Award:	$1,311,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P28.	
Agency / Title of Grant:	U.S. Department of Energy / Design of SC Walls and Slabs for Impulsive Loading
Duration of Funding (Dates):	Aug. 2012 - Dec. 2014
Total Amount of Award:	$120,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P29.	
Agency / Title of Grant:	U.S. Department of Energy / Modular Connection Technologies for Composite Walls in SMRs: Development and Experimental Verification
Duration of Funding (Dates):	Aug. 2012 - Dec. 2015
Total Amount of Award:	$792,572
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	NA
P30.	
Agency / Title of Grant:	HDR Inc./ Behavior of Strengthened Built-Up Steel Columns
Duration of Funding (Dates):	Aug. 2012 - Dec. 2015
Total Amount of Award:	$85,371
Your Role and Responsibility:	co-Principal Investigator (41% responsibility)
Co-Investigators:	Prof. Rob Connor (41%), Prof. Judy Liu (18%), Purdue University
P31.	
Agency / Title of Grant:	Bechtel Power Corp. / Unrestricted Gift to Advance Research of SC Walls for Safety-Related Nuclear Facilities
Duration of Funding (Dates):	May 2009 - unending
Total Amount of Award:	$9,000
Your Role and Responsibility:	Principal Investigator
Co-Investigators:	NA
P32.	
Agency / Title of Grant:	Canadian Nuclear Safety Commission (CNSC) / Testing and Development of Regulatory Requirements for Steel Plate Concrete - SC Structures
Duration of Funding (Dates):	May. 2013 - May 2016
Total Amount of Award:	$299,000
Your Role and Responsibility:	co-Principal Investigator (53% responsibility)
Co-Investigators:	Prof. Andrew Whittaker (47%, University of Buffalo)

P33.	
Agency / Title of Grant:	Westinghouse Electric Company / Shear Strength of RC Structures with T-headed Shear Bars in Safety-Related Nuclear Facilities
Duration of Funding (Dates):	May. 2013 - May 2014
Total Amount of Award:	$390,000
Your Role and Responsibility:	Principal Investigator (50% responsibility)
Co-Investigators:	Prof. Michael Kreger, Purdue University
P34.	
Agency / Title of Grant:	National Institute for Standards and Technology / IPA for Selvarajah Ramesh (Post-Doc Working at NIST Fire Lab)
Duration of Funding (Dates):	Dec. 2013 - Dec. 2017
Total Amount of Award:	$313,047
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P35.	
Agency / Title of Grant:	Hardesty and Hanover / Analytical Evaluation of the Orthotropic Deck of the Johnson Street Bridge
Duration of Funding (Dates):	Sept. 2013 - Aug. 2014
Total Amount of Award:	$76,389
Your Role and Responsibility:	co-Principal Investigator (30% responsibility)
Co-Investigators:	Prof. Rob Connor (70%, Purdue University)
P36.	
Agency / Title of Grant:	National Academy of Sciences / NCHRP 12-87A - Fracture Critical Analysis
Duration of Funding (Dates):	June. 2014 - Aug. 2016
Total Amount of Award:	$260,000
Your Role and Responsibility:	co-Principal Investigator (40% responsibility)
Co-Investigators:	Prof. Rob Connor (60%, Purdue University)
P37.	
Agency / Title of Grant:	American Iron Steel Construction + National Steel Bridge Alliance / Fracture of Steel Tub Girder Bridges
Duration of Funding (Dates):	April. 2014 - unending
Total Amount of Award:	$40,000
Your Role and Responsibility:	co-Principal Investigator (50% responsibility)
Co-Investigators:	Prof. Rob Connor (50%, Purdue University)
P38.	
Agency / Title of Grant:	Westinghouse Electric Company / AP1000 Wire Embed Testing Program
Duration of Funding (Dates):	April. 2014 – May 2017
Total Amount of Award:	$312,435
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P39.	
Agency / Title of Grant:	US Department of Energy / Improvement of Design Codes to Account for Accidental Thermal Effects on Seismic Performance
Duration of Funding (Dates):	September 2014 - September 2017
Total Amount of Award:	$800,000
Your Role and Responsibility:	Principal Investigator (75% responsibility)
Co-Investigators:	Prof. Andrew Whittaker (University at Buffalo)
P40.	
Agency / Title of Grant:	US Nuclear Regulatory Commission / Steel Plate Composite (SC) Walls: Behavior, Analysis, and Design for Missile Impact
Duration of Funding (Dates):	September 2014 - September 2017
Total Amount of Award:	$391,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P41.	
Agency / Title of Grant:	American Institute of Steel Construction / Unrestricted grant for Design of SC Slabs and Connections
Duration of Funding (Dates):	September 2014 - no end date
Total Amount of Award:	$60,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	

P42.	
Agency / Title of Grant:	Idaho National Laboratory / Nonlinear SSI: Numerical and Experimental Exploration of Interfacial Nonlinearities
Duration of Funding (Dates):	June 2016 – June 2017
Total Amount of Award:	$60,000
Your Role and Responsibility:	Principal Investigator (45% responsibility)
Co-Investigators:	Dr. Jungil Seo (55%, Post-Doc working with Prof. Varma)
P43.	
Agency / Title of Grant:	Modular Walling Systems / Unrestricted Gift: Research on SC Walls and Slabs
Duration of Funding (Dates):	June 2016 – no limit
Total Amount of Award:	$28,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P44.	
Agency / Title of Grant:	Korea Hydro Nuclear Power / Dankook University: Collaborative Experimental Investigation of Composite SC Walls Subjected to Missile Impact
Duration of Funding (Dates):	July 2016 – Dec. 2018
Total Amount of Award:	$232,824
Your Role and Responsibility:	Principal Investigator (60% responsibility)
Co-Investigators:	Dr. Jungil Seo (40%, Post-Doc working with Prof. Varma)
P45.	
Agency / Title of Grant:	Charles Pankow Foundation / Seismic and Wind Behavior and Design of Coupled CF-CPSW Core Walls for Steel Buildings
Duration of Funding (Dates):	August 2016 – August 2021
Total Amount of Award:	$1,018,000
Your Role and Responsibility:	Principal Investigator (85% responsibility)
Co-Investigators:	Prof. Michel Bruneau (15%, Univ. at Buffalo)
P46.	
Agency / Title of Grant:	Westinghouse Electric Company / Evaluation of an RC Shield Building
Duration of Funding (Dates):	August 2016 – May 2017
Total Amount of Award:	$235,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P47.	
Agency / Title of Grant:	Westinghouse Electric Company / Design of Lap-Splice Connections and Bent Shear Stud Pullout Tests
Duration of Funding (Dates):	August 2016 – May 2017
Total Amount of Award:	$235,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P48.	
Agency / Title of Grant:	Charles Pankow Foundation / R-factors for Composite Plate Shear Walls
Duration of Funding (Dates):	August 2017 – August 2018
Total Amount of Award:	$74,750
Your Role and Responsibility:	Principal Investigator (60% responsibility)
Co-Investigators:	Dr. Jungil Seo (40%, Post-Doc working with Prof. Varma)
P49.	
Agency / Title of Grant:	Indiana Department of Transportation / Post-Fire Assessment, Evaluation, and Inspection of Prestressed Concrete Bridge Girders
Duration of Funding (Dates):	Jan. 2018 – Dec. 2020
Total Amount of Award:	$360,000
Your Role and Responsibility:	Principal Investigator (40% responsibility)
Co-Investigators:	Prof. Jan Olek (25%), Prof. Christopher Williams (35%)
P50.	
Agency / Title of Grant:	Charles Pankow Foundation - American Institute of Steel Construction / Performance-Based Structural Fire Engineering of Concrete Filled Composite Plate Shear Wall (CF-CPSW) Buildings
Duration of Funding (Dates):	July 2018 – Dec. 2019
Total Amount of Award:	$160,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	

P51.	
Agency / Title of Grant:	Westinghouse Electric Company / Pushout Tests to Classify and Evaluate Shear Connectors in Composite Walls
Duration of Funding (Dates):	July 2018 – Dec. 2018
Total Amount of Award:	$145,000
Your Role and Responsibility:	Principal Investigator (50% responsibility)
Co-Investigators:	Jungil Seo (50% responsibility)
P52.	
Agency / Title of Grant:	Moltex Energy Limited / Moltex – Rigid-Elastic Composite Civilworks
Duration of Funding (Dates):	Jan. 2019 – July 2020
Total Amount of Award:	$110,000
Your Role and Responsibility:	Principal Investigator (50% responsibility)
Co-Investigators:	Prof. Jungil Seo (50%)
P53.	
Agency / Title of Grant:	Veolia Water Company / Experimental and Numerical Evaluation of Reinforced Concrete Pier and Pass-Through Connection of KCL-3 Structure
Duration of Funding (Dates):	July 2018 – December 2024
Total Amount of Award:	$700,000
Your Role and Responsibility:	Principal Investigator (50% responsibility)
Co-Investigators:	Prof. Jungil Seo (50%)
P54.	
Agency / Title of Grant:	Korea Electric Power Company / Korea Hydro Nuclear Power: Behavior and Design of Steel Plate Composite (SC) Wall-to-Reinforced Concrete (RC) Wall Mechanical Connections =
Duration of Funding (Dates):	March 2019 – July 2020
Total Amount of Award:	$640,000
Your Role and Responsibility:	Principal Investigator (60% responsibility)
Co-Investigators:	Dr. Jungil Seo (40%, Post-Doc working with Prof. Varma)
P55.	
Agency / Title of Grant:	Korea Electric Power Company / Korea Hydro Nuclear Power: Design of Deformed Rebar Anchors for Concrete Attachments Voluntary support from Hilti Inc.
Duration of Funding (Dates):	August 2019 – July 2020
Total Amount of Award:	$66,000
Your Role and Responsibility:	Principal Investigator (60% responsibility)
Co-Investigators:	Dr. Jungil Seo (40%, Post-Doc working with Prof. Varma)
P56.	
Agency / Title of Grant:	Indiana Department of Transportation / Shear and Bearing Capacity of Corroded Steel Beam Bridges and Effects on Load Rating
Duration of Funding (Dates):	August 2020 – May 2023
Total Amount of Award:	$225,000
Your Role and Responsibility:	Principal Investigator (50% responsibility)
Co-Investigators:	Prof. Jungil Seo, Prof. Rob Connor
P57.	
Agency / Title of Grant:	Charles Pankow Foundation+ American Institute of Steel Construction + MKA Foundation + Steel Institute of New York / Composite Floor-to-SpeedCore wall Systems: Performance-based Fire Resistance and Design
Duration of Funding (Dates):	January 2021 – December 2023
Total Amount of Award:	$216,000
Your Role and Responsibility:	Principal Investigator (75% responsibility)
Co-Investigators:	Prof. Jungil Seo (25% responsibility)
P58.	
Agency / Title of Grant:	Electric Power Research Institute / Assessment, Design and Analysis Guidance of SC Walls for Advanced Reactors and SMRs
Duration of Funding (Dates):	February 2021 – April 2024
Total Amount of Award:	$240,000
Your Role and Responsibility:	Principal Investigator (75% responsibility)
Co-Investigators:	Prof. Jungil Seo (25% responsibility)
P59.	
Agency / Title of Grant:	GE Hitachi / Prototype testing for BWRX-300
Duration of Funding (Dates):	Jan. 2022 – July 2024
Total Amount of Award:	$1,900,000
Your Role and Responsibility:	Principal Investigator (75% responsibility)
Co-Investigators:	Prof. Jungil Seo (25% responsibility)

P60.	
Agency / Title of Grant:	Electric Power Research Institute / Digital Twin for Construction Demonstration of BWRX-300
Duration of Funding (Dates):	Jan. 2022 – July 2024
Total Amount of Award:	$310,000 (contract negotiations ongoing)
Your Role and Responsibility:	Principal Investigator (75% responsibility)
Co-Investigators:	Prof. Jungil Seo (25% responsibility)
P61.	
Agency / Title of Grant:	Indiana Department of Transportation / New Repair Strategies for Life-Cycle Extension of Corroded Steel Beam Bridges
Duration of Funding (Dates):	September 2021 – Feb. 2024
Total Amount of Award:	$262,669
Your Role and Responsibility:	Principal Investigator (70% responsibility)
Co-Investigators:	Prof. Jungil Seo, Prof. Rob Connor
P62.	
Agency / Title of Grant:	Indiana Department of Transportation / Synthesis Study: Repair and Durability of Fire Damaged Prestressed Concrete Bridge Girders
Duration of Funding (Dates):	July 2021 – Jan. 2022
Total Amount of Award:	$60,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P63.	
Agency / Title of Grant:	Bechtel National / Blast Resistant Design for Buried Structures: Phase 1 – Static Testing of SC Walls and Connections
Duration of Funding (Dates):	Feb. 2022 – June 2024
Total Amount of Award:	$7,200,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	Sanj Malushte, Wayne Chen,
P64.	
Agency / Title of Grant:	Lawrence Livermore National Laboratory / Enhanced Nuclear Safety Using Modular Steel-Plate Composite (SC) Design / Construction
Duration of Funding (Dates):	Aug. 2022 – Aug. 2024
Total Amount of Award:	$247,000
Your Role and Responsibility:	Principal Investigator (50% responsibility)
Co-Investigators:	Jungil Seo
P65.	
Agency / Title of Grant:	Charles Pankow Foundation / Introduction to Performance-based Structural Fire Design (PBSFD) for Authority Having Jurisdiction (AHJ) Officials
Duration of Funding (Dates):	Sept. 2022 – Dec. 2023
Total Amount of Award:	$120,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P66.	
Agency / Title of Grant:	Bechtel National / Blast Resistant Design for Buried Structure: Phase 2 – Dynamic Blast Tests of Structural Components and Systems
Duration of Funding (Dates):	June. 2023 – June 2024
Total Amount of Award:	$2,544,864
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	Sanj Malushte, Steve Son, Meliton Flores
P67.	
Agency / Title of Grant:	Los Alamos National Laboratory / SC Composite Qualification Study – Phase 1
Duration of Funding (Dates):	Sept. 2022 – June 2023
Total Amount of Award:	$250,000
Your Role and Responsibility:	Principal Investigator (70% responsibility)
Co-Investigators:	Sanj Malushte (30% responsibility)
P68.	
Agency / Title of Grant:	Federal Energy Regulatory Commission / Geotechnical and Structural Document Review for LNG Facilities
Duration of Funding (Dates):	09/2023 – 09/2028
Total Amount of Award:	$1,252,440
Your Role and Responsibility:	Co-Principal Investigator (50%)
Co-Investigators:	Sanj Malushte (50% responsibility)

P69.	
Agency / Title of Grant:	American Institute of Steel Construction / SpeedConnection: Steel Coupling Beams and Connections for SpeedCore Seismic Design
Duration of Funding (Dates):	Dec. 2023 – Dec. 2025
Total Amount of Award:	$375,000
Your Role and Responsibility:	Principal Investigator (70% responsibility)
Co-Investigators:	Soheil Shafaei (30% responsibility)
P70.	
Agency / Title of Grant:	Los Alamos National Laboratory / SC Composite Qualification Study – Phase 2
Duration of Funding (Dates):	Oct. 2024 – September 2025
Total Amount of Award:	$792,000
Your Role and Responsibility:	Principal Investigator (70% responsibility)
Co-Investigators:	Sanj Malushte (30% responsibility)
P71.	
Agency / Title of Grant:	Holtec International / Concrete Reinforced Steel Modules for SMR 300®
Duration of Funding (Dates):	Aug. 2024 – June 2025
Total Amount of Award:	$280,000
Your Role and Responsibility:	Principal Investigator (70% responsibility)
Co-Investigators:	Sanj Malushte (30% responsibility)
P72.	
Agency / Title of Grant:	GE Vernova / Damping Ratio for Diaphragm Plate – Steel Composite (SC) Modules
Duration of Funding (Dates):	Mar. 2025 – Dec. 2025
Total Amount of Award:	$243,122
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	Jungil Seo
P73.	
Agency / Title of Grant:	X-Energy, LLC / PARI PIIL X-Energy RB Trade Study and Consultation
Duration of Funding (Dates):	Aug. 2025 – Feb. 2026
Total Amount of Award:	$281,865.98
Your Role and Responsibility:	Principal Investigator (70% responsibility)
Co-Investigators:	Sanj Malushte (30% responsibility)
P74.	
Agency / Title of Grant:	Los Alamos National Lab / SC Composition Qualification Study Phase 3
Duration of Funding (Dates):	Oct, 2025 – Sept. 2026
Total Amount of Award:	$600,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P75.	
Agency / Title of Grant:	Holtec International / Holtec SMR 300® - Design, Analysis, and Licensing Support for Concrete Strengthened Steel Modules
Duration of Funding (Dates):	Mar. 2025 – Mar. 2026
Total Amount of Award:	$700,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P76.	
Agency / Title of Grant:	Korea Hydro Nuclear Power / Development of design, manufacturing, and construction technology for application of nuclear facility SC structure modules
Duration of Funding (Dates):	Aug. 2025 – Aug. 2027
Total Amount of Award:	$978,199
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	Jungil Seo
P77.	
Agency / Title of Grant:	Holtec International / PARI PIIL CSSM for SMR-300: Design, Analysis, and Testing
Duration of Funding (Dates):	Dec. 2025 – Dec. 2026
Total Amount of Award:	$295,253
Your Role and Responsibility:	Co-Principal Investigator (50% responsibility)
Co-Investigators:	Saahas Bhardwaj (50% responsibility)
P78.	
Agency / Title of Grant:	TerraPower LLC / Natrium Steel Composite Module Feasibility Study
Duration of Funding (Dates):	Oct. 2025 – Dec. 2026
Total Amount of Award:	$49,880
Your Role and Responsibility:	Principal Investigator (50% responsibility)
Co-Investigators:	Sanj Malushte (50% responsibility)

P79.	
Agency / Title of Grant:	Orano USA LLC / Orano IKE Nuclear Fuel Enrichment Facility Design Criteria
Duration of Funding (Dates):	April 2024 – Mar. 2026
Total Amount of Award:	$79,887
Your Role and Responsibility:	Co-Principal Investigator (50% responsibility)
Co-Investigators:	Sanj Malushte (50% responsibility)
P80.	
Agency / Title of Grant:	Holtec International / Holtec SMR 300® - PO Line 3.3 - Design, Analysis, and Licensing Support for Concrete Strengthened Steel Modules
Duration of Funding (Dates):	April 2026 – Dec. 2026
Total Amount of Award:	$500,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P81.	
Agency / Title of Grant:	Nuclear Industry Consortium / Steel Construction Modernization in Nuclear (SCMN) Program
Duration of Funding (Dates):	Jan. 2026 – Dec. 2027
Total Amount of Award:	$1,885,000 (Cash) + $1,750,000 (In-Kind)
Your Role and Responsibility:	Principal Investigator (50% responsibility)
Co-Investigators:	Sanj Malushte, Rinaldo Hunt (50% responsibility)
P82.	
Agency / Title of Grant:	Charles Pankow Foundation and American Institute of Steel Construction → Northeastern Univ. / FastFloor: Behavior of Modular Steel Plate Floor Assemblies
Duration of Funding (Dates):	Oct. 2026 – June 2027
Total Amount of Award:	$52,500 + $247,500
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	
P83.	
Agency / Title of Grant:	Batelle Energy Alliance or Idaho National Lab / NRIC Nuclear Quality Assurance Improvement Initiatives: Potential Improvements to ACI 349 Requirements
Duration of Funding (Dates):	March 2026 – Sept. 2026
Total Amount of Award:	$125,000
Your Role and Responsibility:	Principal Investigator (100% responsibility)
Co-Investigators:	

9. IMPACT OF RESEARCH ACTIVITIES

Prof. Varma has dedicated his academic and professional life to the development of innovative steel-concrete composite structures for the built infrastructure including commercial and residential buildings, industrial structures such as nuclear power plants, and protective structures. He has conducted fundamental research including large-scale experimental investigations and numerical analyses to evaluate and improve the structural behavior of steel-concrete composite members, connections and overall structural systems subjected to various extreme loading conditions including seismic, fire, blast, and impact loading. His research products are the basis of (and directly cited in) several AISC codes / specifications (AISC 360, AISC 341, AISC N690) for the design of steel-concrete composite structures for building structures and safety-related nuclear facilities. These codes / specifications govern the design and construction of all steel building structures and safety-related nuclear facilities in the US and are also used / referenced extensively around the world by engineers, consultants, regulators, and building officials.

9.1 Composite Columns and Frames

Prof. Varma received his Ph.D. in Civil Engineering from Lehigh University in 2001. His Ph.D. research on steel-concrete composite columns was a seminal evaluation of the effects of high strength materials on the seismic performance of such members. His journal papers ([J4], [J5], [J6], [J7]), just on this topic of high strength composite members, have been cited more than 800 times (google scholar), and have retained value and relevance as high strength materials have become more readily accessible in the US and abroad. Prof. Varma has continued his research on the topic of composite members throughout his career. Over the past decade, Prof. Varma has conducted fundamental research on composite columns that has led to their classification into compact, noncompact and slender sections; evaluation of their behavior as columns and beam-columns, while accounting for various complexities including material and geometric nonlinearities, slenderness effects, fracture etc. Prof. Varma and his students have published papers in top journals summarizing these findings ([J30], [J36], [J46], [J58]). These papers are the basis of the relevant provisions in the recent AISC Specification (360-10, 360-16), Chapter I, and are cited in the commentary. Prof. Varma's research products and the associated changes in the Specification have enabled the use of noncompact and slender composite members in the US. Prof. Varma and his students have recently published several new journal articles ([J68], [J72], [J76], [J94], [J102], [J133], [J137], [J132]) on high strength steel and composite members and their use in seismic systems. Based on this research, the upcoming AISC Specification (360-22) has included a new Appendix 2 focused on the design of composite members made from high strength materials. This is the first time that the US steel specification has permitted the use of high strength materials for design. Prof. Varma and his former student (Prof. Lai) have received the ASCE Alfred Noble Prize for their publication [J76] and contributions on this topic.

Prof. Varma's expertise in composite members has long been recognized by colleagues and peers, and he was invited to join AISC Task Committee 5 in 2005. He has been a member of the committee for almost 12 years and has made substantial contributions to the AISC Specification (360-22) and Seismic Provisions (341-22) over the years. Prof. Varma's research is the basis of the composite member design specifications in AISC 360-22, Chapter I, and the seismic provisions for composite systems in AISC 341-22. Several of his papers are cited directly in the commentary as the basis of these provisions. Additionally, Prof. Varma was the chair of the Structural Engineering Institute / American Concrete Institute (SEI/ACI) joint committee on composite construction from 2010-2017. As the chair, he organized several sessions on composite structures at the annual Structures Congress, and directed a committee special project that involved developing a state-of-the-art report on connections for composite moment resisting frames [J82, B3].

Prof. Varma and his graduate student (Dr. Lai) were engaged by the US Army Corps of Engineers to assist with the analysis and design of noncompact / slender concrete filled steel tube (CFT) members used as piers in floodwall structures for rehabilitating the west closure complex damaged by Hurricane Katrina in New Orleans. This high-profile project was a significant application of the research done by Varma and Lai, and led to further investigations summarized in a recent journal article [J69].

During the early part of his career, Prof. Varma received the AISC Milek Faculty Fellowship for developing long-span composite floor systems for residential construction. Prof. Varma's research led to the development of several unique and innovative composite floor systems including the cellular and non-cellular deep deck systems and a self-shored flooring system. These composite floor systems were made available to the industry through AISC publications, presentations and showcases.

9.2 Fire Resistant Design of Steel & Composite Structures

Prof. Varma started his career as an Assistant Professor in 2001, a year that was marked by the occurrence of 9/11 and the collapse of the world trade center towers. Since then, Prof. Varma has dedicated himself to conducting fundamental research on the behavior and analysis of steel and composite structures under fire loading, and the development of design provisions for improving their fire resistance and collapse resistance. This has truly been a labor of love. One of the biggest limitations (in the US) was the paucity of experimental data and results on the fundamental behavior of steel structural members, connections, and assemblies under fire loading. This paucity was due to the difficulty, complexity, risks, and expense associated with conducting fire tests in structural engineering laboratories that are ill-suited and ill-equipped for conducting open flame or gas furnace fire tests. Prof. Varma met this challenge head-on and developed an innovative and completely unique method of conducting realistic fire tests on structural members and assemblies without a traditional gas furnace. This ground-breaking work was funded by several grants from the National Science Foundation (NSF) and National Institute of Standards and Technology (NIST). Prof. Varma chose not to patent his testing approach and equipment design. He published and shared this

testing approach openly, which has led to significant interest in replicating it (with modifications) at several structural engineering laboratories around the world.

Prof. Varma and his students used this innovative approach to conduct experimental investigations and evaluate the fundamental behavior of steel and composite members subjected to standard and / or realistic fire loading. For example, the fire behavior of: (i) steel and composite columns ([J16], [J18], [J21], [J51], [J92]), (ii) composite floor assemblies [J17], (iii) composite beams [J48], and (iv) steel connections ([J60], [J74]) was evaluated experimentally. Prof. Varma and his students also developed and benchmarked detailed numerical (3D nonlinear finite element) models for predicting the observed experimental behavior of: (i) steel and composite columns ([J14], [J19], [J26], [J27], [J54], [J92]), (ii) composite floor assemblies [J20], (iii) composite beams ([J38], [J52], [J57]), and (iv) steel connections ([J38], [J61], [J74]). They used these benchmarked modeling approaches to investigate the fire behavior, resistance, and overall collapse of 3D steel and composite building structures ([J24], [J25], [J61], [J86], [J95], [J108], [J119]). They have recently extended this work to evaluate the multi-hazard behavior and design of steel building structures under post-earthquake fire loading ([J71], [J80], [J105]). Prof. Varma and his students' ground-breaking work on the fire-resistant design of steel and composite structures was the basis of (and directly cited) in the AISC Specification 360-22, Appendix 4 – Fire Design. Prof. Varma and his students' research articles have contributed to the development of performance based fire-resistant design provisions for steel structures, and thus improved the fire safety of the built infrastructure.

Prof. Varma's peers and colleagues have long recognized his contributions in the area of fire-resistant design of steel and composite structures. He has contributed regularly to the AISC Task Committee 8 on fire design and was appointed in 2016 as the chair of this national American Iron and Steel Institute (AISI) / AISC Task Committee on the fire design of steel structures. As the chair of this national committee, Prof. Varma has co-authored articles in the trade magazine, *Modern Steel Construction*, participated in meetings with practitioners authoring standards for the corresponding American Society of Civil Engineers (ASCE) technical committee, and served on blue-ribbon panels reviewing committee reports. The committee has recently drafted the next version of the Appendix 4 on Fire Design in the AISC 360 (2022) specification.

Recognizing his expertise in structural fire engineering, Prof. Varma received multiple grants from the Charles Pankow Foundation, Steel Institute of New York, and AISC to develop performance-based fire-resistant design methods for composite (steel-concrete, SC) walls and floor-to-wall connections. The first project focusing on SC walls was recently completed including large-scale testing, numerical analysis, and development of design methods [R19, J124], which have been included in the next version of AISC 360-22 specification, Appendix 4 on fire design The second project on fire resistant design of floor slab-to-wall connections is also complete. The results from the experimental investigations have been published in [J151] and the complete report with all results has been published in [R32].

9.3 Steel-Plate Composite (SC) Walls for Nuclear Facilities

Recognizing his extensive contributions in the field of steel-concrete composite structures, Prof. Varma was recruited in 2008 by the nuclear power industry to lead the research, testing, analysis, and development of design specifications for steel-plate composite (SC) structures being used in the third generation of nuclear power plants. The nuclear industry had selected these steel-plate composite (SC) structures for their innovation, modularity, speed and ease of construction, and their missile (aircraft) impact resistance, which was mandated for nuclear structures after the 9/11 event. Over the past fifteen years, Prof. Varma and his research team of several graduate students, post-doctoral research associates, and research engineers have conducted extensive research on the behavior, analysis and design of nuclear structures (consisting of composite SC walls) subjected to design basis and beyond-design basis loading conditions including seismic, accident thermal, blast, and impact.

This research has been funded by the US and international nuclear industry, US Department of Energy, and the US and international regulatory organizations. The research includes large-scale experimental investigations, development and benchmarking of numerical (nonlinear finite element) models, analytical parametric studies, and development of design specifications and guidelines. Prof. Varma and his team have conducted extensive large-scale experimental investigations and numerical analyses to evaluate the fundamental behavior of composite SC walls subjected to: (i) axial compression ([J23], [J97]), (ii) out-of-plane shear ([J29], [J59], [J90], [J104]), (iii) out-of-plane flexure [J37], (iv) in-plane shear ([J53], [J66], [J96]), (v) combined in-plane and out-of-plane forces ([J22], [J81], [J87], [J91]), and (vi) combined thermal and mechanical loading ([J42], [J43], [J83]). They have also conducted research to evaluate the effects of local buckling, interfacial slip and partial composite action [J23], and to develop minimum requirements and section detailing provisions ([J62], [J93]) for composite SC walls.

Prof. Varma and his students have developed and benchmarked numerical (3D nonlinear finite element) models for predicting the seismic response of an entire containment internal structure consisting of SC walls ([J41], [J42]), and used these models to evaluate the effects of accident thermal plus seismic loading ([J43], [J89]). They have experimentally and numerically evaluated the behavior and design of: (i) SC wall-to-basemat connections ([J63], [J65]), (ii) wall-to-wall T and L connections ([J70], [J85], [J85]), and (iii) SC to RC wall splice connections ([J63], [J109], [J118]). Prof. Varma and his students have also conducted large-scale experimental investigations and numerical analyses to evaluate behavior and design of SC walls subjected to blast loading ([J64], [J77], [J103]) and missile impact loading ([J33], [J40], [J101], [J100], [J101], [J122]).

Prof. Varma has recently initiated research and development of steel-plate composite containment vessels (SCCV) for nuclear power plants. Containment vessels are designed to serve as the last line of defense and contain accident pressure and radiation in the event of a severe nuclear accident. Only three types of containment vessels (steel, reinforced concrete, and post-

tensioned concreted) have ever been designed, approved by the regulators, and constructed around the world. Prof. Varma and his team are developing design provisions for a new and innovative containment vessel (SCCV) to address some the structural limitations and economic inefficiencies of traditional designs. Prof. Varma's research and development effort are being supported by the US Department of Energy through the Nuclear Reactor Innovation in Construction (NRIC) program award to GE-Hitachi. GE-Hitachi plans to use SCCV for their BWRX-300 small modular reactor design, and is working with team members Purdue, EPRI (Electric Power Research Institute), Black and Veatch, Univ. of North Carolina at Charlotte, and Modular Walling Systems to complete Phase 1 of the project.

Prof. Varma was invited by the ASME Section III, Div. 2 on concrete containment and the working group on Modernization to become a member and submit a code case for SCCV for balloting and approval. This ASME code case is currently being balloted, and being reviewed by GE-Hitachi, US NRC, Holtec International, and various ASME-ACI sub-groups and the joint committee. If approved, this ASME Code Case will represent a significant evolution in the design and construction of nuclear power plants around the world. Prof. Varma was recently appointed Chair of a new Task Group on steel-plate composite containment vessel for ASME, and the Chair of the Modernization Working Group.

9.4 Applications in the US and Impact of Work

The research done by Prof. Varma and his team has directly impacted the design approval and licensing of the AP1000© and US-APWR© nuclear power plant designs in the US and abroad including the UK and China. The licensing of the AP1000©, multi-billion-dollar nuclear power plant design, in the US was a direct consequence of the work done by Prof. Varma's research team in Bowen Lab in collaboration with industry practitioners (Mr. Tod Baker and Mr. Keith Coogler from Westinghouse; Dr. Sanj Malushte from Bechtel; and Dr. Bob Kennedy from RPK Consulting). Prof. Varma presented and defended this research numerous times to the US Nuclear Regulatory Commission (NRC), and the Advisory Committee of Reactor Safeguards (ACRS), which is the final advisory committee to the nuclear commissioners approving and licensing the design. Prof. Varma's research was thoroughly reviewed, examined, and audited by the US NRC and its team of consultants, which included several renowned professors and engineers (Drs. Joe Braverman and Rick Morante from Brookhaven National Lab; Mr. Brian Thomas and Dr. Jose Pires from NRC; and Professors Jerry Hajjar, Jim Jirsa, and Frank Vecchio). The tireless efforts of Prof. Varma and his research team led to the licensing of the AP1000© nuclear power plant, and its ongoing construction in Vogtle, GA, which has created numerous jobs and strongly influenced the economy.

They were recruited by Japan's Mitsubishi heavy industries (MHI) and URS (now AECOM) to lead the testing and analysis of the US-APWR© nuclear power plant design consisting of composite SC walls. Once again, Prof. Varma and his team conducted all the large-scale tests, numerical analyses, and worked collaboratively with practitioners from URS (Mr. Derek Winkler, Mr. Branko Galunic, Mr. Matt Van Liew) and MHI (Dr. Hiroyuki Fuyama, Mr. Kentaro Mori, and Mr. Ryu Fujimoto) to present and defend the results to the US NRC reviewers and their consultants (Drs. Joe Braverman and Rick Morante from Brookhaven National Lab; Mr. Brian Thomas and Dr. Jose Pires from NRC). The work done at Bowen Lab was thoroughly reviewed and audited by the NRC technical and quality engineers. Several Japanese engineers and URS managers were stationed at Bowen Lab for an extensive period while this project was ongoing.

Over the past few years, Prof. Varma has been working actively with Westinghouse engineers (Mr. Stuart Kellner, Dr. Kai Zhang) to help with the optimization of the SC walls used extensively in AP1000© for future applications. To this end, they have conducted additional SC-to-RC walls lap-splice connection tests, pushout tests to evaluate new types of SC wall tie systems, and anchorage to RC wall tests. This work is currently ongoing, and Prof. Varma's team is providing invaluable support to the industry.

Prof. Varma has also provided consulting support to several small modular reactor (SMR) designers interested in using SC walls for their structural design. These included mPower (with Bechtel and Babcock and Wilcox), Moltex, and the VTR based on the Prism design (GE-Hitachi). He is currently working actively with the GE Hitachi BWRX-300 design and is part of the team that has received funding ($6M) from the US Department of Energy as part of the NRIC Advanced Construction Technology Initiative to conduct prototype fabrication and testing and support the construction demonstration. Over the past couple of years, Prof. Varma has been working with various industry partners to develop an ASME code case for the use of SC walls for nuclear containment vessel (CV) applications, which is the holy grail of nuclear power plant design. The research and testing funded by the NRIC project is supporting the development of the new ASME code case for SCCV, a completely new type of containment structure for nuclear applications. If approved, this ASME Code Case will represent a significant evolution in the design and construction of nuclear power plants around the world. Prof. Varma and his team are currently also working with Holtec International on their SMR-300® design, which also includes a proprietary SCCV and concrete strengthened steel modules (CSSM) for the entire power plant. They are c

9.5 International Applications and Impact

Prof. Varma and his research team also worked collaboratively with Westinghouse engineers to support the UK review and licensing of the AP1000© design including the associated testing and numerical analyses. The review team included engineers from AMEC (Dr. Stewart Gallocher) and UK Office of Nuclear Regulations (Dr. Andrew Coatesworth). Prof. Varma has conducted a research project for the Canadian Nuclear Safety Commission (CNSC) collaboratively with researchers from the Univ. of Buffalo (Dr. Andrew Whittaker) and CNSC (Dr. Nebojsa Orbovic). The project focused on the effects of out-of-plane

loading on the in-plane behavior of steel-plate composite walls. The project was completed successfully resulting in publications ([J81], [J87]) and design guidelines for CNSC review of modular designs with composite walls.

Prof. Varma and his team have conducted various research and consulting projects for the Korea Electric Power Company (KEPCO) and Korea Hydro Nuclear Power (KHNP). He has completed a multi-year collaborative research project between Purdue University, US NRC (Dr. Jose Pires, Dr. Hernando Candra) and KHNP (Dr. Kapsun Kim and Dr. Jinwon Shin) focusing on the design of SC walls for missile impact. These teams have conducted small-scale and large-scale missile impact tests in the US (Purdue) and S. Korea (Dr. Kyungkoo Lee at Dankook Univ.). These tests were used to benchmark numerical models and conduct the benchmarked models were used to conduct analytical parametric studies. The experimental and numerical results were used to develop new design methods for preventing local perforation of SC walls in safety-related nuclear facilities [J101]. The Korean regulators and US code developing committees are currently reviewing this research for inclusion.

Prof. Varma and his team have completed another collaborative research project with KEPCO engineers (Dr. Keum Ho Han and Mr. Sung Mun Kim) to develop design methods for connections between steel-plate composite SC and reinforced concrete RC walls in safety-related nuclear structures, and experimental verification of the connection performance. The results of this project haven been used to develop a technical report to be reviewed by the Korean regulator (Korea Institute of Nuclear Safety), and journal articles to disseminate the research findings [J118].

Prof. Varma and Dr. Jungil Seo have recently started a project with funding from Korea Hydro Nuclear Power (KHNP) to experimentally evaluate the effective damping ration for SC structures used in SMR applications. This international project includes collaborators from UK and KEPCO, and the outcomes are being reviewed by the regulatory body (Korean Institute of Nuclear Safety, KINS).

9.6 Steel-Plate Composite Wall Codification Activities and Impact

Prof. Varma has been recognized as the world leader and pioneer in the field of steel-plate composite (SC) structures for safety-related nuclear facilities. He was recruited to become a member of AISC Task Committee 11 on nuclear steel structures, and appointed the vice chair of the ad-hoc sub-committee (2007-2016) on modular composite construction. Prof. Varma's extensive research products, and his tireless work for the sub-committee led to the development and acceptance of the first consensus code / specification for the design of modular composite structures in the US, namely, the AISC N690-12s1 (2015). This consensus standard is a hallmark of US ingenuity and world leadership in the design of unique, innovative structures of the future. Other codes around the world are borrowing heavily from this US standard and Prof. Varma's research, which is cited extensively in this specification, is internationally recognized as defining the pinnacle of the field. The US NRC has completed its review and issued a new regulatory guide (RG1.243) for this specification. A contractor report was previously published by researchers at Brookhaven National Lab (BNL) reviewing this AISC N690 specification.

Prof. Varma has been invited to various countries to present his research and its translation into the AISC N690-12s1 code. Inspired by the level of interest and excitement about the topic, Prof. Varma was commissioned along with his Ph.D. student (Saahas Bhardwaj) to develop and author AISC Design Guide 32 (published Aug. 2017, [B2]) to further explain the background and basis, and to illustrate the use of this new specification (AISC N690s1) for the design of composite SC walls and their connections. Prof. Varma has developed a course based on this design guide and taught it to Korean engineers from KEPIC and KHNP in the Summer of 2018. He has taught this course to UK regulators and engineers in Fall 2019.

Prof. Varma (2017) received the AISC Special Achievement Award in recognition of his contributions and impact to the profession in terms of facilitating the structural design and licensing of the next generation of nuclear power plants in the US and around the world. Recently, Prof. Varma received the 2021 Stephen D. Bechtel Jr. Energy Award from ASCE's Energy Division for his "seminal contributions seminal contributions as a preeminent researcher, leading code/standard developer, educator, and invaluable consultant to the nuclear industry..."

9.7 Reinforced Concrete (RC) Design for Nuclear Facilities

Prof. Varma is also the vice chair of the American Concrete Institute (ACI) Committee 349 on design of reinforced concrete structures for nuclear facilities. He is a lead for the task group working on the revisions to ACI 349.1R (committee report) on thermal effects. As the leader of the task group working on thermal effects, Prof. Varma and his team have conducted experimental research on the effects of thermal loading on out-of-plane shear behavior of RC walls [J83], and the in-plane shear behavior of RC walls. This research was funded by the Department of Energy as part of the Nuclear Energy University Program (NEUP).

Prof. Varma's research also assisted with the construction of the AP1000© power plants in China. In particular, the plant at Haiyang had some construction non-conformance issues with the reinforced concrete (RC) shield building, and fuel loading and commissioning could not be completed without Prof. Varma's review and assessment. Prof. Varma's team worked collaboratively with the team of engineers (Dr. Ahmed Mustafa and Mr. Sam Young) on an impossible schedule to conduct experimental investigation and numerical evaluation of the non-conformance and its influence on the out-of-plane shear strength of reinforced concrete members. After this through but timely investigation and resolution by Prof. Varma, the project at Haiyang was completed on time and commissioned in 2018. A similar project on the use of shear ties with headed bars instead of stirrups was also conducted by Prof. Varma's research team to assist with regulatory review of the reinforced concrete shield

building in China. Prof. Varma's conducted large scale tests to demonstrate that RC designs with headed tie bars have equivalent or better behavior than designs with hooked stirrups. This research convinced the regulators and enabled the industry to expedite RC construction using headed bars for shear ties.

Prof. Varma is also leading the ACI 349 initiative and research on the development of design provisions for breakout failure of fully developed rebars used as anchors in nuclear construction. This research issue was identified by Prof. Varma working collaboratively with industry practitioners part of ACI 349 (Dr. Bernd Laskewitz and Mr. John Silva of Hilti). The initiative has developed into a full-fledged, international, collaborative research project with funding and teams from the ACI 349 committee (Ms. Adeola Adediran, Mr. John Silva, Dr. Shen Wang), China (Mr. Meng Chu of SNERDI and Dr. Bin Zhao of Tongji Univ.), researchers from Purdue (Prof. Varma, Dr. Jungil Seo), and S. Korea (Mr. Sung Mun Kim of KEPCO). The results from all these experimental investigations are being used to develop a simple design method in ACI 349 that will be of significant benefit to the industry [J99]. This work is complete and had a significant impact on the ACI 349 code and the nuclear industry-at-large with respect to the use of full-developed rebars used for anchorage.

Prof. Varma has been consulted by the practitioners in the nuclear industry to assist with the use of high strength rebar and concrete within the context of ACI 349. He has assisted by evaluating experimental results from around the world, developing and benchmarking numerical models for conducting nonlinear analysis, and helping engineers with understanding the advantages and limitations of using high strength rebar and concrete in nuclear construction.

As part of ACI 349, Prof. Varma organized special sessions at the Spring 2017 convention on the state-of-practice for the use of the 3D finite element method and its results for the design of reinforced concrete nuclear structures. Practitioners from different companies within the US and abroad (China, UK, S. Korea etc.) presented their current design approaches, which led to significant discussion and exchange of information at the sessions and within the ACI 349 committee. Prof. Varma is currently working on a report for the ACI 349 committee to showcase the different approaches that were presented and discuss their advantages and shortcomings. This will be of significant help for the committee when preparing for the next version of the ACI 349 code.

9.8 Steel-Plate Composite Walls for High-Rise Commercial Building Construction

Recognizing his extensive contributions leading to the deployment of composite SC walls in nuclear structures, Prof. Varma was recruited in 2016 by experts in the commercial building industry to lead the research, testing, analysis, and development of design specifications for the use modular composite SC walls in high-rise building construction, where they are referred as concrete filled-composite plate shear walls (CF-CPSW). There is significant interest in the use of coupled composite (CF-CPSW) walls for the core structure of mid-rise to high-rise building structures, particularly in regions prone to high wind or high seismic loading. This interest stems from their modularity, ease and speed of construction, and their stiffness, strength and ductility for extreme loading conditions. The coupled composite (CF-CPSW) core wall system has been recognized as the most important innovation in the steel building industry (https://www.enr.com/articles/42852-steel-core-system-could-transform-office-tower-construction), and Prof. Varma has led the research along with Prof. Michel Bruneau (Univ. at Buffalo) and Mr. Ron Klemencic (Magnusson Klemencic Associates) for their codification into future AISC specifications and seismic provisions through appropriate task committees.

Prof. Varma and his students have conducted large-scale experimental investigations and numerical analyses to evaluate the seismic (in-plane flexure and shear) behavior of composite walls for commercial building applications ([J32], [J45], [J50], [J66], [J97]). These research findings are the basis of the current seismic design provisions in AISC 341-16, Chapter H7, focusing on individual (uncoupled) CF-CPSW for commercial construction. Using some of these design provisions, Magnusson Klemencic Associates (MKA, Inc.) has designed one of the tallest buildings in Seattle, the upcoming 58-story signature structure in Rainier Square, which uses coupled composite (CF-CPSW) walls as the core system providing seismic and wind resistance (https://www.enr.com/articles/43671-rainier-square-towers-composite-steel-frame-called-a-game-changer). Prof. Varma has worked closely with engineers from MKA, Inc. and Mr. Ron Klemencic on three research projects funded by the Charles Pankow Foundation and AISC. Two or these projects are collaborative with Prof. Michel Bruneau from the University at Buffalo. These projects have led to the development of large-scale experimental results [J110, J135, J138] , benchmarked numerical models [J111, J113], design specifications [J112, J123,J129, B4], and seismic design provisions [J114, J115] for coupled composite (CF-CPSW) walls for commercial and high-rise buildings ([R17], [R18]).

Prof. Varma and Prof. Bruneau working together with a team of industry experts and their respective students have developed seismic design provisions for coupled-composite plate shear wall systems. These extensive provisions developed based on their FEMA P695 studies research project, experimental investigations, and supporting research have been balloted positively by Building Seismic Safety Council (BSSC) Issue Team 4, the Provisions Update Committee (PUC), and the seismic sub-committee of ASCE 7. Consequently, the NEHRP 2020 provisions and the subsequent ASCE 7-22 standard permits the use of coupled composite plate shear walls / concrete filled for the design of structural systems in high seismic regions. They provide the highest R factor of 8 for this system recognizing its excellent ductility achieved using capacity-based system design principles developed by the research team [J115]. Additionally, Section 14.3.5 of the NEHRP 2020 and the subsequent Section H8 of AISC 341-22 include detailed recommendations for capacity-based seismic design of the system and seismic detailing requirements for all the composite structural elements (walls, coupling beams) and their connections.

Besides his contributions to the seismic design, Prof. Varma and his research team have made significant contributions to the wind design [J123] and fire resistant design [J124, R19] of SpeedCore systems. Based on his sustained contributions, AISC 360-22 Chapter I includes specifications for the design of composite plate shear walls (SpeedCore) for non-seismic applications, and App. 4 of AISC 360-22 includes provisions for estimating the standard fire resistance rating (FRR) of SpeedCore walls in hours and for estimating the strength of walls as a function of elevated temperature from fire loading, which can be used for performance-based structural fire design of SpeedCore walls.

In recognition of their tireless contributions and research activities leading to the development and design provisions for composite plate shear walls, also referred as SpeedCore, the team of Mr. Ron Klemencic, Prof. Michel Bruneau, and Prof. Amit Varma have been awarded the AISC Special Achievement Award for 2020. Prof. Varma is probably the only person to receive this award twice (once in 2017 for his work on nuclear structures, and in 2020 for his work on buildings)

In recognition of his career long research contributions to the innovation, development, and industry guidance for steel-concrete composite structures and their use in large infrastructure projects including nuclear power plants and high-rise buildings, Prof. Varma was awarded the 2021 AISC T. R. Higgins Lectureship Award. The title of Prof. Varma's talk is, "SpeedCore and Steel-Concrete Composite Construction: The Best of Both Worlds." He presented his lecture as the Keynote lecture in the 2022 North American Steel Construction Conference (NASCC), which is typically attended by 5000+ delegates. Prof. Varma's lecture was on tour in 2022-23. He was invited and gave the Keynote lecture and invited talks at 15+ top-tier Universities and at national and international professional society meetings. Prof. Varma and Mr. Klemencic were invited to present the 2022 Paul Zia distinguished lecture at North Carolina State University in the presence of 400+ live attendees and 1000s online.

ASCE has announced the Charles Pankow Innovation Award for 2026 to the team of practitioners, academics (including Prof. Varma), industry foundations, and trade organizations that led the development, acceptance, and deployment of SpeedCore for high-rise buildings.

9.9 Composite Construction for Blast Resistant Design

Prof. Varma has recently been working with US stakeholders (industry, federal labs, and federal agencies) to develop steel-plate composite construction for blast and impact resistant design in commercial and defense-related applications. While a lot of this work is not available in the public domain, it is having a significant influence on the future of US construction related to critical assets and defense applications. Prof. Varma and his team are conducting large-scale static and dynamic experimental investigations, numerical studies, and developing design codes and standards like the UFC (United Facilities Criteria) to facilitate the use of these innovation construction technologies in blast resistant applications. His contributions in this area have been recognized recently with the Bechtel Innovation Award of 2023.

Prof. Varma was appointed as the Executive Director for the Purdue Infrastructure & Innovation Laboratory (PIIL). He has employed a team of accomplished subject matter experts, research engineers, and graduate students to work on various national security and defense related projects / contracts funded by federal labs like Los Alamos National Laboratory and Defense-industry contractors like Bechtel and Northrup Grumman working for the US Air Force. Prof. Varma has received significant funding ($10M+) and the work in terms of research, testing, analysis, and design is currently ongoing. Since a lot of this work is classified, there are no public domain publications resulting from the same. The team has authored several technical reports and presentations to the sponsors including the US Air Force reviewers etc. that are all CUI and not available in the public domain due to the nature of the content.

10. IMPACT OF TEACHING ACTIVITIES

Prof. Varma has taught several undergraduate and graduate courses at Purdue University. These include courses on introductory structural mechanics (CE 270), structural analysis (CE371), steel design (CE 470), senior design (CE 498), structural stability (CE 579), finite elements in elasticity (CE 595), plastic design (CE592), and seismic behavior and design of steel structures (CE 697R). His teaching approach emphasizes learning of fundamental concepts, independent thinking, engineering judgment, cooperative learning, and class participation. In all these courses, Prof. Varma includes discussions of current research, development of design specifications and manuals, and engineering projects from around the world.

10.1 Undergraduate courses

Prof. Varma has taught two undergraduate courses, CE 270: Introductory Structural Mechanics, and CE470: Structural Steel Design, multiple times. CE270 is the first course in structural engineering that CE sophomores / juniors take, and CE 470 is the penultimate course in structural engineering that CE Seniors take. Thus, CE students are first introduced to structural engineering by Prof. Varma and then trained in structural design by Prof. Varma at the end of their journey. This is a huge responsibility, and Prof. Varma does an outstanding job, first teaching and inspiring students towards studying structural engineering, and then completing their journey in the end by training them in the art of structural design, innovation, and practice.

Over the years, Prof. Varma has evolved his teaching methods in keeping with advancements in technology. He uses all the technological tools available and accessible to students to provide a state-of-the-art learning experience. His CE270 classes are usually recorded, and available to the students along with the transcribed notes, presentations etc. His recorded courses have

been used by students in the University (with permission) to revisit and review materials even after the course ended. A few of his recorded lectures on general topics are also available to the students via youtube.com, and he has amassed a bit of international following for the depth and clarity of presentation.

A few years back (around 2011), the biggest disruption in the classroom was the use of cell phones during class hours. Prof. Varma dealt with this disruption in an innovative way, by making it his strongest ally in the classroom. He shared his cell phone number along with the syllabus, and asked students to text questions or discussion points to him in class or anytime during the course. While somewhat intimidating to begin with, this experiment was extremely successful with students asking a lot of questions during class (due to the anonymity afforded by the cell phone), and after hours while working on their assignments, labs, homework, and particularly when preparing for exams. Students really appreciate the availability afforded by Prof. Varma being just a quick text away, especially when they have something simple or quick to ask, or just an urgent situation that requires immediate contact.

Over the years, Prof. Varma has received both the Harold Munson teaching award (2012) and the Roy E. and Myrna G. Wansik teaching awards (2017) from the Lyles School of Civil Engineering. These highly coveted and competitive awards are decided based on student votes, course reviews, and instructor evaluations.

10.2 Graduate courses

Prof. Varma has enhanced the graduate courses on structural stability and design by emphasizing: (i) analytical and numerical approaches, (ii) inelastic stability analysis of members and frames, and (iii) 2nd order nonlinear analysis and design of frames using the latest AISC specifications. The course project required students to review research articles, and validate their numerical approaches using published results. Students learned the basis of the stability design provisions and developed numerical analysis skills.

Prof. Varma has developed and taught a new course on the seismic behavior, design, and performance evaluation of lateral force resisting systems (LFRS) for steel building structures. This course emphasized the findings of recent research, and the development of current AISC seismic provisions pertaining to the seismic behavior and design of: (i) moment resisting frames, (ii) concentric and eccentric braced frames, (iii) buckling-restrained braced frames, (iv) steel plate shear walls, and (v) composite moment resisting frames. Prof. Varma also taught the seismic performance evaluation of LFRS using ASCE 41 recommendations and analytical approaches. The course project required the student teams to: (i) design a LFRS of their choice, (ii) evaluate its seismic performance, and (iii) present their findings to the entire class. As indicated by the course evaluations, the graduate students highly appreciated this course.

Prof. Varma has developed and taught a new course (CE597R) on the fire behavior and design of steel building structures. This course has been taught for the first time at Purdue University, and is extremely rare to be taught at higher education institutions due to lack of expertise in the topic. Prof. Varma's course focused on: (i) understanding fire as an event, scenario, and structural loading, (ii) fire design philosophies and approaches, (iii) building fire design according to prescriptive codes and their limitations, (iv) fundamental behavior of steel and concrete materials and structural elements under realistic fire loading, (v) performance-based analysis and design of steel building structures under realistic fire loading including cooling.

10.3 Online MS Courses

As a member of the inaugural committee, Prof. Varma assisted with the development, launch, and promotion of the online MS degree program, related courses, certificate programs, and interdisciplinary tracks. Prof. Varma has developed and offered the following courses in an asynchronous online format multiple times: (a) CE 591 – Advanced Steel Design, (b) CE 579 – Structural Stability and Design, and (c) CE697R – Seismic Design of Steel Structures. All these courses are part of: (i) the online MS degree program in structural engineering, (ii) interdisciplinary track on infrastructure, resilience, and sustainability, and (iii) advanced steel specialist certificate program.

10.4 Research Mentoring of Undergraduate Students

Prof. Varma absolutely loves having undergraduate students in his research group, and working with them on his research projects. He participates in the SURF (summer undergraduate research fellowship) program almost every year, and recruits students from his undergraduate classes to work on his projects. He also participates in the PURE (Purdue Undergraduate Research Experience) program started in 2016. Prof. Varma also participates in a cadet / midshipman summer research program sponsored by the US Military Academies, and gets a couple of cadets each summer to work on research projects in Bowen Lab. Besides all these programs, Prof. Varma frequently hires undergraduate research assistants to work on large-scale experiments and analysis projects with his research team in Bowen Lab. In any given academic year, he has at least 2-3 undergraduate assistants working with him in Bowen Lab.