Title: Hyper Redundant articulated robot for NDT of closed complex structures

Abstract:

Composite aircraft structures have become increasingly widespread in civil and military aircraft and drones. The composites used in aircraft consist of fibers suspended in a matrix of epoxy resin. For example, the Boeing 787 Dreamliner was the first commercial airplane constructed from 50% composite materials. We can say that even though composite materials have revolutionized the aviation industry, but their use does present some engineering, manufacturing, and maintenance challenges. One of the most common problems in the use of composite material is the air bubbles between the layers that can form during the manufacture or assembly of the structures, which can cause failure during the flight.

In this talk, we will present a new cable-driven hyper redundant articulated robotic system for Non-Destructive-Test (NDT) in closed and complex structures, like aircraft's wings. The robotic system consists of several links and joints actuated with Kevlar strings. We will discuss the challenges of developing this type of multidisciplinary robotic system, motion planning, and controlling it.

Bio

Shmulik Edelman is a Ph.D. student at the robotics and control research lab led by Prof. Amir Shapiro, Mechanical Engineering Department, Ben-Gurion University. His research interests include robotics, integrated systems, perception, and motion and task planning.

Title: Human Preferences for Robot Eye Gaze in Human-to-Robot Handovers

Abstract:
This paper investigates human's preferences for a robot's eye gaze behavior during human-to-robot handovers. We studied gaze patterns for all three phases of the handover process: reach, transfer, and retreat, as opposed to previous work which only focused on the reaching phase. Additionally, we investigated whether the object's size or fragility or the human's posture affect the human's preferences for the robot gaze. A public data-set of human-human handovers was analyzed to obtain the most frequent gaze behaviors that human receivers perform. These were then used to program the robot's receiver gaze behaviors. In two sets of user studies (video and in-person), a collaborative robot exhibited these gaze behaviors while receiving an object from a human. In the video studies, 72 participants watched and compared videos of handovers between a human actor and a robot demonstrating each of the three gaze behaviors. In the in-person studies, a different set of 72 participants physically performed object handovers with the robot and evaluated their perception of the handovers for the robot's different gaze behaviors. Results showed that, for both observers and participants in a handover, when the robot exhibited \emph{Face-Hand-Face} gaze (gazing at the giver's face and then at the giver's hand during the reach phase and back at the giver's face during the retreat phase), participants considered the handover to be more likable, anthropomorphic, and communicative of

timing ($p < 0.0001$). However, we did not find evidence of any effect of the object's size or fragility or the giver's posture on the gaze preference.

Bio:
Tair is an Industrial Engineering and Management M.Sc student, specialized in Intelligent Systems,and supervised by Prof. Yael Edan and Dr. Armin Biess. Her Thesis focused on Deep Reinforcement Learning and Human-Robot interaction. In her thesis she investigated human's preferences for a robot's eye gaze behavior during human-to-robot handovers. She also practically implemented a model-based reinforcement learning method- Guided Policy Search (GPS), to train a robot controller (in a simulation environment and real-world environment) for human-robot object handovers.