SOUPTICK CHANDA

PhD (*thesis submitted, awaiting degree*) Department of Mechanical Engineering, Indian Institute of Technology Kharagpur Email: souptick@gmail.com Mob: +919874079798

Career Objective:

To succeed in an environment of growth and excellence through hard work, perseverance and continuous self development and thereby, achieving personal as well as organization goals.

Academic Qualifications:

PhD (pursuing) in Mechanical Engineering (Spl. Biomechanics):

Indian Institute of Technology Kharagpur, Kharagpur, West Bengal. *Start date January 2012, tentative submission by August 2015.*

Masters of Technology in Mechanical Engineering (spl. Machine Design):

Indian Institute of Technology Guwahati, North Guwahati, Assam. Passed in 2006 with overall C.P.I. of 8.27 out of 10 (Ist Class).

Bachelor of Engineering in Mechanical Engineering:

Bengal Engineering College (Deemed University), Shibpore, West Bengal (*now IIEST Shibpore***)** Passed in 2003 with 73.31% marks (Ist Class).

Higher Secondary Examination:

Passed in **1999** with **88.30%** marks (Ist Class) under W.B.C.H.S.E. <u>Secondary Examination</u>:

Passed in 1997 with 89.50% marks (Ist Class) under W.B.B.S.E.

Areas of interest:

- Orthopaedic Biomechanics
- Computational Mechanics
- Soft Computing

Computer Exposure:

Programming Languages Known: C, Fortran, VBScript IT packages known: HP QTP & HP QC (for quality assurance testing) Software Packages known: SolidWorks, CATIA V5, Rhinoceros, MIMICS, Ansys, Matlab

PhD Thesis (ongoing, tentative submission date July, 2015):

The topic of my PhD thesis is **"Shape Optimization of Cementless Femoral Implant Using Genetic Algorithms"**. Total Hip Arthroplasty (THA), commonly known as Hip replacement, has become a standard orthopaedic surgical procedure, which offers relief from pain and restoration of joint functions for patients suffering from osteoarthritis (arthrosis), rheumatoid arthritis, congenital deformities or post-traumatic disorders. Over the past few decades, THA has seen much advancement and ever since has achieved an exceptional position in the field of total joint replacement. In spite of such stupendous success, the incidences of aseptic loosening of hip

prostheses are not rare. This calls for in-depth biomechanical analyses of the prostheses by addressing multiple, often mutually incompatible, failure mechanisms. Therefore, it is necessary to implement a multi-objective shape optimization strategy for the optimal design.

The goal of the study was to design better cementless femoral implants by judiciously compromising on the biomechanical cost functions by integrating adaptive machine learning strategy with the FE (finite element) model of the bone-implant construct through batch processing technique. The design variables to be optimized were selected based on a CAD based parameterized hip implant model (TriLock[®], Depuy). The automated parameterization was implemented by means of a custom application programming interface (SolidWorks API) script written for this purpose. Over 2000 implant shapes were analysed through multiple generations of genetic algorithms (GA) run to arrive at the optimum geometry. The FE model generation procedure was validated based on measured full-field surface strain data obtained from analogue femurs, both implanted and intact. The trade-off implant geometry was further evaluated based on evolutionary interfacial conditions by combining the effect of both bone remodelling and bone ingrowth.

Language/Tools used: C, Matlab, MIMICS, SolidWorks, Rhinoceros, Ansys (APDL script)

Publication:

International journal papers:

- 1. Chanda, S., Gupta, S., Pratihar, D.K., A Genetic Algorithm based Multi-objective Shape Optimization Scheme for Cementless Femoral Implant, 2015, *J. Biomech. Eng.*, Trans. ASME, 137(3):034502, doi: 10.1115/1.4029061
- Chanda, S., Dickinson, A.S., Gupta, S., Browne, M., Full-field *in vitro* Measurements and *in silico* Predictions of Strain Shielding in the Implanted Femur after Total Hip Arthroplasty, 2015, *J. Eng. Med.*, Proc. Institution of Mechanical Engineers, Part-H, 229(8):549-559, doi: 10.1177/0954411915591617
- 3. Chanda, S., Gupta, S., Pratihar, D.K., A Combined Neural Network and Genetic Algorithm based Approach for Optimized Femoral Implant having Improved Primary Stability, *Appl. Soft Comput. (under revision for resubmission)*
- 4. Chanda, S., Gupta, S., Pratihar, D.K., Effects of Interfacial Conditions on Shape Optimization of Cementless Hip Stem: an Investigation Based on Hybrid Intelligent Framework, *Struct. Multidisc. Optim. (under review)*

International conference papers:

- 1. Chanda, S., Gupta, S., Pratihar, D.K., Shape Optimization of Cementless Hip Prosthesis, 7th World Congress of Biomechanics, Boston, USA, July 2014.
- Chanda, S., Dickinson, A.S., Gupta, S., Ozturk, H., Browne, M., Prediction of Bone Remodeling after Total Hip Arthroplasty Using Digital Image Correlation on an Analogue Bone Model, 7th World Congress of Biomechanics, Boston, USA, July 2014.
- 3. Chanda, S., Gupta, S., Pratihar, D.K., Towards an Optimally Designed Cementless Hip Stem: a Multiobjective Genetic Algorithm based Approach, *12th International Symposium on Computational Methods in Biomechanics and Biomedical Engineering*, Amsterdam, October 2014.
- 4. Chanda, S., Gupta, S., Pratihar, D.K., Shape Optimization of Femoral Implant Based on a Machine Learning Framework and Assessment of the Optimal Design Using Evolutionary Interface, 28th Annual Congress: International Society for Technology in Arthroplasty, Vienna, Austria, September 2015 (accepted).

Industry Experience:

I have worked for two private concerns (Tata Consultancy Services Ltd. & Wipro Technologies) from Nov, 2006 till Jan, 2012, as Systems Engineer – Engineering & Industrial Services. During this time span, I have been primarily involved in two major projects:

1) Client Name: Boeing

Project: Boeing 787

Work Area: As a team member, I was involved in part design, part modeling of various interior parts of Boeing's flight model no. Boeing-787. The design encompassed modeling and structural analysis and quality assurance of parts using tools, such as CATIA V5, ENOVIA, ANSYS and sometimes hand calculations, purely based on the customer specific requirements.

Tools used: CATIA V5, ENOVIA, ANSYS

2) Client Name: General Electric Project: GE Wind Turbine

Work Area: As a team lead, I was involved in working inline with the customer requirement of necessary drafting changes of various Wind Turbine parts and thereafter, carrying out Product Lifecycle Management using Newton Suite's Applications (a GE specific PLM tool).

Tools used: Unigraphics, Digital Workbench, HP QC, HP QTP

Teaching Experience:

Worked as a Teaching Assistant (TA) at Indian Institute of Technology Guwahati and Indian Institute of Technology Kharagpur for a total duration of 4 years.

Subjects taught:

- Engineering Mechanics
- Strength of Materials
- Finite Element Method
- Numerical Computing
- Engineering Drawing & CAD drafting

Special Achievements:

- Topped in my district in the secondary examination and state-wise ranked 41 and awarded National Merit Scholarship in the year of 1997.
- Qualified GATE-2004 with 97.28 percentile (AIR 643); Cleared TOEFL iBT (score 105 out of 120) and GRE general (score 1100).
- Awarded Institute Scholarship for Master's degree in Technology at IIT Guwahati, Assam.
- Awarded Institute Scholarship (continuing) for doctoral thesis at IIT Kharagpur, West Bengal.
- Appointed as a visiting student at University of Southampton, UK for a project work (related to PhD thesis) in June, 2013 for a period of 7 weeks.
- Invited for a Podium Presentation at the prestigious 7th World Congress of Biomechanics, July 2014, Boston, USA.

Personal Information:

Father's Name	Dilip Kr. Chanda
Date of Birth	28-01-1981
Gender	Male

Permanent Address	s/o. D. K. Chanda, Rabindra Nagar, P.O. Rabindra Sarani, Siliguri, Dist- Darjeeling, Pin-734006, West Bengal, Ph: +91353-2592372
Mailing Address	11/78, Laha Colony More, N. N. Road, Dum Dum, Kolkata-700028
Nationality	Indian
Marital Status	Married
Languages Known	English, Bengali, Hindi and French (learning)

References:

Prof. Sanjay Gupta (supervisor) Department of Mechanical Engineering, Indian Institute of Technology Kharagpur Phone: +913222-282958 Email: sangupta@mech.iitkgp.ernet.in Prof. Dilip Kumar Pratihar (co-supervisor) Department of Mechanical Engineering, Indian Institute of Technology Kharagpur Phone: +913222-282992 Email: dkpra@mech.iitkgp.ernet.in

Declaration:

I hereby declare that the information furnished above is true to the best of my knowledge and belief.

Date: July 17, 2015 Place: IIT Kharagpur, India

(SOUPTICK CHANDA)