SMARTER is a unique project at NYU Polytechnic School of Engineering that provides a paid research opportunity to middle and high school teachers. Funded by the Division of Engineering Education and Centers of the National Science Foundation, under its Research Experience for Teachers Site program, SMARTER aims to enrich education in middle and high school classrooms by providing teachers with enhanced science, technology, engineering, and mathematics (STEM) educational content through a mechatronics research program and an entrepreneurship experience.

The project explores mechatronics-based hands-on activities to hone teachers’ skills; engages them in an entrepreneurship module consisting of instruction, experiential learning, group discussion, reflection, and site visits; and enables them to conduct inquiry-based, engineering research. Teachers will:

- Learn scientific and mathematical foundations of circuit theory, sensors, actuators, and feedback control
- Learn and experience the integration of circuits, sensors, actuators, and low-cost microcontrollers for measurement and control in practical contexts
- Receive an introduction to business planning, social entrepreneurship and technology, new product development, intellectual property, raising funding, etc.
- Conduct inquiry-based, hands-on, collaborative engineering research activities

**BENEFITS TO TEACHERS**

- Reinforce their present science and mathematics skills
- Enrich their STEM experience through exposure to real-world engineering applications
- Develop their research, communication, and presentation skills
- Hone their creativity, innovation, and entrepreneurship traits
- Network with tech-entrepreneurs

**BENEFITS TO SCHOOLS**

After successfully completing the SMARTER program, teachers will be able to:

- Provide their students with a solid foundation for college-level study in STEM disciplines
- Integrate real-world, hands-on, learning activities aligned with STEM standards in curriculum
- Mentor students to participate in a student idea competition
- Become STEM ambassadors in their schools
- Develop laboratory activities in their schools using an equipment kit (consisting of a microcontroller and components) provided by the SMARTER project

**ELIGIBILITY**

- Regular teaching appointment at a middle or high school located in New York City (all five boroughs), Westchester, Long Island, or New Jersey
- Three years of full-time teaching experience in STEM disciplines
- Endorsement by the school principal

**DURATION**

- Six weeks: July 6, 2015—August 14, 2015
- Schedule: Monday to Friday, 8:30 A.M.—5:00 P.M., on NYU School of Engineering’s 6 MetroTech campus

**STIPEND**

Project participants who successfully complete all requirements (including submission of final project report, academic year follow-up—attend the RET Day @ NYU in fall, participate in two Research Seminars/semester, and mentor student teams at their schools to participate in an annual Inno/Vention student idea competition at NYU; and assessment activities), will receive a stipend of $9,000. Income tax obligations are the responsibility of the teachers.

**RESPONSIBILITIES**

To receive a full stipend, participants are required to:

- Attend all training, research, and presentation activities
- Complete assigned engineering research, oral presentation, research report, and project web page
- Participate in academic year follow-up activities
- Conduct assessment of project impact in their classrooms and provide the results for reporting to NSF

**APPLICATION DEADLINE:**

March 27, 2015

SMARTER Open House:

Information Session on March 11, 2015 @4:30pm

**APPLICATION CHECKLIST**

- Résumé which includes information stating your
  - Education
  - Professional experience with relevant teaching history
- Essay (300-500 words)
  - Based on your experience, what STEM concepts do you wish to demonstrate to your students with the aid of sensors, actuators, and micro-controllers? How will this create an exciting learning activity for students?
  - What experimental facilities do you use at your school for hands-on learning activities? How have you developed an engaging curriculum using this facility?
  - Detail how you will incorporate modern technology in your instruction to enhance STEM education after participating in the SMARTER program.
- Two reference letters from your
  - Principal
  - Assistant-principal, department head, or a senior colleague who can comment on your professional background and future outlook

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SMARTER project provides a professional development opportunity to middle and high school teachers in the areas of science, technology, engineering, and mathematics (STEM) and entrepreneurship. Twelve teachers will be selected during each of the three project years, 2013—2015, to receive mentoring, engage in entrepreneurship activities, and conduct inquiry-based, hands-on, engineering research through six-week long summer workshops. The project will consist of a two-week “Guided Training” followed by a four-week “Collaborative Research” experience. During the first eight days of guided training, teachers will study and explore hands-on activities in the exciting field of mechatronics—synergistic integration of mechanical engineering, control theory, computer science, and electronics to manage complexity, uncertainty, and communication in engineered systems. On the last two days of the guided training, through experiential learning, group discussion, and site visit, teachers will be engaged in an entrepreneurship module to address: business planning, social entrepreneurship and technology, new product development, intellectual property, raising funding, etc. During the last four weeks, in two-person teams, teachers will conduct engineering research in a collaborative environment consisting of graduate and undergraduate researchers and NYU School of Engineering faculty. Participation in the project will allow teachers to gain an appreciation for the range of activities involved in being an entrepreneur. Moreover, they will learn to use sensors, actuators, instrumentation, and microcontrollers to perform research in robotics; fiber-optic sensing; mechatronic camera-triggers to visualize soil-projectile interaction; mobile apps for robotics; etc.

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