Yiyan Li

PhD Candidate of Electrical and Computer Engineering
University of Nevada, Las Vegas
4505 S. Maryland Parkway
Las Vegas, NV 89154-4026
(+1) 702-688-0222
liy10@unlv.nevada.edu
www.yilectronics.com

EDUCATION

University of Nevada, Las Vegas, NV	**Electrical and Computer Engineering**	**PhD, 2012-2016**
Chongqing University, China	**Biomedical Engineering (Electrical)**	**M.S., 2009-2012**
Henan University of Science and Technology, China	**Biomedical Engineering (Electrical)**	**B.S., 2005-2009**

RESEARCH AND DEVELOPMENT

2012-Present

- **Design a high throughput digital microfluidic chip. (On-going research).**
  Including digital microfluidic chip design and fabrication; system design for pico-amps level current sensing; capacitive sensing system and its GUI monitoring system. Wireless controller (WiFi to serial converter) ESP8266 is used for real-time experiment control.

- **Design an ultrafast capacitive to digital converter for droplet sensing in digital microfluidics. (On-going research).**
  Using GFUS SiGe 8HP (0.13 μm) technology to fabricate an ultrafast capacitive to digital converter for droplet sensing in digital microfluidics.

- **Design a high precision DMF top plate height controller using a PZT actuator.**
  Including mechatronic design, vibration control, PZT precise positioning, PZT deflection modeling, displacement sensing, 12-bit digital-to-analog converter (DAC) MCP4921, PIC24fJ96 16-bit MCU, and intelligent DMF control.

- **Develop an on-chip integrated digital color-sensor based droplet PH value measurement system.**
  Including DMF patterning, TCS34725 RGB sensor, MCU interfaces, PIC24fJ96 16-bit MCU, and serial communications.

- **Investigation on the droplet motion under a beak-like non-parallel DMF device.**
  Including PZT bimorph actuator positioning, Omron Z4M-W40 laser displacement sensor, amplifier design, feedback control, DAC MCP4921, PIC24fJ96 16-bit MCU, and mechatronics. This work also includes droplet contact angle measurement, c.a. hysteresis evaluation, surface engineering, and dynamic droplet trajectory tracking.

- **Design a capacitance-to-digital sensor based droplet composition measurement system.**
  Use a 24-bit capacitive-to-digital converter (CDC) for droplet position monitoring in a DMF system. The system includes AD7745, Altera DE2 FPGA system, PCB design, and real-time monitoring by serial communications.

- **Design an ultra-thin flat lens with metamaterials for wave front shaping.**
  Electromagnetic numerical computation for a negative index nano-antenna array. The simulation is conducted by moment method, FDTD, and FEM.

- **Investigation on behavioral and pathological effects of transcranial direct current stimulation in a rat model of Alzheimer's disease.**
  Including design, layout, and fabricate the brain stimulator. Design feedback motor evoked potential monitoring system for the cortex excitability evaluation. Build neural disorder models of Alzheimer's disease. This study includes immunohistochemistry, HE, silver staining experiments, and tissue engineering-related study.

- **Design an electrowetting DMF chip on a CMOS ASIC chip.**
  Use high voltage ON's C5 technology, design an electrowetting surface directly on the passivation layer of a CMOS chip. Use the top metal layer as the electrode. Use on-chip decoders to address the electrodes. Use Cadence, ElectricVLSI, LtSpice for circuit design, simulation, and chip layout.

- **Design a continuous time *K*-Delta-*1*-Sigma modulator for broadband analog-to-digital conversion.**
  Design a time-interleaved oversampling delta-sigma modulator with ON's C5 technology. Use Cadence, ElectricVLSI, LtSpice for circuit design, simulation, and chip layout.

- **Design a commercial software for Hunter-Schmidt Meta-Analysis.**
  This tool is coded with VBA and multimedia authorware for Meta-Analysis experiments. This work includes algorithm implementation, software development, and on-line promotion.

- **Modeling the long-range ordered, broccoli-like SERS arrays for the detection of endocrine disrupting chemicals.**
  FDTD modeling for broccoli-like gold particle SERS fields.

TEACHING EXPERIENCE AT UNLV

I have teaching experiences in analog/digital integrated circuit design, computer logic basics, signal and systems, and the corresponding labs with CMOS integrated circuit fabrication, microcontrollers, AD/DA converters, FPGAs, circuit simulations, and system integration on PCBs. I have multiple project experiences of interfacing sensors, actuators to microcontrollers, and collecting, processing raw data using serial communication with PC. I am familiar with I2C, SPI, RS232, and USB protocols. I understand the basic operations of PLC and SCADA systems for instrumentation and process control.

2015 Fall
1. EE421L, Digital Integrated Circuit Design Laboratory.
Lectures were given before the students start doing the labs. The main course contents are using Cadence to design and layout digital integrated circuits, such as digital to analog converters, logic gates, muxes, adders, and flip-flops. The final project of this lab is integrating all of the developed circuits in the semester into a 1.5 mm × 1.5 mm die, the chip was fabricated with MOSIS using ON's C5 technology.

2. EE621, Digital Integrated Circuit Design.
Tutoring homework problems and help on student project troubleshooting; configure CDK with Cadence on the server; collect, and grade circuit and layout files from students. Outcomes of this course: layout digital circuits and chips; design, estimate delays, and determine speed bottlenecks in digital circuits, describe the operation of MOSFETs using square law equations, discuss the movement of electrons and holes in pn-junctions and transistors under various operating conditions, and sketch the cross-sectional view of a layout.

2015 Spring
1. **EE420L, Engineering Electronics II Lab.**
Lectures will be given before the students start doing the labs. This course focused on analog circuit simulation and development, RC circuits, compensated scope probe circuit, op-amps, audio amplifiers, and beta-multipliers. Simulations are based on LTSpice, circuits are built with breadboards.

2. EE620, Engineering Electronics II and Analog Integrated Circuit Design.
Tutoring homework problems and help on student project troubleshooting; collect and grade homework and project files from students. Outcomes of this course: MOSFET spice parameters and operations; gain, speed, and matching trade-offs when setting the width, length, and overdrive of transistors; current mirrors, amplifiers, and differential amplifiers; voltage and current references; op-amps; frequency response; op-amps stability.

2014 Fall
1. EE460L, Communications Lab.
Tutoring communication labs and helping on theoretical and experimental verification of DSBSC, FM modulation, PCM coding / encoding, baseband digital communication and BER in noisy channel using TIMS 301 communication module.

2. CPE200L, Computer Logic Design Lab II.
This is an FPGA based advanced computer logic design lab. This course covers serial communication, random number generators, multipliers and Nios II processors, and a final project.

2014 Spring
1. CPE200L, Computer Logic Design Lab II.
This is an FPGA based advanced computer logic design lab. This course covers serial communication, random number generators, multipliers and Nios II processors, and a final project.

2. EE320, Engineering Electronics I.
Tutoring homework problems and help on project troubleshooting; grading homework and projects. This course covers inverting and non-inverting op-amps, integrators' output current of MOSTETs and diodes; diode circuit design and analysis; amplifier design and analysis; use spice for circuit simulation.

2013 Fall
1. CPE100L, Computer Logic Design Lab.
This is an FPGA based advanced computer logic design lab. This course covers logic gates, combinational logic, multiplexers, ALU, alarms design, clock design, and final project.

2. CPE100, Computer Logic Design.
Tutoring homework problems and help on project troubleshooting; grading homework and projects. This course covers basic concepts in computer engineering; binary, octal, decimal and hexadecimal systems; Arithmetics of non-decimal numbers; logic gates; combinational logics; sequential logics; clocked synchronous state machines.

3. EE360, Signal and Systems.
Tutoring homework problems and help on project troubleshooting; grading homework and projects. This course covers fundamentals of signal and system analysis, focusing on representations of discrete-time and continuous-time signals and representations of linear, time-invariant systems. Applications are drawn broadly from engineering and physics, including feedback and control, communications, and signal processing.

2009-2012
- **Investigated behavioral and pathological effects of transcranial direct current stimulation in a rat model of Parkinson's disease.**
  Stimulator circuit design, voltage booster design, skull electrode design, and rat PD model design; rat behavioral experiments and tissue staining.

- **Design an ultra-low power sleep monitoring device.**
  Use low-power MCU TI MSP430 to monitor and analyze the pulse wave for sleep quality evaluation.

- **Design a portable ECG defibrillation overload recovery testing instrument.**
  Develop a C8051 controlled, LabView interfaced ECG electrode testing equipment.

2008-2009
- **Undergraduate research on a low cost and high resolution intelligent on-line ECG system.**
  PCB fabrication with in-house drills and copper boards; Circuit design and simulation using Altium PCB designer; ECG monitoring using National Instruments AD converters and LabView based online GUI.

WORK EXPERIENCES

1. Software Engineer, 12 months, website and Apps development, 3E Promotions, LLC.
2. Software Engineer, 10 months, meta-analysis commercial software development, department of management at UNLV.
3. CT/MRI Engineer, 4 months, internship of pathological diagnostics using CT/MRI, Orthepedic Hospital at Luoyang.

TECHNICAL SKILLS AND DESIGN TOOLS

Electrical & Computer Engineering Design Tools: Cadence Virtuoso, Electric VLSI, Spectre, UltraSim, LTSpice, Cadence Diva, Mentor Graphics Calibre, Altera Quartus II and DE2 FPGA System, Lumerical FDTD, Moment Method Programing, Remcom Xfdtd, and Visual Basic.NET with Microsoft Access.
Biological & Biomedical Experiment Skills: Tissue processing, cryostat and paraffin tissue section, H&E, cell cultures, immunohistochemistry.
Nanofabrication: Photolithography, E-beam deposition, microfluidic device patterning.

HONORS AND AWARDS

2015   UNLV GPSA Award.
2013   NASA EPSCoR Fellowship.
2011   CQU VSCF Award.
2009   HAUST Annual Leadership Award.
2009   Henan Province Outstanding Undergraduate Alumni Award.

ON-GOING RESEARCH AND SUBMITTED JOURNAL ARTICLES

1. **Y. Li** and R. Jacob Baker. EWOD DMF based on-chip cell cultures and micro-tissue arrays. **On-going research.**
2. **Y. Li** and R. Jacob Baker. A low cost healthcare cloud using EWOD DMF devices for diagnostics and an open source online API for data collection – a proof of concept. **On-going research.**
3. **Y. Li** and R. Jacob Baker. Droplet transportation under subthreshold voltages in digital microfluidics with top plate vibrations. *Applied Physics Letters*. **Submitted**.
4. **Y. Li** and R. Jacob Baker. Droplet transportation in a beak-like EWOD DMF device. *Microfluidics and Nanofluidics*, 2015. **Submitted.**

PUBLICATIONS

Y. Li and R. Jacob Baker. Improving the performance of electrowetting on dielectric microfluidics using piezoelectric top plate control. *Sensors and Actuators B: Chemical*, **Accepted**, 2016.
Y. Li, H. Li and R. Jacob Baker. A low-cost and high-resolution droplet position detector for an intelligent electrowetting on dielectric device. *Journal of Laboratory Automation*. 20 (2015) 663-669.
Y. Li and R. Jacob Baker. Precise EWOD top plate positioning using inverse Preisach model based hysteresis compensation. *IEEE Dallas Circuits and Systems Conference*. (2015) 1-4.
Y. Li and R. Jacob Baker. A highly efficient and reliable electrowetting on dielectric device for point-of-care diagnostics. *IEEE Dallas Circuits and Systems Conference*. (2015) 1-4.
Y. Li and R. Jacob Baker. Computer vision assisted measurement of the displacements of a bimorph piezoelectric cantilever beam. *IEEE Biomedical Circuits and Systems Conference.* (2015) 1-4.
Y. Li, R. Chen and R. J. Baker. A fast fabricating electro-wetting platform to implement large droplet manipulation. *IEEE International Midwest Symposium on Circuits and Systems*. (2014) 326-329.
Y. Li, H. Li and R. J. Baker. Volume and concentration identification by using an electrowetting on dielectric device. *IEEE Dallas Circuits and Systems Conference*. (2014) 1-4.
Y. Li, X. Tian, L. Qian, X. Yu and W. Jiang. Anodal transcranial direct current stimulation relieves the unilateral bias of a rat model of Parkinson's disease. *IEEE Engineering in Medicine and Biology Society*. (2011) 765-768.
K. Huang, **Y. Li**, X. Tian, D. Zeng, X. Gao. Design and analyses of an ultra-thin flat lens for wave front shaping in the visible. *Physics Letters A*. 379 (2015) 3008-3012.

X. Yu, **Y. Li**, H. Wen, Y. Zhang, X. Tian. Intensity-dependent effects of repetitive anodal transcranial direct current stimulation on learning and memory in a rat model of Alzheimer's disease. *Neurobiology of Learning and Memory.* 123 (2015) 168-178.

T. Wang, Z. Zhang, **Y. Li**, G. Xie. Amplified electrochemical detection of mecA gene in methicillin-resistant Staphylococcus aureus based on target recycling amplification and isothermal strand-displacement polymerization reaction. *Sensors and Actuators B: Chemical.* 221 (2015) 148-154.

J. Chen, G. Qin, W. Shen, **Y. Li** and B. Das. Fabrication of long-range ordered, broccoli-like SERS arrays and application in detecting endocrine disrupting chemicals. *Journal of Materials Chemistry C.* 3 (2015) 1309-1318.

J. Chen, W. Shen, B. Das, **Y. Li** and G. Qin. Fabrication of tunable au SERS nanostructures by a versatile technique and application in detecting sodium cyclamate. *Rsc Advances.* 4 (2014) 22660-22668.

X. Jing, X. Cao, L. Wang, T. Lan, **Y. Li** and G. Xie. DNA-AuNPs based signal amplification for highly sensitive detection of DNA methylation, methyltransferase activity and inhibitor screening. *Biosensors and Bioelectronics.* 58 (2014) 40-47.

C. Ma, M. Liang, L. Wang, H. Xiang, Y. Jiang, **Y. Li** and G. Xie. MultisHRP-DNA-coated CMWNTs as signal labels for an ultrasensitive hepatitis C virus core antigen electrochemical immunosensor. *Biosensors and Bioelectronics.* 47 (2013) 467-474.

J. Li, X. Tian and **Y. Li**. Design of temperature control system for burn-avoiding infrared physiotherapy apparatus based on fuzzy PID. *Transducer and Microsystem Technologies.* 1 (2012) 120-123.

L. Luo, X. Tian, P. Zhang and **Y. Li**. Defibrillation overload recovery performance test system for ECG electrode. *Chinese Journal of Scientific Instrument.* 32 (2011) 1981-1986.

L. Li, X. Tian and **Y. Li**. Amplitude and phase measurement circuit design used on neuromuscular disease assessment system. *Application of Electronic Technique.* 37 (2011) 1-8.

J. Zhang, X. Tian and **Y. Li**. Design on MSP430-based portable sleep monitoring instrument. *Transducer and Microsystem Technologies.* 30 (2011) 118-121.