The **Mechatronics and Robotics RET Site** is a unique project at NYU Tandon 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, this project 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 and robotics research program and an entrepreneurship experience. The project explores mechatronics and robotics 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; provides them industry experiences; and enables them to conduct engineering research. Teachers will:

- Learn scientific and mathematical foundations of circuit theory, sensors, actuator, 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 model canvas, minimum viable product, intellectual property, raising funding, etc.
- Conduct inquiry-based, hands-on, collaborative engineering research activities and engage in interactions with industry mentors

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
- Develop an understanding of the engineering workforce

BENEFITS TO SCHOOLS

After successfully completing this RET Site 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
- Develop lab activities using a mechatronics/robotics equipment kit provided by this RET Site project
- Mentor students to participate in a student idea competition
- Become STEM ambassadors in their schools
- Share with colleagues and students their awareness for

ELIGIBILITY

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

DURATION

- Six weeks: July 8, 2019—August 16, 2019
- Schedule: Monday to Friday, 8:30 A.M.—5:00 P.M., on NYU School of Engineering, 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 $7,500. 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

SELECTION

Each school must submit a complete application package for its teacher/s. A complete application package consists of the application form, résumé, essay, and reference letters. Applications may be hand delivered, mailed, or e-mailed. Finalists for the 2019 project will be announced on the project web site by May 10, 2019.

APPLICATION DEADLINE:

April 22, 2019
Online: http://engineering.nyu.edu/k12stem/educators/

RET Site Open House:

Information Session on February 27, 2019 @4:30pm

CONTACT INFORMATION

Professor Vikram Kapila
RET Site, Mechanical and Aerospace Engineering
NYU Tandon School of Engineering
6 MetroTech Center, Brooklyn, NY 11201
Tel: (646) 997-3161, Fax: (646) 997-3532
E-mail: vkapila@nyu.edu

Detach ✂

Mechatronics and Robotics RET Site

APPLICATION

Type or print neatly

Date:_____ Gender: M/F

Name:_____
Last First Middle

Position:_____

Department:_____

School:_____

Mailing Address:_____
Street

_____
City State ZIP

E-Mail:_____

Phone:_____

Fax:_____

Home Address:_____
Street

_____
City State ZIP

_____
Principal's Endorsement/Signature

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, microcontrollers, and robotics? 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 this RET Site program.

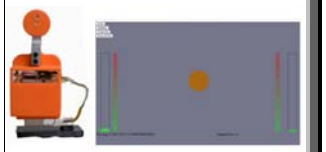
❑ Two reference letters from your
- Principal
- Assistant-principal, department head, or a senior colleague who can comment on your professional background and future outlook

Online submission link:
http://engineering.nyu.edu/k12stem/educators/

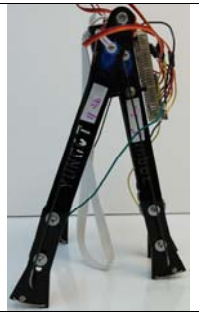
Professor Vikram Kapila
Mechatronics and Robotics RET Site
Department of Mechanical and Aerospace Engineering
NYU Tandon School of Engineering
6 MetroTech Center
Brooklyn, NY 11201

RET Site in Mechatronics and Robotics with Entrepreneurship and Industry Experiences

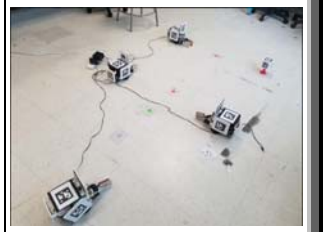
Fish robot



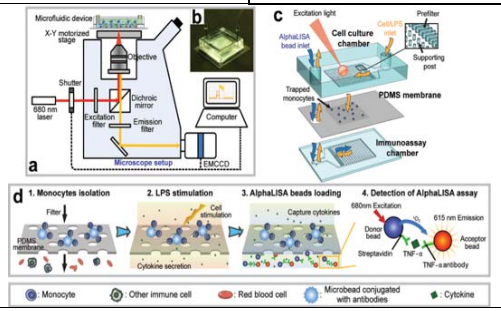
Game-based rehabilitation



Actuated passive walker



Localizing multi-robot system



Integrated microfluidic biosensing

NYU Tandon School of Engineering
Brooklyn, NY
Mechanical and Aerospace Engineering Department
Mechatronics Laboratory
http://engineering.nyu.edu/mechatronics/RET/

NYU TANDON SCHOOL OF ENGINEERING

The **Mechatronics and Robotics RET Site** project provides a professional development opportunity to middle and high school teachers in the areas of science, technology, engineering, and mathematics (**STEM**) and entrepreneurship. Ten teachers will be selected during each of the three project years, 2017—2019, to receive mentoring, conduct engineering research engage in entrepreneurship activities, and gain industry experiences 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 fields of *mechatronics and robotics*. 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 model canvas, minimum viable product, intellectual property, raising funding, etc. During the last four weeks, in two-person teams, teachers will conduct engineering research and receive industry experiences in a collaborative environment consisting of graduate and undergraduate researchers, faculty, and industry collaborators. Attendees will learn to use sensors, actuators, instrumentation, and microcontrollers to perform research in marine robotics; microfluidic biosensing; wearable robotics; mechatronics devices; and robots for disabilities; etc. Participation in the project will allow teachers to gain an appreciation for the range of activities involved in being an entrepreneur. Moreover, industry interactions will engender an authentic understanding of engineering workforce among teachers and increase their awareness for STEM career opportunities.

This RET Site project is funded by **The National Science Foundation**

The project gratefully acknowledges the support from NYU Tandon's
Center for K-12 STEM Education
Centers for Entrepreneurship & Technology