Angsagan Abdigazy

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Education

University of Southern California (USC)   **Aug 2019 - Present**
Ph.D. Student in Electrical and Computer Engineering (GPA: 3.76/4.0)   *Los Angeles, CA*
Analog and Mixed-Signal Integrated Circuits Design for Implantable/Wearable Devices

Ulsan National Institute of Science and Technology (UNIST)   **Sep 2015 - Jun 2019**
B.S. in Electrical Engineering with Minor Degree in Computer Science (GPA: 3.93/4.3)   *Ulsan, South Korea*
Global UNISTAR Scholarship Holder, Graduated with Summa Cum Laude

Research & Course Projects

Ingestible Capsule for Oxygen Sensing in the GI tract   **Mar 2022 - Present**
- Designed and tested the PCB that inegrates a battery, DC-DC converter, LDOs, LEDs, photodiodes and MCU.
- Programmed nRF52 MCU to transmit the sensor data to the mobile device over Bluetooth Low Energy.
- Designed and tested a wearable 3D magnetic coil for capsule's localization.

An Ultra Low-Power Transceiver for Insertable Smart Pills ↗   **Jun 2020 - Nov 2021**
- Designed a chip (180nm CMOS) that integrates a transmitter, on-chip antenna, bandgap voltage reference and 2 LDOs.
- Designed and tested a set of loop antennas on Ansys HFSS.
- Integrated and tested a chip, MCU, magnetic sensor, DC-DC converter and a battery on a 3.2mm x 13.6mm flex PCB.

An 8-Channel Neural Amplifier in 90nm CMOS ↗   **Fall 2019**
- The Schematic Level Design of the Fully-Differential 8-Channel Neural Amplifier in 90nm CMOS.
- Power: $< 3.1\mu\text{W}$/channel, IRN: $< 9.82\mu\text{V}_{rms}$, Gain: 45dB-65dB, BW: 500Hz-8kHz, CMRR & PSRR > 60dB.

An 8-bit 1.25 GS/s 5x Time-Interleaved Asynchronous SAR ADC in 45nm CMOS ↗   **Spring 2020**
- The Schematic Level Design of an 8-bit 1.25 GS/s 5x Time-Interleaved Asynchronous SAR ADC in 45nm CMOS.
- Input Swing: < 500mV, ENOB = 6.84 bits, Power: < 7mW, FoM: < 48.6fJ/conv-step.

A General-Purpose Microprocessor in 45nm CMOS ↗   **Spring 2020**
- The Schematic and Layout Level Design of a 5-stage Pipeline General-Purpose Microprocessor in 45nm CMOS.
- 17 supported commands including Store, Load, Add, Min, Mul, Right/Left Shift.
- Operating Frequency: < 1.7GHz, Power: $< 794\mu\text{W}$, Area: $61\mu\text{m}$ x $93\mu\text{m}$;

Industry & Research Internships

Camera Hardware Team at Apple Inc. | *Cupertino, CA*   **May 2022 - Aug 2022**
- Designed a custom testing system (PCB) to characterize LDOs on the camera module.
- Designed a low-noise read out circuit (schematic) to characterize the performance of a magnetic sensor.

Yale Nanodevices Lab | *Yale University, USA*   **Jun 2018 - Aug 2018**
- Generated Matlab script for NRZ/PAM-N modulation and experimentally verified results with optical fiber link.
- Implemented PID control (LabVIEW) on laser wavelength stabilization in Differential Phase Shift Keying.

Communication Theory Lab | *King Abdullah University of Science and Technology, KSA*   **Jul 2017 - Dec 2017**
- Worked on the experimental application of OFDM in Free Space Optical Wireless Communication Systems.

Institute of Batteries | *Nazarbayev University, Kazakhstan*   **Jan 2017 - Feb 2017**
- Conducted research on the development of 3D aqueous rechargeable lithium ion batteries.

Power Electronics for Advanced Renewable Systems Lab | *UNIST, South Korea*   **Jan 2016 - Feb 2016**
- Worked on the project of generating power in wearable devices by using the Peltier-Seebeck Effect.

Technical Skills

Electronic Components: RF Transceiver, LDO, bandgap voltage reference, ADC, oscillator, magnetic sensor, antenna.
Software Skills: Cadence Virtuoso, Ansys HFSS, MATLAB, Altium PCB Designer, Eagle, C, C++, Python, LaTex.
Hardware Tools: Arm-based MCUs, Opal Kelly FPGA, Arduino, Raspberry PI
Lab Instruments: Oscilloscope, Waveform generator, Spectrum analyzer, VNA, Wirebonder, Soldering kit etc.

Journal Papers

[1] **A.Abdigazy**, M.Monge, "A Bimodal Low-Power Transceiver Featuring a Ring Oscillator-Based Transmitter and Magnetic Field-Based Receiver for Insertable Smart Pills", IEEE Solid-State Circuits Letters, vol. 5, pp. 154-157, 2022, doi: 10.1109/LSSC.2022.3179458.

[2] **A.Abdigazy**, M.Arfan, G.Lazzi, C.Sideris, A.Abramson, Y.Khan, "End-to-End Design of Ingestible Electronics", submitted to Nature Electronics.

[3] **A.Abdigazy**, M.Arfan, J.Shao, M.S.Islam, Md.F.Hassan, B.P.Kunnel, Y.Khan, "Gas Sensing Ingestible Pill with Wearable Magnetic Field-based 3D Localization Platform", in preparation.

Poster Sessions

[1] **A.Abdigazy**, N.Udayanga, M.Monge, "Ultra-Low Power Communication for Implantable Medical Devices", Abiotic-Biotic Interfaces for Ophthalmology, USC Ginsburg Institute for Biomedical Therapeutics, Los Angeles, CA, USA, Jan 2021.

[2] **A.Abdigazy**, M.Arfan, M.S.Islam, B.P.Kunnel, H.Hashemi, Y.Khan, "Ingestible Pill for Understanding the Gut-Brain Axis in the Context of Stress", Engineering for Mental Health, USC Viterbi School of Engineering, Los Angeles, CA, USA, Jan 2023.

Teaching & Mentoring Experience

Mentor at Viterbi Undergraduate Research Programs (VSI and CURVE) | *USC, USA*   **Jul 2021 - Aug 2023**
- Mentored multiple undergraduate students on various research projects.

Teaching Assistant in General Physics | *UNIST, South Korea*   **Sep 2016 - Jun 2019**
- Conducted weekly recitation classes and graded exam papers.

Languages

Native: Kazakh, Russian
Fluent: English, Turkish
Intermediate: Korean