Message from the Director

Welcome to the Spring 2018 Newsletter.

Education encompasses so much of our lives, and through this division, we hope to attract and engage those who have interests in all the different aspects of education. Everyone is invited to participate in this division, including students, instructors, professors, administrators, corporate trainers, and anyone who has an interest in education.

Once you become involved in the division, you will have the opportunity to promote various academic priorities, and faculty/student interests. You will be able to provide expertise in the peer review process, publications, and actively contribute to divisions’ symposia.

Educational Initiatives

The Education Division (EDD) aims to promote and advance educational initiatives including automation engineering and engineering technology, automation related courses and programs, and activities related to the mission of the Society. The Division will function as a resource and technical information exchange for students, faculty, education professionals, and others with an interest in education. Members will have the opportunity to share experiences and learn from their peers. The division will work with other groups within ISA to recruit student members and support their retention.

Programs and Courses in Automation Engineering

The Education Division develops and maintains a list of programs and courses related to Automation Engineering and Engineering Technology. If your institution is not listed or the information needs to be updated, please contact me. One program and associated courses is described later in this newsletter. I hope to describe other programs in later newsletters. Hopefully, this information will stimulate discussion among institutions about who is doing what and perhaps spur some discussion about what each of us can do to promote more courses and programs in automation engineering and engineering technology.

Student Sections

We need to hear from the ISA Student Sections. Please send us your current activities and accomplishments. We want to publish your student activities, regardless of your country. Email kte@mst.edu with your news anytime.
Students: Get Recognized!

**CAP Associate Recognition Program**

Recognition of your achievements is critical when you seek employment. The ISA CAP Associate program will give you third-party, objective assessment and confirmation of your potential to become an automation professional.

The ISA CAP Associate program is a recognition program for individuals that have graduated from (or will graduate from within six months of taking the exam) a four year technical degree program who are interested in working in the field of automation. The CAP Associate program provides recognition of the individual’s interest and knowledge of automation. Although the CAP Associate program is not a certification program, it provides an additional credential for your resume. Individuals who pass the CAP Associate exam will receive one year of “work experience” credit toward the Certified Automation Professional® (CAP®) eligibility requirements. CAP® applicants who have a four year technical degree must document five years of experience in automation. The CAP Associate would be eligible to sit for the CAP exam after four years of work experience in automation.

Professionals: Get Certified!

**ISA’s Certified Automation Professional® (CAP®)**

ISA certification as a Certified Automation Professional (CAP) will provide a non-biased, third-party, objective assessment and confirmation of your knowledge and skills as an automation professional. Automation professionals are responsible for the direction, definition, design, development, implementation, deployment, operation, documentation, and support of systems, software, and equipment used in control systems, systems integration, and operational consulting.

Become a Certified Automation Professional (CAP) and

- document your specialized education, training, and knowledge in automation
- demonstrate your qualification, competence, and potential to current and future employers
- establish career paths and job advancement opportunities
- indicate your commitment to a career in automation

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**Contact Us**

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Call for Student Presentations and Posters
ISA Process Control & Safety Symposium
Oct. 29 - Nov. 1, 2018
Houston, Texas

The ISA Education Division invites student presentations and poster presentations in the upcoming ISA Process Control & Safety Symposium. This event is developed for students currently pursuing post-secondary degrees (e.g., Associate, Bachelor, Master, etc.) in subject areas related to the mission of ISA, including but not limited to automation, mechatronics, electrical, electronic, computer, mechanical, chemical, etc.

Student presentations and posters tentatively on Wednesday, Oct 31

Suggested projects for oral or poster presentations:
- Senior capstone project
- Class/lab project
- Project from internship/cooperative education experience
- Undergraduate or graduate research

Guidelines for Submission:
- 500-word (max) abstract in English submitted by email, indicating preference for oral or poster presentation
- Final presentation must use the official ISA Symposium template
- Abstracts accepted for presentation or poster will require completion of the ISA's Rights and Responsibilities form

Deadlines:
Abstract  1 August 2018
Presentation/Poster  8 October 2018

Submit your abstract via email to either:
Dr. Kelvin Erickson
Missouri Univ. of Science and Technology
kte@mst.edu

or
Dr. Xiaojing Yuan
University of Houston
xyuan@uh.edu

or
Dr. Weining Feng
University of Houston - Downtown
fengw@uhd.edu
ISA Student Membership

ISA Student Membership provides increased career opportunities. From the moment you join, ISA broadens your knowledge and exposure to the world of automation and automation professionals. Membership in ISA indicates to prospective employers that you are a step ahead of the crowd...taking charge and actively involved in pursuing your professional future. Students have two levels of membership to choose from: Student Member and Virtual Student Member.

**Student Member** - An individual who is enrolled as a full-time student in a program leading to an instrumentation, systems, or automation related degree or certificate. Join for only $10.00/year.

- Two free Technical Division Memberships
- Free subscription to digital InTech and Automation Weekly
- Free access to ISA standards
- Free access to pre-recorded web seminars
- Free access to ISA technical papers library
- Student Games
- Mentoring Program

As a special bonus, Student Members may upgrade to Regular Member at the low student membership price for the year following the completion of their training or graduation.

**Virtual Student Member** - An individual who is enrolled as a full-time student in a program leading to an instrumentation, systems, or automation related degree or certificate. Join for only $5.00/year.

This Member grade allows students who do not have access to a Regular or Student Section to participate in ISA through electronic communications. Virtual Student Members have limited benefits and do not receive any mailed correspondence, for instance, InTech magazine. Virtual Student Members cannot participate in the ISA International Student Games.

**CAP Associate Recognition Program**

The ISA CAP Associate program is a recognition program for students graduating from a four year technical degree program who are interested in working in the field of automation. The CAP Associate program provides recognition of the student’s interest and knowledge of automation. Although the CAP Associate program is not a certification program, it provides an additional credential for the graduating student. Students who pass the CAP Associate exam will receive one year of “work experience” credit towards the Certified Automation Professional® (CAP®) eligibility requirements. CAP® applicants who have a four year technical degree must document five years of experience in automation. The CAP Associate would be eligible to sit for the CAP® exam after four years of work experience in automation.

**Request for Participation**

The EDD leadership wishes to get you and your colleagues involved with the Education Division and its members. Please consider becoming involved now. Pick up the telephone and call 573-341-4757 or email kte@mst.edu.

Current open positions at time of publication:

- Webmaster
- Newsletter Editor
- Membership Chair
- Director-Elect
Automation Engineering – Related Programs at Missouri Univ. of Science & Technology

Undergraduate Minor In Automation Engineering

Required courses:
- Elec Eng 3340 – Basic Programmable Logic Controllers
- One of the following courses (required undergraduate control systems course in ChE/EE/ME):
  - Elec Eng 3320 – Control Systems
  - Mech Eng 4479 – Automatic Control of Mechanical Systems
  - Chem Eng 4110 – Chem Engr Process Dynamics and Control

Elective courses: Choose 9 additional hours of coursework from the following list.
- Chem Eng 5370 – Intermediate Process Dynamics and Control
- Chem Eng 5190/Elec Eng 5350 – Plantwide Process Control
- Chem Eng 4310/Mech Eng 5644 – Interdisciplinary Problems in Manufacturing Automation
- Elec Eng 4380 – Practicum in Automation Engineering (no more than one can be applied to the Automation Engineering Minor)
- Elec Eng 5340 – Advanced PLC
- Elec Eng 5345 – PLC Motion Control
- El Eng 5870/Mech Eng 5478 – Mechatronics
- Mech Eng 5449 – Robotic Manipulators and Mechanisms
- Mech Eng 5655 – Manufacturing Equipment Automation

Graduate Certificate In Automation Engineering And PLC

Required courses:
- Chem Eng 5190/Elec Eng 5350 – Plantwide Process Control
- Elec Eng 5340 – Advanced PLC

Elective courses: Choose two of the following courses
- Chem Eng 5140 – Intermediate Chemical Process Safety
- Elec Eng 5345 – PLC Motion Control
- Elec Eng 5870/Mech Eng 5478 – Mechatronics
- Mech Eng 5449 – Robotic Manipulators and Mechanisms
- Mech Eng 5655 – Manufacturing Equipment Automation

Course Descriptions:

CHEM ENG 5140 Intermediate Chemical Process Safety (online and on campus) offered Fall semesters
The identification and quantification of risks involved in the processing of hazardous and/or toxic materials are studied. Methods to design safety systems or alter the chemical process to reduce or eliminate the risks are covered. Prerequisite: Graduate Standing.

CHEM ENG 5190 Plantwide Process Control (online and on campus) offered Spring semesters
Synthesis of control schemes for continuous and batch chemical plants from concept to implementation. Multiloop control, RGA, SVD, constraint control, multivariable model predictive control, control sequence descriptions. Design project involving a moderately complicated multivariable control problem. Prerequisites: Chem Eng 4110 or Elec Eng 3320 or Elec Eng 3340 or graduate standing. (Co-listed with Elec Eng 5350).

ELEC ENG 3340 Basic Programmable Logic Controller (online and on campus) offered Fall and Spring semesters
Introduction to programmable automation in manufacturing, programmable logic controller (PLC) hardware, programming languages and techniques, PID closed-loop control, electrical code. Case studies. Laboratory exercises. Prerequisite: Preceded or accompanied by either Elec Eng 2120 or Elec Eng 2800.
ELEC ENG 4380 Practicum in Automation Engineering - typically offered Summer semesters
Students on an approved internship or cooperative education assignment with industry will complete a project designed by the advisor and employer. The project selected must be related to topics in one or more of the other courses in the Automation Engineering Minor program. The same work period cannot receive credit for both Elec Eng 3002 and Elec Eng 4380. Prerequisite: Elec Eng 3340.

ELEC ENG 5340 Advanced PLC (online and on campus) typically offered Fall semesters
Advanced programmable logic controller (PLC) programming, function block, structured text, function chart, sequencer. Factory communications, system simulation, human-machine interface (HMI) programming. Advanced PID control. Network security and reliability. Class-wide project. Prerequisite: Elec Eng 3340.

ELEC ENG 5345 PLC Motion Control (online and on campus) offered Spring semesters
Factory automation motion control integrated with programmable logic controllers, servo control, variable-speed drive control, PackML state model, sizing motors and drives, machine safety, and experience with commercial hardware/software. Laboratory exercises on small-scale standard applications such as coordinated motion of multiple axes and camming. Prerequisite: Elec Eng 3340.

ELEC ENG 5350 Plantwide Process Control (online and on campus) offered Spring semesters
Synthesis of control schemes for continuous and batch chemical plants from concept to implementation. Multiloop control, RGA, SVD, constraint control, multivariable model predictive control, control sequence descriptions. Design project involving a moderately complicated multivariable control problem. Prerequisites: Chem Eng 4110 or Elec Eng 3320 or Elec Eng 3340 or graduate standing. (Co-listed with Chem Eng 5190).

ELEC ENG 5870 Mechatronics (online and on campus) typically offered Spring semesters
This course will introduce students to the basics of mechatronics (i.e., the integration of mechanical, electrical, computer, and control systems). Students will learn the fundamentals of sensors and actuators for mechanical systems, computer interfacing, microcontrollers, real-time software, and control. Prerequisite: Mech Eng 4479 or equivalent. (Co-listed with Mech Eng 5478, Aero Eng 5478 and Comp Eng 5820).

MECH ENG 5449 Robotic Manipulators and Mechanisms (online and on campus) typically offered Spring semesters
Overview of industrial applications, manipulator systems and geometry. Manipulator kinematics; hand location, velocity and acceleration. Basic formulation of manipulator dynamics and control. Introduction to machine vision. Projects include robot programming, vision-aided inspection and guidance, and system integration. Prerequisites: Mech Eng 3313; Comp Sci 1970 or Comp Sci 1971 or Comp Sci 1972 or Comp Sci 1570. (Co-listed with Aero Eng 5449).

MECH ENG 5478 Mechatronics (online and on campus) typically offered Spring semesters
This course will introduce students to the basics of mechatronics (i.e., the integration of mechanical, electrical, computer, and control systems). Students will learn the fundamentals of sensors and actuators for mechanical systems, computer interfacing, microcontrollers, real-time software, and control. Prerequisite: Mech Eng 4479 or equivalent. (Co-listed with Aero Eng 5478, Elec Eng 5870 and Comp Eng 5820).

MECH ENG 5655 Manufacturing Equipment Automation (online and on campus)
Manufacturing automation at the equipment level. Topics include sensors, actuators, and computer interfacing for manufacturing equipment, dynamic modeling and control of manufacturing equipment, interpolation, coordinated motion control, kinematic and geometric error modeling, and runout. Prerequisites: Preceded or accompanied by Mech Eng 4479 or equivalent.