

# Sensorization of soft structures with guidance of strain vectors

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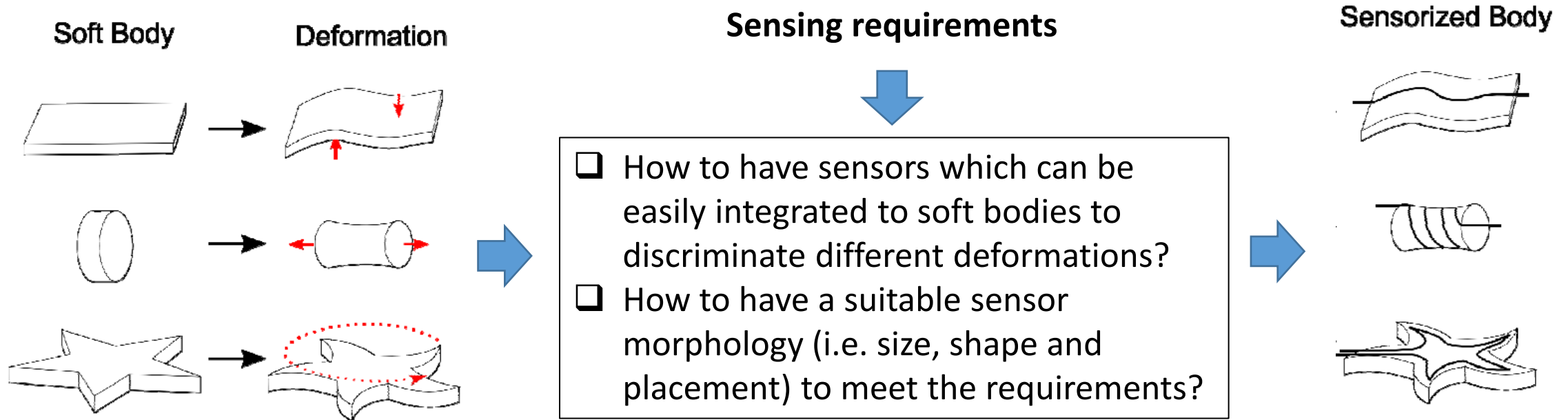
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Robosoft Plenary Meeting

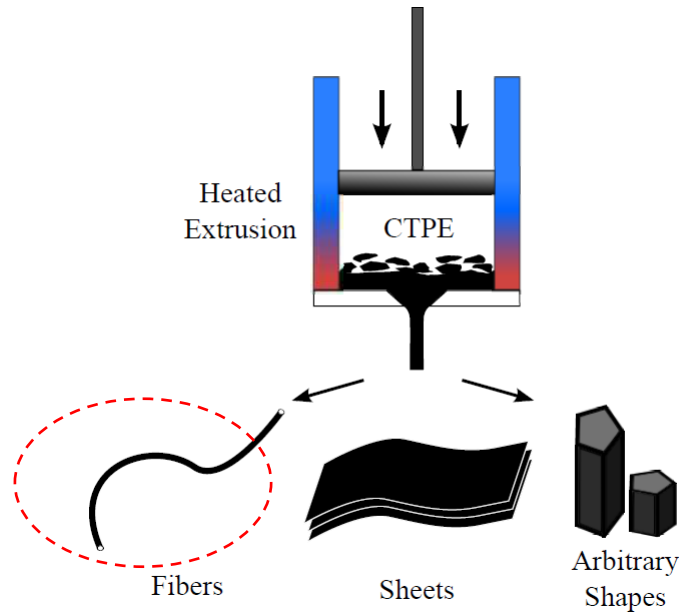
April 1, 2014

# Background

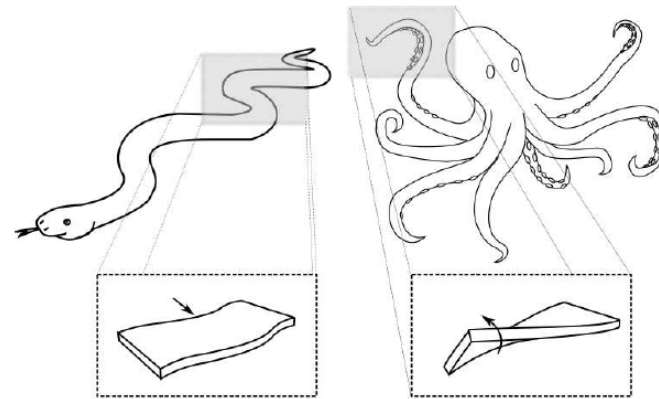


# Approach: SVAS3\*

CTPE (Conductive Thermoplastic Elastomer) Based Linear Strain Sensors



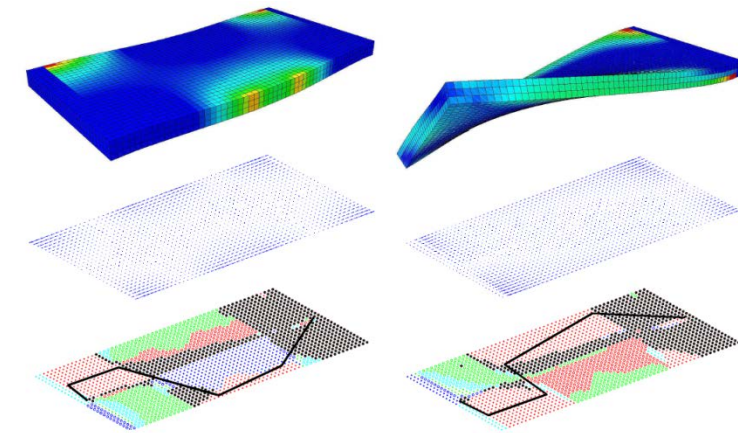
Soft Body Deformations



Serpentine Pattern

Twisting Pattern

Sensor Morphology: Path Planning of CTPE based of Clusters of Strain Vectors



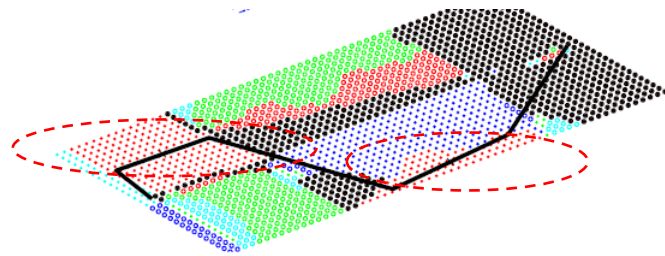
Serpentine Pattern

Twisting Pattern

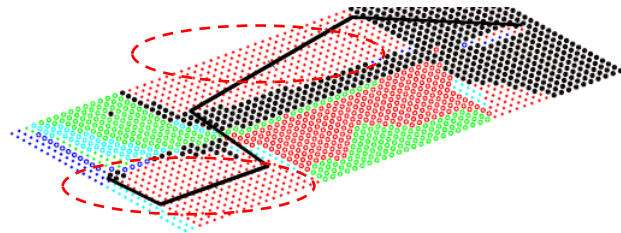
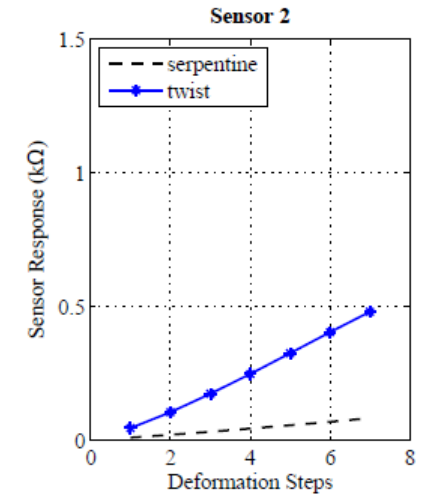
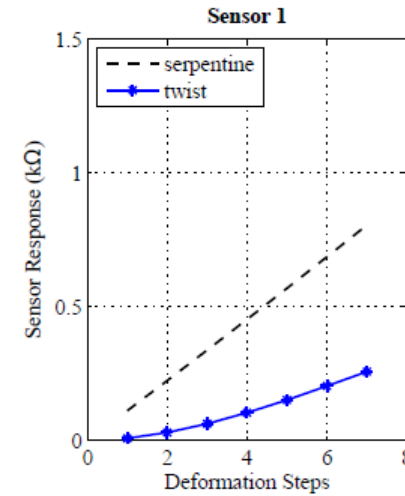
\* Strain Vector Aided Sensorization of Soft Structures

# Simulation Results: Change of Sensitivity

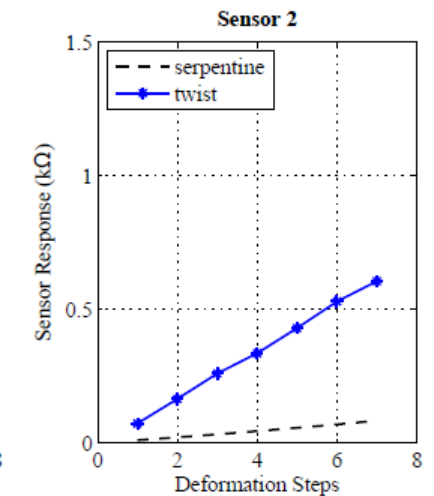
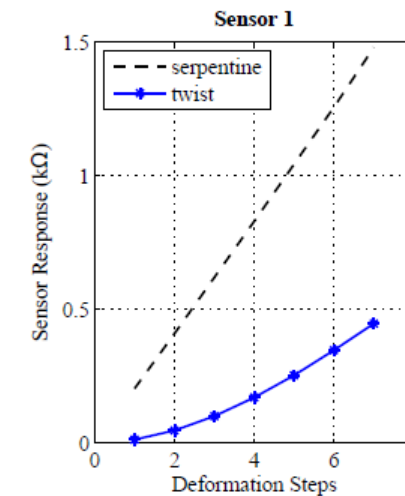
Sensor Morphologies  
(top: serpentine, bottom: twist)



1<sup>st</sup> Design



2<sup>nd</sup> Design

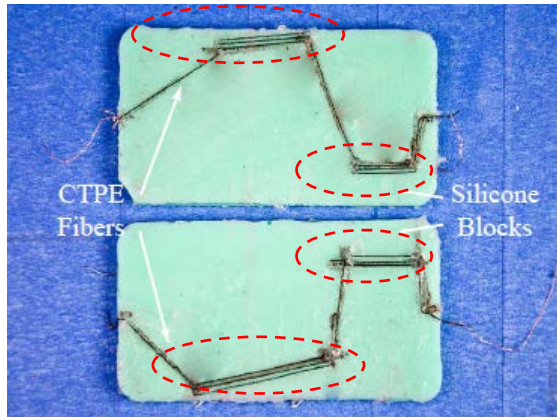


----- : 1<sup>st</sup> design → 1 line

----- : 2<sup>nd</sup> design → 3 lines

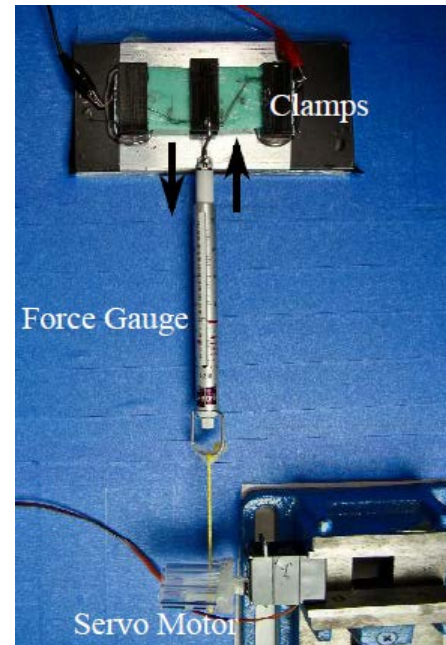
# Validation on Physical Platform

Twisting Sensor (top)  
Serpentine Sensor (bottom)

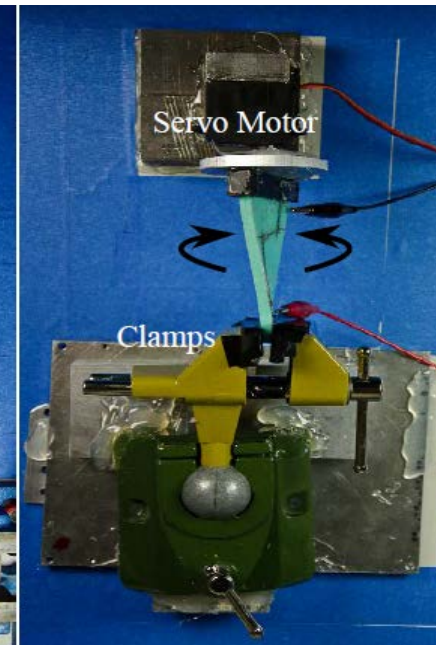


----- : 3 lines

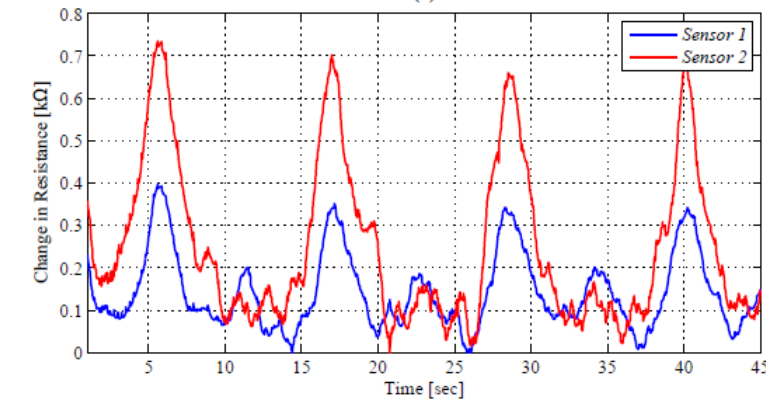
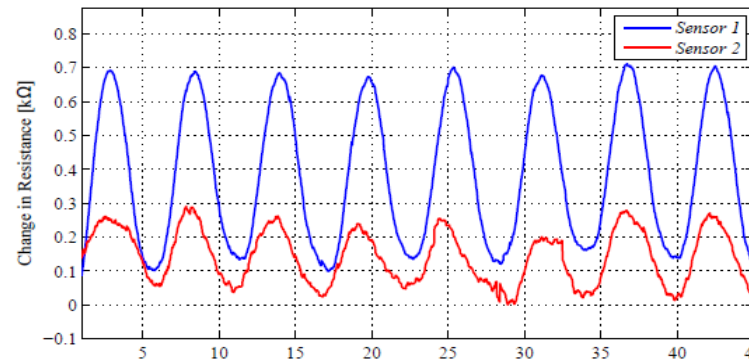
Serpentine Motion



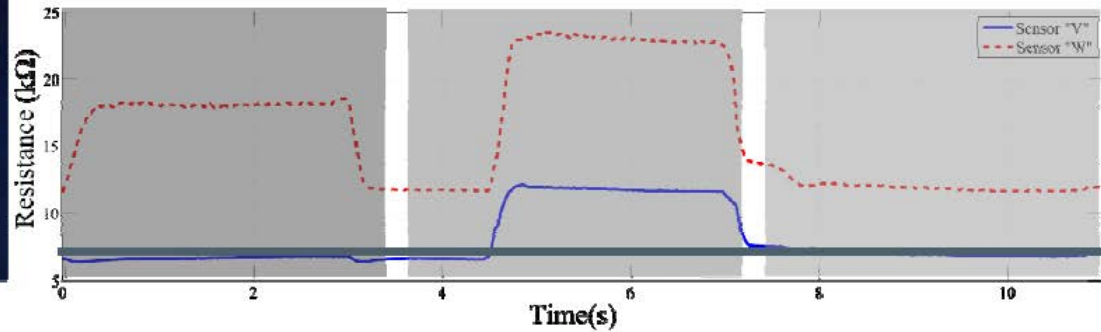
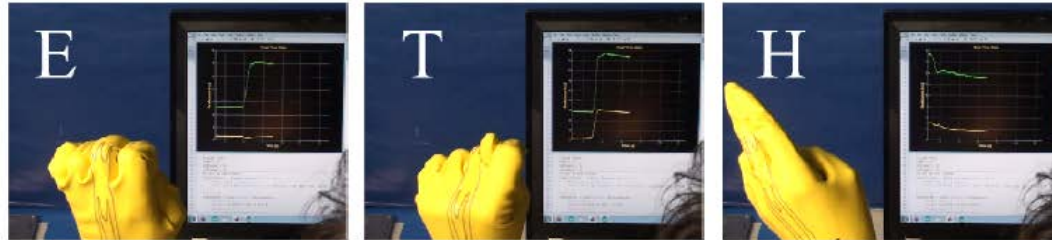
Twisting Motion



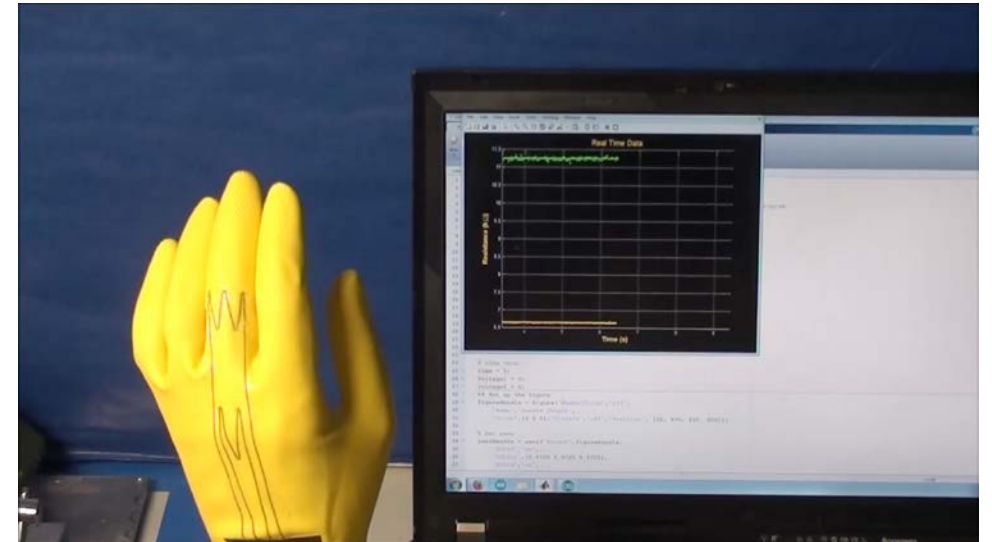
--- : serpentine sensor  
--- : twisting sensor



# Application Example



--- : sensor "V"  
--- : sensor "W"



Culha U., Nurzaman S.G., Clemens F. and Iida F., *Sensors* (submitted)

Culha U., Wani U., Nurzaman S.G., Clemens F. and Iida F., *IEEE IROS 2014* (submitted)

Thank you for your attention