

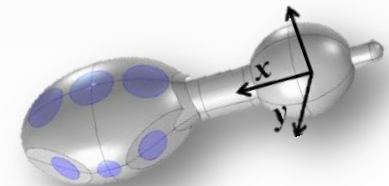
Towards **O**ptimized **N**eural **S**timulation in a **D**evice for **U**rinary **I**ncontinence

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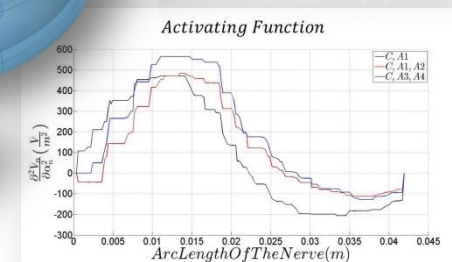
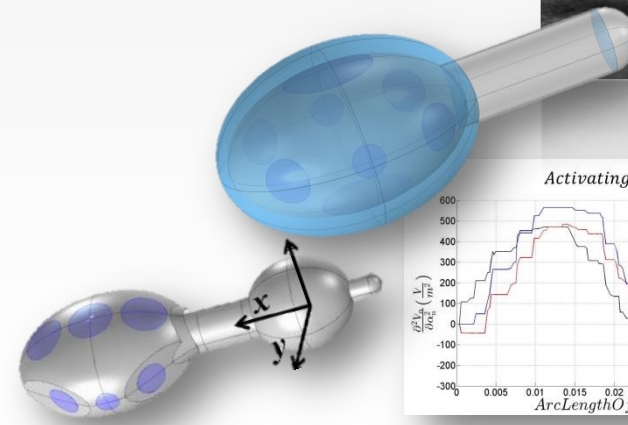
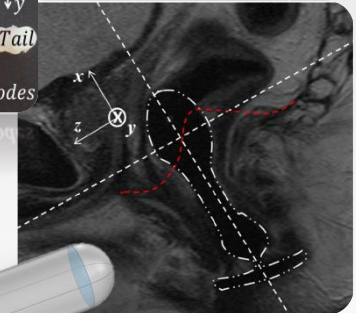
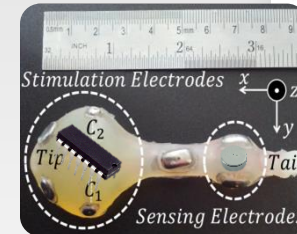
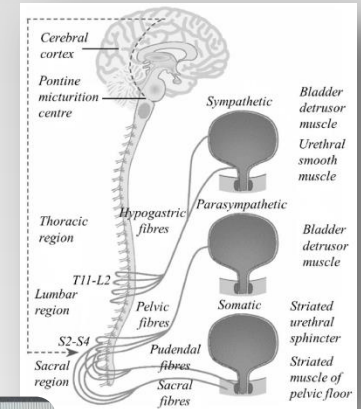
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October 23, 2013



Outline:

- **B**ackground
- **S**olution and objectives
- **M**RI studies
- **M**odel
- **R**esults
- **O**ngoing research
- **S**ummary



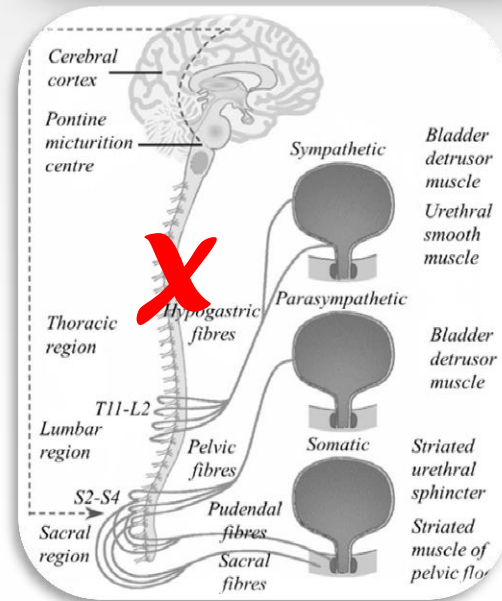
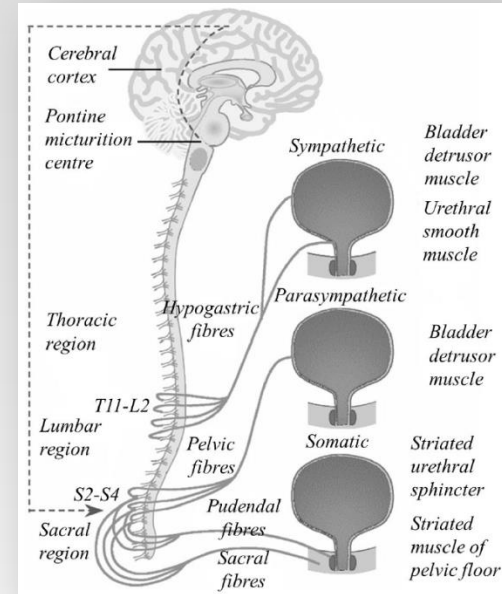
Background:

Lower urinary tract function depend upon complex signalling of the central and peripheral nervous systems to carry out its functions

Storage
Voiding

Spinal cord injury can seriously disrupt the functions

Neurogenic detrusor overactivity
Detrusor – sphincter dyssynergia



Solution & Objectives :

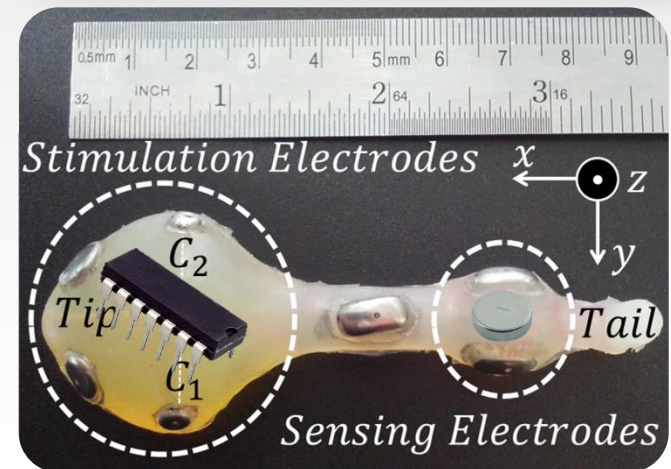
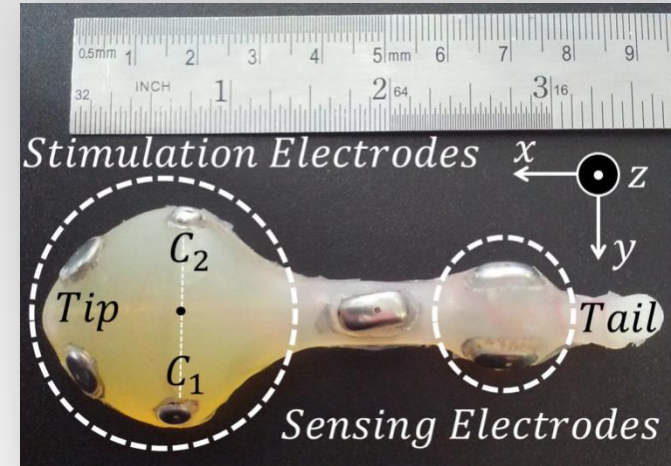
Craggs *et al.* proof of concept study

Conditional ano-rectal stimulation of pudendal nerve

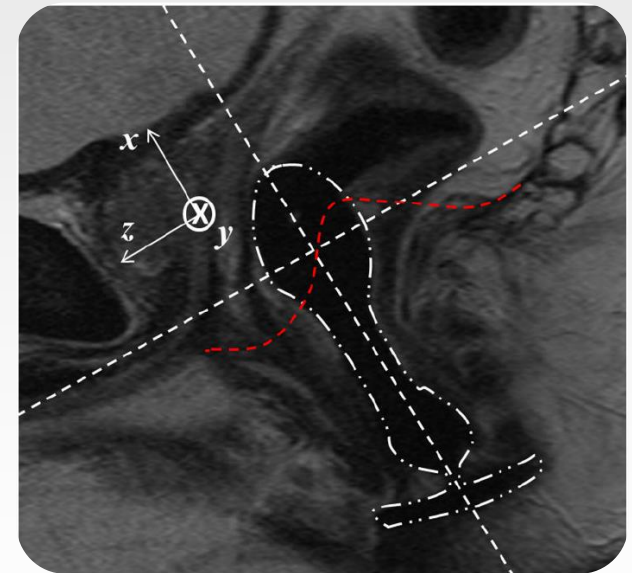
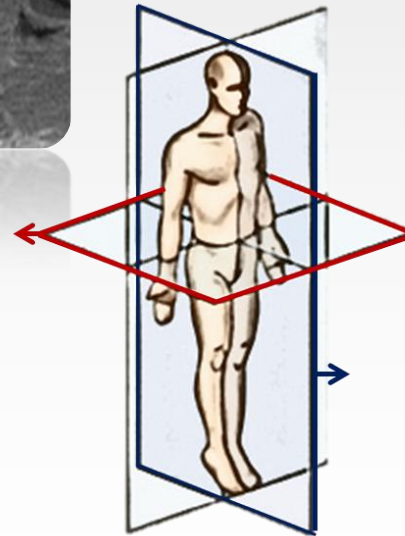
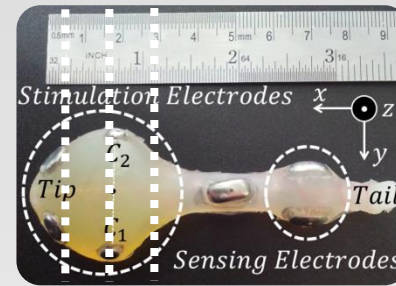
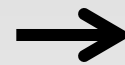
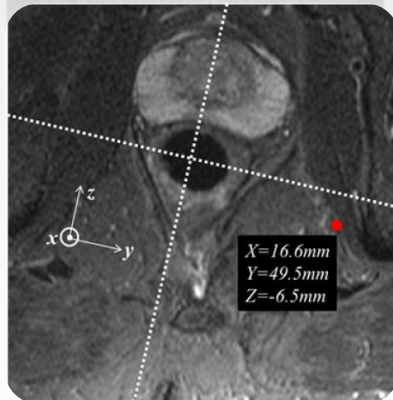
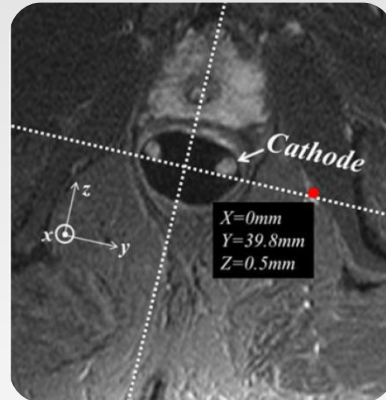
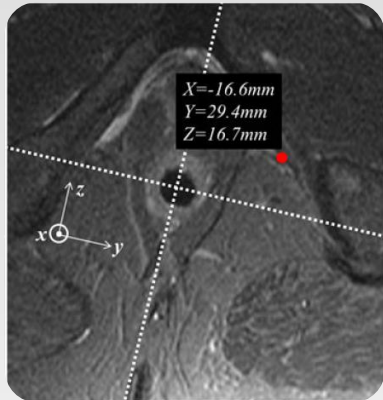
Make an autonomous device

Battery life

High voltage



MRI Studies:



Model:

Conductivity, multiple layers, materials

Multiple electrodes

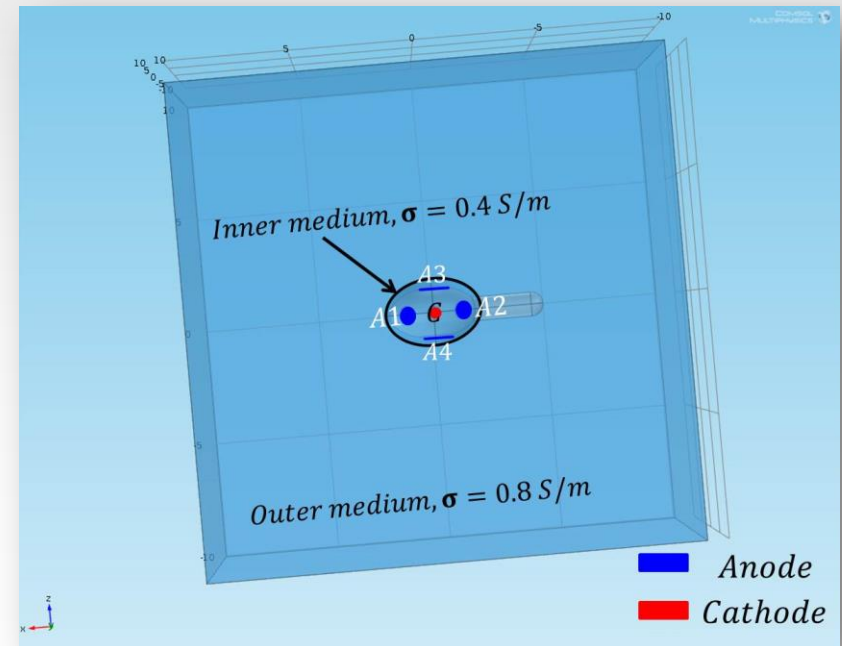
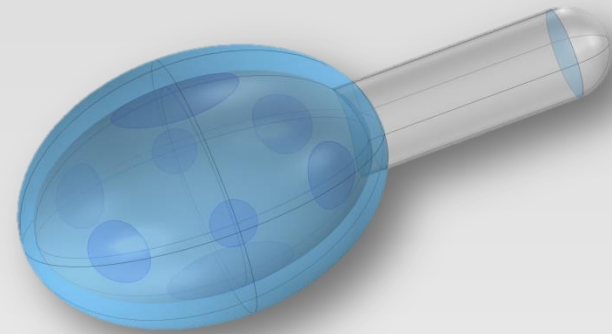
Boundary current source (2518 A/m^2)

Grounding the anodes

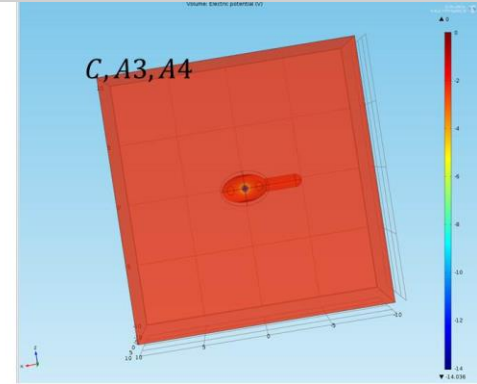
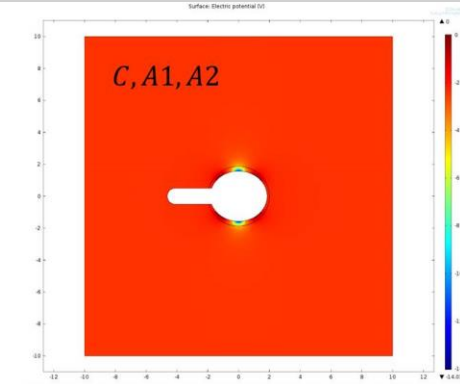
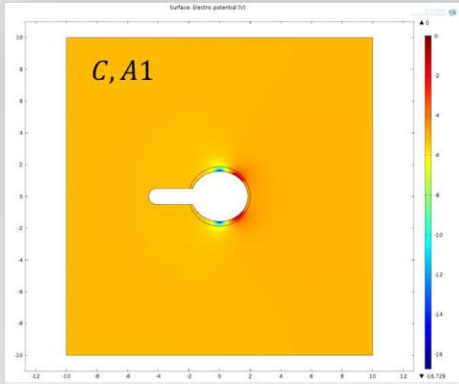
Meshing 2 domains

Cut-line 3D, nerve trajectory
(Post-process)

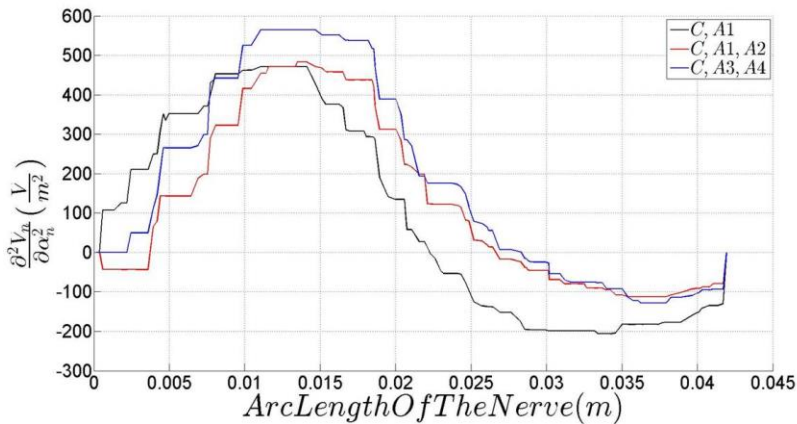
Activating function



Results:



Activating Function



<i>Configuration</i>	<i>Area under the curve (V/m)</i>
<i>C, A1</i>	<i>3,7229</i>
<i>C, A1, A2</i>	<i>5,2020</i>
<i>C, A3, A4</i>	<i>7,3954</i>

Summary:

- **S**pinal cord injury and lower urinary tract issues
- **C**onditional ano-rectal stimulation of pudendal nerve
- **M**RI studies and nerve trajectory
- **M**odel and parameters
- **R**esults and selected configuration
- **O**ngoing research, more developed model

Thank you for your attention

Acknowledgments:

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ROTTERDAM2013