ABHINANDAN JAIN

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EDUCATION

B.Tech — **ZHCET, AMU** — *Aug. 2013 - June 2017*

Electronics Engineering (advisor: Prof. M. Hasan)
CPI - 8.88/10.00 (Honours)
Thesis - "FPGA Implementation of Image Coder for WSN"

EXPERIENCE

Visiting Scholar — **MIT Media Lab** — *Oct. 2017 – Present*

Fluid Interfaces Group (advisor: Prof. Pattie Maes)

- Research in Robotic Symbionts. Developing Human Machine Interface for Augmenting Human Capabilities and Creativity for artistic tasks such as playing a Guitar.
- Research in Sleep Stage Classification using bio-signals for using auditory biofeedback in hypnagogic stage for augmenting cognitive process and human creativity.

Research Assistant — **Dept. of Petroleum Studies, AMU** — *July 2017 – Sep. 2017*

Polymer and Composite Material Lab (advisor: Dr. S.J.A Rizvi)

- Developed Actuator based on Ionic Polymer Metal Composite (IPMC) for soft robotics applications as in Artificial Muscles.
- Developed Low Cost flexible inkjet-printed passive RF sensor tags for Humidity, Temperature and Strain sensing applications.
- Developed Automatic Impact Testing apparatus for measuring Impact Strength and Impact Energy of a composite material.

RESEARCH INTERESTS

Interdisciplinary Systems Development and Implementation, Human Computer Interaction, Robotic User Interfaces, Augmented Reality, Visual Sensor Networks Development, Polymers and Smart Materials, Renewable Energy Systems.

HONORS AND AWARDS

Analog Devices Anveshan Fellowship, 2016
Granted Anveshan IOT Fellowship, supported by Analog Devices for the development of Low Power Visual Sensor Nodes for surveillance applications in remote locations, Mentioned in Top 3 Projects.

Best Poster Award, 2017
"Actuator Based on Ionic Polymer Metal Composite (IPMC) and its Applications". ThinkNano-2017, IISC Bangalore.

Sir Syed Emerging Scholar Award, 2016
Awarded SSESA Scholarship by Sir Syed Education Society of North America.

Product Development and Innovation Award, 2015
"System for Assisting Visually Impaired", Awarded $500 By ZHCET Alumni Association of North America.

Best Paper Award, 2014
"A Proposed Model of Fully Autonomous Underwater Vehicle System, by making use of only Three Thrusters". 2nd Unmanned Systems Conference and Exhibition India 2014, Air Force Auditorium, New Delhi.

Best Paper Presentation Award, 2015
"A Novel Advance Cane System for Assisting Visually Impaired". Workshop on Information Technology – Prospects and Challenges (ITPC-2015), Aligarh.

Certificate of Merit, GIAN Course on Biomedical Signal Processing , 2017
1st Rank Candidate in the course of Biomedical Signal Processing by GIAN under MHRD held at AMU. Received Certificate of Merit.

PUBLICATIONS

Journal Publications

- Afshan Ilyas, M. Ayyub, M. Rizwan Khan, **Abhinandan Jain** & M. Aslam Husain, "Realization of Incremental Conductance MPPT Algorithm for Solar Photovoltaic System", International Journal of Ambient Energy, Taylor & Francis, 2017
- M. Aslam Husain, **Abhinandan Jain**, Abu Tariq, "A Novel Fast Mutable Duty (FMD) MPPT technique for solar PV system with reduced searching area", Journal of Renewable Sustainable Energy 8, 054703, AIP, 2016
- M. Aslam Husain, Abu Tariq, Salman Hameed, M Saad Bin Arif, **Abhinandan Jain**, "Comparative Assessment of Maximum Power Point Tracking Procedures for Photovoltaic Systems", Green Energy & Environment, Elsevier, In Press, Available Online, 2016

Conference Papers

- Mohd. Mohsin Ikram, **Abhinandan Jain**, S.J.A. Rizvi, "Design and Development of Ionic Polymer Metal Composite (IPMC) based Light Weight Flexible and Low Cost Artificial Finger", Humanizing Work and Work Environment (HWWE-2017), Aligarh
- Sameer Hasan, **Abhinandan Jain**, Faisal Anwar, Saleem Anwar Khan, "Concept Design of an Autonomous Underwater Vehicle with Integrated Ice Penetrating system", AIAA Space Forum and Exposition 2017, Orlando
- Baqar A. Rizvi, Omar Farooq, Sadaf Iqbal, **Abhinandan Jain**, Abid A. Khan, "sEMG Signal Enhancement using Cubical Denoising for Wrist movement Classification", IEEE International Conference on Communication and Signal Processing (ICCSP-17), Melmaruvathur
- **Abhinandan Jain**, Baqar A. Rizvi, Omar Farooq, Shashank K. Garg, "Fatigue Detection and Estimation using Auto-Regression analysis in EEG", 5th IEEE International Conference on Advances in Computing, Communications and Informatics (ICACCI-2016), Jaipur
- **Abhinandan Jain**, M.A. Husain, Abu Tariq, "A Novel Fast and Accurate Temperature tolerant PV Maximum Power Point Tracking System", IEEE International Conference on Power Electronics, Intelligent Control and Energy Systems (ICPEICES-2016), New Delhi
- Bhanu Pandey, **Abhinandan Jain**, "Self-Sustaining WBAN Implants for Biomedical Applications", 2nd IEEE International Conference on Applied and Theoretical Computing and Communication Technology (ICATCCT-2016), Bangalore
- M.A. Husain, **Abhinandan Jain**, Abu Tariq, "A novel Fast Alterable Duty (FAD) MPPT procedure for Solar PV Hybrid Vehicles", International Conference on Recent Trends in Engineering and Material Sciences (ICEMS-2016), Jaipur
- M. A. Husain, Asif Khan, Abu Tariq, Z. A. Khan and **Abhinandan Jain**, "Aspects Involved in the Modeling of PV System, Comparison of MPPT Schemes and Study for Different Ambient Conditions Using P&O Method", Computer Society of India (CSI-2015), New Delhi
- **Abhinandan Jain**, Shashank Varshney, "A Novel Advance Cane System for Assisting Visually Impaired", Workshop on Information Technology – Prospects and Challenges (ITPC-2015), Aligarh.
- S. Yusuf Ali, Sameer Hasan, **Abhinandan Jain** "A Proposed Model of Fully Autonomous Underwater Vehicle System, by making use of only Three Thrusters", 2nd Unmanned Systems Conference and Exhibition India (USCEI-2014), New Delhi.

Under Review

- Sameer Hasan, **Abhinandan Jain**, "Under Ice Communication System for Europa Exploration Mission", AIAA SpaceOps 2018, Marseille, - Accepted
- **Abhinandan Jain**, M. Tausif, Ekram Khan, M. Hasan, "A Extremely Low Memory Multiplierless Architecture for 2D-DWT"
- **Abhinandan Jain**, M. Tausif, Ekram Khan, M. Hasan, "Memory Efficient Multiplierless Architecture of FrWF for Wearable Visual Sensor Networks"
- M. Aslam Husain, **Abhinandan Jain**, Abu Tariq, "Fast and Precise GMPPT Techniques for PV Systems"

PATENTS

- "Novel Maximum Power Point Tracking Method For PV Panels"
  Indian Patent Office, No 201611001525
- "Barefoot Detection Sensor"
  Indian Patent Office – 3035/DEL/2015
- "System For Assisting Visually Impaired"
  Indian Patent Office – 2010/DEL/2015

RELEVANT PROJECTS

Low Energy Actuating Ionic Polymer Metal Composite
Developed low cost, low energy, light weight and flexible actuating polymer by using an ionomer Kraton, type of Ionic Polymer Metal Composite (IPMC). Silver (Ag) was electro-less plated using a novel technique and Copper (Cu) was electroplated. The strip of polymers were used as finger muscles for imitating the natural finger structure. Actuation achieved was similar to a natural finger movement on application of 3V bipolar voltage. The bend angle was more than 90 degrees in both the polarities. The angular velocity achieved was 0.16 rad/s. Applications constitutes of Artificial muscles, soft-robotics, MEMS, biosensors.

Inkjet Printable Passive Chipless RF sensors
Developed flexible, inkjet printable, batteryless, chipless RF sensor for sensing temperature, humidity and strain using Sulphonated Poly-ether-ether Ketone (SPEEK) polymer as the sensing layer over interdigitated electrodes on a flexible substrate.

FPGA Implementation of Image Coder for WSN
Developed Low Power and Low Memory Architecture of the Image Coder on FPGA for the applications of Wireless Sensor Networks. Designed HDL architectures for Fractional Wavelet Filter (FrWF) and ZM-SPECK algorithm. Also proposed a novel algorithm for forward multilevel transform which utilize only 24 Bytes of RAM for 5/3 Daubechies coefficients, independent of the image size. It enables implementation of image compression algorithms on Energy Efficient IC's suitable for Remote monitoring and environment reconstruction in Visual Sensor Networks.

EEG & EMG based Muscle Fatigue Detection & Estimation
Researched on Novel Muscle fatigue detection and estimation criterions by using AR analysis based on Yule's AR Model in EEG domain. Also verified the features with already discovered features of the fatigue development.

Advance Cane System for Assisting Visually Impaired
Developed a novel low cost cane system for assisting blind people in their movement by giving them modulated haptics feedback. The Affordable System is targeted for the Lower-Middle Class Blind People for aiding their movement and detecting obstacles in their path. The System was tested In Ahmadi School for Blinds, AMU and was given a positive response for mass production.

COMPUTER SKILLS

Programming: C, C++, C#, JAVA, Python, Verilog, VHDL

Applications: MATLAB, SolidWorks, OpenFrameworks, Xilinx ISE, Xilinx Vivado, NI Multisim, CST, Altium Designer, Proteus, ADS, NI Labview, HSPICE

OTHER

Badminton: Competed In All India Junior Badminton Tournament-Mumbai.
Captain, NRSC, AMU Badminton Team, 2016.
Won Inter Hall Badminton Tournament-AMU, 2015.
Represented College Twice at IIT-BHU Spardha.

Music: Instrumentalist - Guitar.