Curriculum Vitae

Victor (Farm-Guoo) Tseng

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Nationality: **U.S. citizen**

Education:

University of Florida, Gainesville, Florida, USA

Ph.D.	**Electrical and Computer Engineering**	**May 2015**	(**GPA 4.0/4.0**)

Dissertation: Integrated passives and resonant inductive coupling as a displacement sensing mechanism for large piston / rotation micromirrors

National Chiao Tung University, Hsinchu, Taiwan, ROC

M.S.	Electrical and Computer Engineering	July 2007	(GPA 4.0/4.0)

Thesis: Micro capacitive vibration-to-electric energy converter with integrated mechanical switches

National Chiao Tung University, Hsinchu, Taiwan, ROC

B.S.	Electrical and Computer Engineering	July 2005

Employment:

2010-2015: **Lab teaching assistant / research assistant**, ECE dept., UF, Gainesville, FL, USA
- TA for electronic circuits I/II, two lab sections per week each semester.
- RA for multiple research projects, lab safety manager.

2009-2010: **DLP product engineer**, **Texas Instruments** (Taiwan), Longtan, Taoyuan, Taiwan, ROC
- Production line yield management for the assembly and test of the DLP (Digital Light Processing) pico projector products.

2008-2009: Interpreter/ events coordinator, The World Games of 2009, Kaohsiung, Taiwan, ROC
- English/Chinese interpreter and events coordinator during The World Games of 2009.

Research Project Experience:

■ **Inductive eddy current position sensing** for **MEMS devices**
- Developed microfabricated coil based inductive position sensor with interface circuitry to detect large vertical displacement micromirrors.
- Can simultaneously sense piston position and tilt angle.
- Supports resonant amplitude detection and resonant frequency shift detection.
- Achieved piston sensing range of 1 mm (300 nm resolution) and 130 µm (20 nm resolution).

■ **Chip-scale integration** of **RF MIM capacitors** and **power inductors**
- Demonstrated novel micro/nano-fabrication process to produce high density stacked metal-insulator-metal (MIM) capacitors (2.4 nF capacitance, 3.8 fF/μm^2 density) for RF filters.
- Fabrication of wafer-thick substrate embedded power inductors (NiZn/PDMS composite core, electroplated TSV copper windings) as an assembly platform for power converters.

■ **Vibration energy harvesting** systems (**capacitive transduction**)
- Developed a capacitive based MEMS energy harvesting system with integrated mechanical switches and circuitry for power extraction.
- Provides micro-Watt output power from ambient 120 Hz vibration sources.

- **Optical MEMS devices** (micromirrors, spot size photo detectors)
  - Developed CMOS-MEMS based microfabrication process for micro knife-edge spot size photo detectors (comb drive based).
  - Assisted with DRIE based microfabrication process for large vertical displacement electrothermal micromirrors for Fourier transform spectroscopy applications.

- **Electromagnetic precise micro-actuators**
  - Developed a NiFe permalloy based magnetically actuated micromirror as an optical switch.
  - Tilt angle control achieved by precisely designed overlapping mechanical stoppers.
  - Driving circuit used to increase the switching speed (from 8 to 4 ms) of the external electromagnet.

Teaching Experience:

Lab teaching assistant, **Electronic circuits I / II**, ECE dept., UF, 2010-2015 (continuously)

- Experienced TA. Taught two lab sections per week (15 students each).
- Handled office hours, grading, and held occasional lectures.
- Developed new series of labs for new ECE curriculum, covering wireless power transmission, transistor radios, audio tone control filters, power electronics, and sensor interfacing circuits.
- New labs are designed to excite the interest of the students with practical circuit design.
- Also a grading assistant for Elements of Electrical Engineering (basic circuits for non ECE majors), and Principles of MEMS Transducers.

Skills and Expertise:

- Micro-electro-mechanical systems **(MEMS) device design**, **Electromagnetic analysis**, **analog and mixed signal circuit design**, integrated passive devices (RF coils, MIM capacitors, power inductors), semiconductor devices
- Hands-on skills in **micro & nano-fabrication** equipment, optical measurement tools (Wyko optical profilometer, photospectrometer, laser Doppler vibrometer, SEM)
- **Finite element analysis & simulation** (COMSOL, HFSS, CoventorWare), **circuit simulations** (SPICE, ADS, Simulink), layout design (L-edit, Layout Editor), data analysis (Matlab, MS Excel)
- Native language speaking level for both English and Mandarin Chinese

Honors and Awards:

Selected as a candidate for Tau Beta Pi of the University of Florida Chapter, 2010 (UF)
HIWIN Thesis Award, Honorable Mention, 2008 (HIWIN Technologies Corporation)
Silver Bamboo Award, ECE undergraduate, 2001 (National Chiao Tung University)

Professional Associations and Services:

Professional society memberships:

- Member, IEEE (Electron Devices Society), 2013-present

Invited journal paper reviewer:

- IEEE Transactions on Electron Devices (2 papers)

List of Publications:

Refereed journal papers:

- V. F.-G. Tseng and H. Xie, "Increased multilayer fabrication and RF characterization of a high density stacked MIM capacitor based on selective etching," *IEEE Trans. Electron Devices*, vol. 61, no. 7, Jun. 2014.
- V. F.-G. Tseng, J. Li, X. Zhang, J. Ding, Q. Chen, and H. Xie, "An electromagnetically actuated micromirror with precise angle control for harsh environment optical switching applications," *Sens. Actuators A,* vol. 206, pp. 1–9, Feb. 2014.

- V. F.-G. Tseng and H. Xie, “Design and fabrication of a high-density multilayer metal–insulator–metal capacitor based on selective etching,” *J. Micromech. Microeng.*, vol. 23, no. 3, Mar. 2013.
- Y. Chiu and V. F.-G. Tseng, “A capacitive vibration-to-electricity energy converter with integrated mechanical switches,” *J. Micromech. Microeng.*, vol. 18, no. 10, Oct. 2008.

Manuscripts under preparation:

- V. F.-G. Tseng and H. Xie, “Resonant inductive coupling based piston position sensing mechanism for large vertical displacement micromirrors,” intended to publish in *Journal of Microelectromechanical Systems*, 2015.
- V. F.-G. Tseng and H. Xie, “Simultaneous piston and tilt angle position sensing for large vertical displacement micromirrors by frequency detection inductive position sensing,” intended to publish in *Applied Physics Letters*, 2015.
- J. Li, V. F.-G. Tseng, Z. Xiao, and H. Xie, “A compact DC-DC converter with wafer-level fabricated substrate-embedded power inductors assembled with an integrated circuits chip,” intended to publish in *IEEE Trans. Power Electronics*, 2015.

Conference papers (presentations):

- V. F.-G. Tseng, H. Xie, "Inductive eddy current sensing as a displacement sensing mechanism for large piston/rotation micromirrors,” in *Proc. Transducers 2015*, Anchorage, AK, USA, 2015 (accepted for oral presentation).
- J. Li, V. F.-G. Tseng, Z. Xiao, and H. Xie, “Wafer-level fabrication of power inductors in silicon for compact DC-DC converters,” in *Proc. Tech. Dig. Solid State Sensor and Actuator Workshop, Hilton Head*, SC, USA, 2014, pp. 407-410 (poster presentation).
- V. F.-G. Tseng, J. Li, X. Zhang, and H. Xie, "Design and fabrication of an electromagnetically actuated optical switch with precise tilt angle control," in *Proc. IEEE Optical MEMS and Nanophotonics*, Kanazawa, Japan, 2013, pp. 67-68 (oral presentation).
- V. F.-G. Tseng, K. Ngo, and H. Xie, “A novel high-density capacitor design and its fabrication technique based on selective etching,” in *Proc. Tech. Dig. Solid State Sensor and Actuator Workshop, Hilton Head*, SC, USA, 2012, pp. 425-428 (poster presentation).
- T.-L. Chang, V. F.-G. Tseng, and Y. Chiu, “Micro knife-edge optical measurement devices fabricated by SOI and CMOS MEMS processes,” in *Proc. IEEE/LEOS Optical MEMS*, Hualien, Taiwan, 2007, pp. 31-32 (oral presentation).
- Y. Chiu and V. F.-G. Tseng, “Capacitive vibration-to-electricity energy converter with integrated mechanical switches,” in *Proc. PowerMEMS 2007*, Freiburg, Germany, 2007, pp. 121-124 (poster presentation).
- H.-C. Liu, V. F.-G. Tseng, and Y. Chiu, “Characterization of a micro electrostatic vibration-to-electricity energy converter with integrated mechanical switches,” in *Proc. The 13th Micro and Nano System Technology Conference*, Hsinchu, Taiwan, 2009.
- V. F-G. Tseng and Y. Chiu, “Micro electrostatic vibration-to-electricity energy converter with integrated mechanical switches,” in *Proc. The 11th Micro and Nano System Technology Conference*, Hsinchu, Taiwan, 2007.
- C.-T. Kuo, V. F.-G. Tseng, and Y. Chiu, “Improvement and testing of an electrostatic vibration-to-electric energy converter,” in *Proc. The 10th Micro and Nano System Technology Conference*, Hsinchu, Taiwan, 2006.