

# MUKUNDA MADHAVA NATH

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## WORK EXPERIENCE

### Samsung R&D Institute India - Bangalore (SRIB)

*Advanced Technology Lab, CTO, Bangalore, India*

### Senior Lead Mechanical Engineer III

December 2017 - Present

- Improve structural integrity of smartphones through drop and bending simulations.
- Modeling of liquid adhesives using hyperelastic and viscoelastic constitutive laws in LS-DYNA and Abaqus.
- Contribute to research and development in the organization by designing novel hardware product concepts.
- Work on collaborative projects with academic institutions to improve research capabilities of the organization.
- Identify advancements in simulation technology and its incorporation into the current processes.

### General Motors Technical Centre India (GMTCI)

*Safety Crashworthiness & Pedestrian Protection CAE, Bangalore, India*

### Senior Engineer - Safety CAE

August 2013 - November 2017

- Developed standard control cards in the global human body models to achieve stability
- Developed numerous countermeasures for pedestrian protection regulations
- Correlation factor guidelines for upper leg impact correlation with 95% correlation
- Material modeling for headlamp cover using multiple modes of test data
- Automation of LS-Opt setup, metal characterization process, and design of experiment process

### Indian Institute of Science Bangalore

*Computational Nano-Engineering Group, M2D2 Lab, under Dr. G. K. Ananthasuresh*

### Project Assistant

August 2010 - June 2011

- Benchmarking of an FEA package developed in IISc (HyFEM) to commercial packages.
- Finite element simulation of micro compliant mechanisms.

## EDUCATION

### Master of Design (MDes), *Product Design and Engineering*, GPA: **6.4/8.0**

July 2011 - July 2013

Centre for Product Design and Manufacturing(CPDM). **Indian Institute of Science (IISc) Bangalore**, India

*Thesis* - Design, Fabrication, and Testing of a Novel and Cost-Effective Soil Moisture Sensor Meter for Farming Applications in India.

*Advisor* - Dr. G. K. Ananthasuresh, Professor, Dept of Mechanical Engineering, IISc Bangalore

### Bachelor of Technology(BTech), *Mechanical Engineering*, GPA: **8.29/10.00**

July 2006 - June 2010

Department of Mechanical Engineering. **National Institute of Technology (NIT) Silchar**, India.

*Thesis* - Design and analysis of thermal actuators for MEMS applications.

*Advisor* - Dr. P. K. Patowari, Associate Professor, Dept of Mechanical Engineering, NIT Silchar.

## PUBLICATIONS(J,C)/PATENTS(P)

1. [C5] Mukunda Madhava Nath, Gaurav Gupta. **Modeling the Mechanical Performance of Bendable Display Under Cyclic Loading**. In proceedings of *2019 IEEE International Flexible Electronics Technology Conference (IEEE IFETC 2019)*, August 2019, Vancouver, Canada.
2. [C4] Mukunda Madhava Nath, Gaurav Gupta. **Characterization of a Flexible Device Using a 3-Point Rolling Test**. In proceedings of *2018 IEEE International Flexible Electronics Technology Conference (IEEE IFETC 2018)*, August 2018, Ottawa, Canada. doi: 10.1109/ifetc.2018.8583958
3. [C3] Mukunda Madhava Nath, Nitin Gupta, Dibakar Sen. **Design of an Ergonomic Bicycle Seat**. In proceedings of *International Ergonomics Conference - Humanizing Work and Work Environment*, December 2014, IIT Guwahati, Assam, India.
4. [P1] Dibakar Sen, Mukunda Madhava Nath, Nitin Gupta. **A bicycle seat assembly**. *Indian patent application 2105/CHE/2013*. Patent pending.

5. [J1] P. K. Patowari, **M. M. Nath**, A. S. Bharali, J. Gogoi, C. K. Singh. **Comparative Study of Different Micro-Thermal Actuators for Micro-Electro-Mechanical-System Application.** *Journal of Advanced Manufacturing Systems (JAMS)*, Volume 11, Issue 1(2012) pp. 17-26, January 1, 2012. doi: 10.1142/S0219686712500023
6. [C2] P. K. Patowari, **M. M. Nath**, A. S. Bharali, J. Gogoi, C. K. Singh. **Comparative Study of Different Micro-Thermal Actuators for MEMS Application.** In Proceedings of the *3rd International and 24th All India Manufacturing Technology, Design and Research (AIMTDR) Conference*, December 2010, Visakhapatnam, India.
7. [C1] P. K. Patowari, **M. M. Nath**, A. S. Bharali, J. Gogoi, C. K. Singh. **Analysis of a Monometallic Two Arm Horizontal Thermal Actuator for MEMS.** In Proceedings of the *2nd International Conference on Mechanical and Electronics Engineering (ICMEE)*, August 2010, Japan. doi: 10.1109/icmee.2010.5558570

## COURSEWORK

Finite Element Analysis for Materials Engineers, Advanced Micro-Nano Systems, Mechanism Design, Computer Aided Design, Creative Engineering Design.

## PROJECTS

### Crowdfunding Research Paper to Video Conversion through Stanford Scholar Program

Guided by Stanford Scholar

May 2016 - Present

Stanford Scholar is an initiative by Stanford researchers to make research more accessible. The initiative facilitates people to collaborate and share their knowledge with others by creating short research talks on diverse topics in global languages. I created videos from the following three papers as a Directly Responsible Individual coordinating and working with others. I primarily worked with *Robotics* and *Human Computer Interface* groups in this process.

- **Robotics Group:** Rovables: Miniature On-Body Robots as Mobile Wearables Link
- **Robotics Group:** ANYmal - A Highly Mobile and Dynamic Quadrupedal Robot Link
- **Human Computer Interface Group:** Haptic Wave: A Cross-Modal Interface for Visually Impaired Audio Producers Link

### Design for manufacturing and full scale prototyping of a hexapod mechanical walking vehicle.

Guided by Dr. Dibakar Sen

May 2012 - June 2015

This project is an exploration of the capability of mechanical components for complex actuation and control. The trajectory of human foot is similar to the alphabet D, rotated anticlockwise 90 degrees. A similar coupler curve can be found in the Hoeken's linkage. An optimized mechanism (in terms of number of links and coupler curve) is designed as a functioning leg and six of them is connected to a rectangular frame with a tripod gait. A single rotating motion is connected to the links through chain drives to control all the legs in a particular gait. The vehicle can be steered using a mechanism that facilitates differential stride for opposing legs.

### Design, Fabrication, and Testing of a Novel and Cost-Effective Soil Moisture Sensor Meter for Farming Applications in India..

Guided by Dr. G. K. Ananthasuresh

Aug 2012 - June 2014

This is the dissertation project for the degree of MDes from CPDM, IISc in a team of two. The final prototype is appreciated by many ground users, agricultural scientists and funding agencies alike.

We designed and prototyped a soil moisture sensor using an absorbent (Sodium Polyacrylate) which expands by absorbing water from the soil and provide an input force to a compliant mechanism. The compliant mechanism, in turn, gives an output in terms of displacement in another point that is correlated to an analog scale.

### Design of an ergonomic bicycle seat.

Guided by Dr. Dibakar Sen

Aug 2011 - Dec 2011

This project aims to design an ergonomic bicycle seat that solves three mutually dependent problems: perineum pressure, suspension design and perceived instability in no-nosed seats.

Two U-shaped rods parallel rods are used to provide stiffness and spring effect to the seat structure. A cushion with

anthropometric dimension and sufficient height is provided at the rear end i.e. towards the U-arms for seating. A frontal damper in the valley of the U-shape takes care of vibration mitigation.

## **Design and analysis of two arm thermal actuators for MEMS applications.**

Guided by Dr. P. K. Patowari

Aug 2009 - June 2010

This is the dissertation project for undergraduate program in Mechanical Engineering from National Institute of Technology Silchar.

This project considers three models of two arm monometallic horizontal thermal actuator for design and analysis. Analysis for the deflection, stress developed, temperature attained by the actuator is carried out by applying different voltages. Three materials, namely Silicon, Poly-Silicon and Titanium, are considered for analysis. This project aims at finding the suitability of the materials and configuration of thermal actuators for their applications with respect to applied voltage.

## **SOFTWARE SKILLS**

*Simulation Packages:* LS DYNA, Optistruct(Nastran), Abaqus.

*Pre-Processing & CAD:* Hypermesh, FreeCAD, Primer, LS-Prepost, NX Unigraphics, Solidworks.

*Programming:* Python, Unix Shell, MATLAB, C++.

*Presentation/Documentation:* MS Office, L<sup>A</sup>T<sub>E</sub>X, Beamer.

## **SCORES**

**IELTS** (appeared 14<sup>th</sup> January, 2017) Score - 8.00 (Listening -8.00 Reading - 9.00 Writing - 7.00 Speaking - 7.00)

**GRE** (appeared 28<sup>th</sup> October, 2014) Score - 325 (Verbal-165, Quant-160), AWA - 3.5

**TOEFL** (appeared 9<sup>th</sup> November, 2014) Score - 110 (Reading 29, Listening 28, Speaking 23, Writing 30)

**GATE**, Paper in Mechanical Engineering (2011) - Scored above 99 percentile

## **HONORS/ACHIEVEMENTS**

- Design for Six Sigma (DFSS) *BlackBelt* and *GreenBelt*, General Motors University
- Graduate Scholarship from MHRD, Government of India for pursuing masters' degree.
- Certificate of Proficiency from the Government of Assam for securing state rank of 24 and 32 in high school board examinations.

## **PERSONAL DETAILS**

Male. Indian Citizen. *DoB* - 31<sup>st</sup> December, 1988

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**Permanent Address:** C/O - Chandra Kanta Nath, Vill - Dakhin Chuburi, PO/PS - Sipajhar, Dist - Darrang, Assam, India - 784145

## **REFERENCES**

- **Dr. Dibakar Sen**, Professor, Center for Product Design and Manufacturing and Department of Mechanical Engineering, Indian Institute of Science Bangalore, India.  
dibakar@cpdm.iisc.ac.in, +91-80-2293-3230/3137
- **Dr. G. K. Ananthasuresh**, Professor, Department of Mechanical Engineering, Indian Institute of Science Bangalore, India.  
suresh@mecheng.iisc.ac.in, +91-80-2293-2334/3363
- **Dr. B Gurumoorthy**, Professor, Department of Mechanical Engineering and Centre for Product Design and Manufacturing, Indian Institute of Science Bangalore, India.  
bgm@cpdm.iisc.ac.in, +91-80-2293-2304
- **Dr. P. K. Patowari**, Associate Professor, Department of Mechanical Engineering, National Institute of Technology Silchar, India.  
ppatowari@yahoo.co.in, +91-94-3552-3391