AMITH HULIKAL NARAYAN

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EDUCATION

Ph.D in Electrical Engineering, Expected - May 2020
University of Maryland, College Park, MD GPA: 3.3

B.E. in Telecommunications, June 2011
R.V. College of Engineering, Bangalore, Karnataka, India GPA: 8.3

RESEARCH EXPERIENCE

Design, Modelling & Development of High Efficiency Megawatt Class Constant Impedance Tunable Power Extraction Circuits for Mobile Ionospheric Heaters

1. Designed a tunable power extraction circuit (pi-circuit consisting of capacitors and inductors connected in pi-shape) for a 70kV-30A Grid-less Tetrode (novel RF source) used in Mobile Ionospheric Heaters at RF frequencies (3-10 MHz) (**PSPICE**).
2. Challenges in building high efficiency circuit are to ensure maximum power delivery to load(antenna) and minimum dissipation in circuit elements. Modelled inductor parasitic effects like proximity effect and self-resonance to reduce the winding losses (**Ansys MAXWELL, HFSS**).
3. Proposed and designed a novel high efficiency inductor to ensure 99% power is delivered to the load.
4. Tested and verified the design concept for 90% efficiency (**Network Analyzer**).

Experiments on the Electron Gun

1. To demonstrate the principle, experiment is carried out on a relatively low power gun (35kV-3A). The pi-circuit is connected across the gap for power extraction (**Thermionic Gun, Ion Pump, High Voltage Transformers, Photo-detectors, IGBTs, Bulk Capacitors**).
2. All the modules mentioned below (power supply, grid bias voltage system) are appropriately integrated to make the gun operational. Gun bring up to obtain expected current levels (around 3A beam current).

Design & Development of High Voltage Power Supply, Grid Bias Voltage System & Solenoid for Beam Confinement

1. A high voltage power supply (0 - 3.5kV) was built to act as an input source to a step-up transformer that generates a 35kV output for the gun.
2. To ensure pulsed beam output from the thermionic emitter, a grid bias voltage circuitry was built using pulse generators, photo-detectors and a DC source.
3. Built a solenoid used for beam confinement on the electron gun (50 mTesla at the centre).

RELEVANT SKILLS

Design Tools: Ansys MAXWELL, HFSS, PSpice, MATLAB, LabVIEW, Modelsim.
Lab Equipments: Network & impedance Analyzers, oscilloscopes, multimeters & delay generators.
Devices: Thermionic Gun, ion pump, high voltage transformers, photo-detectors, IGBTs, bulky capacitors.
Languages: C, Linux, Verilog, VHDL, C++, ASM, Python Scripting.

RELEVANT COURSEWORK

US Particle Accelerator School & UCSD: RF-Cavity, Component & System for Accelerators.

University of Maryland: Electromagnetic Theory, Solar Energy Conversion, Quantum Technology & Computing.

RV College of Engineering: Microwave Engineering, Analog & Digital Microelectronics, Analog & Digital Communications, VLSI for Telecommunication Systems.

CERTIFICATION COURSES

Magnetics, RF Design Theory and Principles, Transmission Line Theory, RF System Design of Transceivers, RF Power Amplifier Design, and LNA Design.

WORK EXPERIENCE

Design Engineer 1 — **Advanced Micro Devices (AMD)**
June 2012 - July 2014 — Bangalore, India

1.Diagnosed RTL design issues on microprocessor core through stall, mismatch and assertion debugs. Suggested appropriate design and verification fixes on both server and low power microprocessors (**Verilog, C++, Verdi**).
2. Improved both functional and code coverage for feature and instruction verification on our low power microprocessor used in upcoming Sony (PS4), Microsoft (Xbox) and Nintendo gaming consoles (**C++**).

Project Engineer — **Wipro Technologies (VLSI Division)**
June 2011 - May 2012 — Bangalore, India

1. Implemented and conducted wafer level tests of a 32-bit micro-controller based on ARM Cortex-M4 processor used in industrial applications and diagnosed pattern generation problems on J750 tester (**Visual Basic for J750 testing**). Developed test program for measuring mixed signal parameters for Analog-to-Digital Converter (ADC) (**C, Visual Basic**).

TEACHING EXPERIENCE

Graduate Teaching Assistant — **University of Maryland**
August 2019 - Present — College Park, Maryland

1. Teach two discussion sessions a week on Electromagnetic Wave Propagation - 2.
2. Hold office hours for student concerns & grade assignments.

CONFERENCE & JOURNAL PUBLICATIONS

1. *Constant Impedance Tunable IOT Power Extraction Circuit,* **A.H. Narayan**, B.L Beaudoin, C Turner, N Goyal, G.S Nusinovich, T.M Antonsen Jr, 2016 IEEE International Vacuum Electronics Conference.
2. *Simulations & Experiments of Constant Impedance Tunable Power Extraction Circuits for Mobile Ionospheric Heating,* **A.H Narayan**, B.L Beaudoin, A Ting, G.S Nusinovich, T.M Antonsen Jr, 2018 International Conference on Plasma Sciences.
3. *Novel High Power Sources for the Physics of Ionospheric Modification,* B.L Beaudoin, T Koeth, G.S Nusinovich, **A.H Narayan**, T.M Antonsen Jr, 2015 IEEE International Particle Accelerator Conference.
4. *Experimental Studies on Radio Frequency Sources for Ionospheric Heaters,* B.L Beaudoin, A Ting, S Gold, **A.H Narayan**, R Fischer, J.A Karakkad, G.S Nusinovich, T.M Antonsen Jr, Physics of Plasmas V-25 I-10 P-103116, 2018.
5. *High efficiency inductive output tubes with intense annular electron beams,* J.A Karakkad, D Matthew, R Ray, B.L Beaudoin, **A.H Narayan**, G.S Nusinovich, A Ting, T.M Antonsen Jr, Physics of Plasmas V-24 I-10 P-103116, 2017.
6. *Physics of Efficient Gridless Tetrodes with Intense Electron Beams,* J.A Karakkad, G.S Nusinovich, B.L Beaudoin, A Ting, **A.H Narayan** & T.M Antonsen Jr, Physics of Plasmas,V-26 I-9 P-093101, 2019.
7. *Highly efficient, megawatt-class, radio frequency source for mobile ionospheric heaters,* B.L Beaudoin, A Ting, S Gold, **A.H. Narayan**, J.A Karakkad & T.M. Antonsen Jr.

AWARDS & GRANTS

Finalist, Best Student Paper: International Conference on Plasma Physics - 2018
Student Travel Grant: International Conference on Plasma Physics - 2018.
Finalist, Best Student Paper: International Vaccum Electronics Conference - 2016.
Best Student Paper Award: Graduate Student Government, UMD - April 2016

ONLINE COURSES

University of Pennsylvania (Coursera Online-In progress): Introduction to Intellectual Property, Copyright Law, Trademark Law, Patent Law.

LEADERSHIP EXPERIENCE

Fest Organizer — **CONNECT - 2011**
January - March 2011 — RV College of Engineering

Oversaw publicity, finance and volunteer management. Budgeted the event expense, pitched to the potential sponsors, coordinated publicity events. Approved the individual event spends & resolved inter-departmental bottlenecks.