# 2019-2020 Assistant Professor Excellence Speaker Series

## *Electroactive Polymer Artificial Muscles Enabled RoboFish*

# Dr. Zheng Chen
### Cullen College of Engineering

### Wednesday, October 23, 2019
### 12:15 p.m. - 1:15 p.m.
### M.D. Anderson Library
### Room 306
#### *(Light lunch will be served.)*

Autonomous underwater robots are highly demanded in environmental monitoring, intelligent collection, and deep water exploration. Recent years have witnessed significant effort in development of bio-inspired underwater robots to mimic aquatic animals, such as robotic fish, robotic jelly fish, and robotic manta ray, to achieve high energy propulsion efficiency and maneuvering capabilities. Novel actuating materials, which are lightweight, soft, and capable of generating large flapping motion under electrical stimuli, are highly desirable to build such bio-inspired robotic fish. Electroactive polymers (EAPs) are emerging smart materials that can generate large deformations under electrical stimuli. As an important category of ionic EAPs, Ionic Polymer-Metal Composites (IPMCs) can work under wet conditions with low actuation voltages, which shows their great potential as artificial muscles in bio-inspired underwater robots. In this talk, a systems perspective is taken, from modeling, control, fabrication, and bio-inspired design, which addresses the most challenges in this research area. Three types of bio-inspired underwater robots using artificial muscles will be presented in this talk, including robotic fish, robotic manta ray, and artificial swimming bladder. Advantages and challenges of using IPMC artificial muscles in bio-inspired robots will be concluded at the end.

SPEAKER BIO: Dr. Zheng Chen is a Bill D. Cook assistant professor in the Department of Mechanical Engineering at the University of Houston. He received B.E. degree in Electrical Engineering, M.E. degree in Control Science & Engineering from Zhejiang University, China in 1999 and 2002, and Ph.D degree in Electrical Engineering from Michigan State University (MSU) in 2009. Dr. Chen joined the Department of Mechanical & Aerospace Engineering at the University of Virginia as a research associate in Sept. 2009. In July 2012, Dr. Chen joined Baker Hughes as a research & development engineer specialized in control systems. From August 2013 to May 2017, Dr. Chen was an assistant professor in the Department of Electrical Engineering and Computer Science at Wichita State University. His research interests include electroactive polymer artificial muscle, bio-inspired underwater robots, underwater cyber physical systems, control of hydraulic fracturing equipment, and renewable energy systems. His research is supported by NSF, Subsea System Institute, and Baker Hughes. Dr. Chen received many prestigious awards, such as NSF CAREER Award in 2017.

*The Assistant Professor Excellence Lecture Series (APeX)  is intended to showcase the breadth and depth of groundbreaking research, scholarship, and creative activity being undertaken by UH early career faculty across disciplines, as well as to offer opportunities for cross-disciplinary networking.*

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