

# **NEXT LEVEL INNOVATION IN ROBOTICS AND AUTONOMY**

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**Title:** Development of a Smart Active Needle for Minimal Invasive Surgery

**Abstract:**

Accurate needle placement in the internal tissue region is essential to enhance the clinical and therapeutic outcomes in image guided percutaneous interventional procedures. Due to the usage of conventional rigid/flexible passive needles there exists a tradeoff between the needle's target reaching accuracy and damage to the critically anatomical neighboring tissue to the target. Hence, smart active self-actuating needles are developed to enhance the clinical and therapeutic outcomes by controlling them precisely to travel the preplanned trajectory to reach the deep-seated target tissue region. In this talk, firstly I will describe the design procedure and development of the novel smart active needle based on Shape Memory Alloy (SMA) wire actuators, by our group. Secondly, I will discuss the control of the active needle with different feedback modalities such as electromagnetic, ultrasound and vision based imaging ones.