# Richard A. McManus Jr.

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## *Education*

**University of Notre Dame** **Class of 2024**

- **Major**: Electrical Engineering **Concentrations**: Semiconductors and Nanotechnology, Photonics
- Boeing Scholar Dean's List Grand Challenges Scholar IEEE-HKN Sorin Scholar Tau Beta PI
- **Overall GPA**: 3.936 **Major GPA**: 3.964

## *Research and Activities*

**Adiabatic Reversible Logic and Single Electron Transport Research – Dr. Greg Snider's Group** **2021 - Present**

- Fabricated experimental AlN piezoelectric MEMS resonators in ND Nanofabrication Facility
- Extracted capacitance and conductance parameters by analyzing the measured coulomb blockade diamonds of a single-electron transistor when coupled to a single-electron box acting as a trap
- Served as the resident expert in PCB Design for chip breakout, active and passive level-shifting, etc.
- Developed a Python GUI that automated the implementation of clock delays and waveform augmentation to synchronize two 8-channel waveform generators within 200 ps
- Assisted in the design and assembly of a microwatt-resolution thermal testing environment
- Developed Verilog code to integrate a Virtex-7 VC707 FPGA with an adiabatic MIPS to write instructions, synchronize clock signals, and store results in memory

**Integrated Circuit Fabrication – EE 40063 – Dr. Alan Seabaugh** **2023 - Present**

- Completed a 2 μm gate-length CMOS process to fabricate MOSFETs, inverters, TLM test structures, ring oscillators, and 5000-transistor sound chips that play the ND Victory March
- Gained experience in photolithography, plasma ashing, reactive-ion etching, RCA cleaning, annealing, implantation, plasma-enhanced and low-pressure chemical vapor deposition (PECVD and LPCVD), xenon difluoride etching, sputter deposition, step profiling, ellipsometry, probe station testing, etc.

**Grand Challenges Scholar** **2021 - Present**

- Accepted into a highly selective research-oriented honors program that provides mentorship to researchers focused on engineering the tools of scientific discovery
- Participated in the 2023 Device Research Conference in Santa Barbara, CA

## *Experience*

**Co-founder, CEO, and Chief Engineer of Mound Power, LLC** **2020 - Present**

- Organized and directed a team to design and manufacture a novel multi-axis force measuring device and software interface to analyze human ground reaction forces
- Filed provisional and non-provisional utility patents: *Multi-Axis Force Measurement Method and Assembly*
- Spearheaded product development across 8 unique force plate prototypes
- Validated and implemented by data scientists at the Chicago Cubs
- Generated over $35,000 in revenue and grants from multiple sources
- Selected to represent Notre Dame in the 2021 ACC Inventure Prize Competition
- Presented technology at the 2022 American Baseball Coaches Association Convention
- Awarded "Best Undergraduate Venture" out of 150+ competing ventures in the 2022 McCloskey New Venture Competition by a panel of industry professionals

**Teaching Assistant – Digital Integrated Circuits – CSE 30342 – Dr. Matthew Morrison** **2023 - Present**

- Conducted weekly office hours to assist students in developing an 8-bit MIPS using Cadence
- Students begin designing single MOSFETs and work up to a microprocessor including an ALU, controller, and 40-pin pad frame

**Startup Coach for the IDEA Center at Notre Dame** **2021 - Present**

- Provided guidance on student business plans, minimum viable products, and fundraising
- Served as liaison between student entrepreneurship and the College of Engineering
- Connected students with technical resources to bring their visions to fruition

**Environmental Test Engineering Intern – The Boeing Company** **Summer 2023**

- Led the performance testing of two large-scale chillers to simulate on-aircraft cooling (managed customer requirements, planning, setup, data acquisition, analysis, etc.)
- Gained experience in a variety of labs: Airflow, Thermal, Vibration, Arc Heater, etc.

## *Relevant Skills*

- Eagle, Cadence Virtuoso and Spectre, C/C++, Fusion 360, FDM 3D Printing, KiCad, LabOne, Matlab, Nanofabrication, PathWave Advanced Design System, Python, Solidworks, SLA 3D Printing, Verilog

## *Relevant Courses*

- Autonomous Mobile Robots (EE 40085), Control Systems (EE 40024), Electromagnetic Fields (EE 30348), Electronic and Optoelectronic Devices (EE 30357), Fundamentals of Semiconductors (EE 30347), IC Fabrication (EE 40063), Introduction to Quantum Mechanics (EE 60587), Logic Design (CSE 20221), Microelectronic Circuit Design (EE 30342), Optics and Photonics (EE 40468), Power Electronics (EE 30043), Signals and Systems (EE 30344), VLSI Circuit Design (CSE 40462)