

# ASHUTOSH CHATURVEDI

SCIENTIST / ENGINEER



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5586 Palm Dr, Hawthorne, CA 90250

## PROFILE

Although formally trained in imaging and neural engineering, my adaptability, resourcefulness, hard-working nature, patience, and tenacity have positively contributed to many interesting and unique projects in diverse areas. While on cross-functional teams, the creativity of building something novel and purposeful from concept through deployment is most enjoyable. Passionate about finding opportunities that challenge me to learn new things while applying my current knowledge and expertise to solve tough problems.

## EXPERIENCE



### CASE WESTERN RESERVE UNIVERSITY

**Ph.D. Biomedical Engineering**

*Feb 2005 - Jan 2012*

**M.S.E. Biomedical Engineering**

*May 2002 - Jan 2005*

**B.S.E. Biomedical Engineering**

*May 1997 - May 2002*



### PROFESSIONAL

- Computational modeling for deep brain stimulation (DBS), ultrasound, fNIRS
- Biophysics / multi-physics modeling (photon, electric and magnetic fields, etc.)
- Algorithm / software development
- Code optimization
- Software pipeline automation
- Cloud computing (AWS)
- Brain imaging (3D source reconstruction)
- Brain-machine interface software for invasive and wearable technologies
- Medical imaging (CT, MRI, fMRI, DTI, PET, SPECT)
- 2D / 3D image processing (registration, segmentation)
- 3D visualization
- Data analysis (brain and muscle signals)
- Signal processing

### TECHNICAL

- Python (NumPy, SciPy, CuPy, pandas, Jupyter, Matplotlib, Plotly, Mayavi)
- GIT
- AWS (EC2, CloudFormation, S3, EBS, EFS)
- Atlassian (Confluence, Jira, Bitbucket)
- MATLAB
- COMSOL / ANSYS / SCIRUN / Sim4Life
- NEURON
- MongoDB / MySQL
- Linux / Bash
- C / C++
- HTML / PHP

### PRINCIPAL SCIENTIST - ALGORITHMS AND INSIGHTS

*KERNEL - LOS ANGELES, CA | MAY 2017 - PRESENT*

- Led computational modeling efforts for four years, which included both invasive and wearable technologies, and collaborated with other groups within the company (data analysis, neuroscience, software, test, mechanical, and hardware).
- Created a gpu-optimized end-to-end pipeline for photon diffusion modeling inside the brain for 3D reconstruction of neural activity for fNIRS Kernel Flow.
- Computational modeling of non-invasive optical and ultrasound detection systems using multi-physics and/or Monte Carlo solvers.
- Machine learning based segmentation of various tissue layers of the human head using multi-modal MRI scans from the open-source Human Connectome Project.
- Biophysical modeling of novel electrode lead designs for deep brain stimulation.

### SENIOR SCIENTIST - ALGORITHMS, APPLIED PHYSICS, AND MODELING

*MEDTRONIC - FRIDLEY, MN | SEP 2013 - JAN 2017*

- Led cross-functional technical projects to create novel algorithms and computational models to improve advanced invasive stimulation therapies for current and emerging neurological indications (Parkinson's disease, depression, obsessive-compulsive disorder, Tourette's syndrome, chronic pain, incontinence).
- Modeled unique electrodes designed for deep brain stimulation and local field potential recordings.
- Exchanged ideas on the future of deep brain stimulation technologies with key customers (neurosurgeons, neurologists) from all around the world.

### POSTDOCTORAL RESEARCH SCHOLAR - NEUROMODULATION CENTER

*CASE WESTERN RESERVE UNIV - CLEVELAND, OH | JAN 2013 - SEP 2013*

- Investigated the activation of potentially relevant neural pathways in the brain surrounding an electrode during deep brain stimulation for Parkinson's disease, using a 7T patient imaging dataset that included MRI, CT, DTI, and fiber tracking.

### POSTDOCTORAL RESEARCH FELLOW - DEEP BRAIN STIMULATION LAB

*CLEVELAND CLINIC FOUNDATION - CLEVELAND, OH | JAN 2012 - DEC 2012*

- Developed a methodology to efficiently quantify and visualize neural activation patterns during DBS across multiple patients, or at multiple time steps within a single patient.
- Developed novel tractography activation models to quantify the activation of individual or bundle of neurons using their DTI-based anatomical trajectories.

### CO-FOUNDER

*DEH MICROSYSTEMS, LLC - CLEVELAND, OH | JUN 2009 - PRESENT*

- Extensive experience in building customized servers, workstations, and high-performance computing clusters for clients in the academic, research, and corporate industries.

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**2021**

A top contributor at Kernel (equity award)

**2012**

Cleveland Clinic innovator award

**2011**

Cleveland Clinic innovator award

**2010**

Figure on cover of Brain Stimulation journal  
Vol. 3, Issues 1 and 2

**2008**

Travel award for Integrative Biomedical  
Computing Workshop

**2006**

3rd place award for student paper  
competition at the 28th Annual IEEE EMBS



## PROFESSIONAL

- IEEE Engineering in Medicine and Biology Society (EMBS)
- Movement Disorders Society (MDS)
- Society for Neuroscience (SfN)
- Society of Photo-Optical Instrumentation Engineers (SPIE)



- Photography
- Traveling
- Car racing
- Basketball
- Tennis



Available upon request.

## EXPERIENCE (CONTINUED)

### SCIENTIFIC CONSULTANT

INTELECT MEDICAL - BOSTON, MA | APR 2009 - DEC 2010

- Developed an artificial neural network approach to determining multi-polar volumes of tissue activated for two different Medtronic DBS electrode leads.

### SCIENTIFIC CONSULTANT

BOSTON SCIENTIFIC - BOSTON, MA | AUG 2008 - DEC 2010

- Investigated the applicability of using a new current-controlled DBS system with multiple independent current sources, to selectively activate various targeted neural populations in the brain using current steering.

### SOFTWARE ENGINEER - CT DIVISION

PHILIPS MEDICAL SYSTEMS - CLEVELAND, OH | JAN 1999 - JAN 2002

- Co-op and internship, where software for the PinPoint system was designed, programmed, and ported. This device is a frameless, stereotactic guidance system attached to a CT scanner used for whole body interventional procedures.

## SELECTED PATENTS / PUBLICATIONS

### PATENTS

- "Systems and methods for data representation in an optical measurement system." - US20210374458A1
- "Imaging markers for stimulator leads." - [US11318297B2](#)
- "Non-invasive optical detection system and method." - [US20190336057A1](#)
- "Activation map based individualized planning for deep brain stimulation." - [US9937347B2](#)
- "Therapy program selection for electrical stimulation therapy based on a volume of tissue activation." - [US10583293B2](#)
- "System and method to estimate region of tissue activation." - [US8589316B2](#)
- "Methods for identifying target stimulation regions associated with therapeutic and non-therapeutic clinical outcomes for neural stimulation." - [US8649845B2](#)

### PUBLICATIONS

- "Kernel Flow: a high channel count scalable time-domain functional near-infrared spectroscopy system." [Journal of Biomedical Optics: 2022, 27\(7\):074710.](#)
- "A novel lead design enables selective deep brain stimulation of neural populations in the subthalamic region." [Journal of Neural Engineering: 2015, 12\(4\):046003.](#)
- "Engineering the next generation of clinical deep brain stimulation technology." [Brain Stimulation: 2015, 8\(1\), 21-26.](#)
- "Artificial neural network based characterization of the volume of tissue activated during deep brain stimulation." [Journal of Neural Engineering: 2013, 10\(5\), 056023.](#)
- "Tractography-activation models applied to subcallosal cingulate deep brain stimulation." [Brain Stimulation: 2013, 6\(5\), 737-739.](#)
- "Current steering to activate targeted neural pathways during deep brain stimulation of the subthalamic region." [Brain Stimulation: 2012, 5\(3\), 369-377.](#)
- "Patient-specific models of deep brain stimulation: influence of model complexity on neural activation predictions." [Brain Stimulation: 2010, 3\(2\), 65-77.](#)
- "CT-integrated robot for interventional procedures: Preliminary experiment and computer-human interfaces." [Computer Aided Surgery: 2002, 6\(6\), 352-359.](#)



Additional patents and publications are available on [Google Scholar](#).