

Department of Electrical Engineering, University at Buffalo

EE 526 Wearable and Implantable Sensors (Spring 2018)

Course Description	EE 526 Wearable and Implantable Sensors, Lecture, 3 credits In this course, students will learn the basic sensing theory behind the wearable and implantable sensing technology. A variety of advanced sensors will be introduced, including pressure, acceleration, gyroscope, magnetometer, GPS, proximity, light, camera, touch screen, identification, acoustic, humidity, temperature, biosignal, heartbeat, gas, chemical, infrared, sweat, glucose, and biomedical sensors. In the class, students will propose and present a concept of their own unique wearable and implantable device/system using multiple sensing techniques. Recent and future trends in wearable and implantable sensor technology will be discussed too. Students will gain a broad perspective in the area of sensors and wearable and implantable technology for healthcare and appealing applications.
Time/Location	Spring 2018, M/W, 12:00 PM - 1:20 PM, Knox 04
Instructor	Kwang W. Oh, Ph.D., Associate Professor (kwangoh@buffalo.edu), SMALL (Sensors and MicroActuators Learning Lab), http://www.SMALL.buffalo.edu , Department of Electrical Engineering and Department of Biomedical Engineering, University at Buffalo (SUNY at Buffalo), 113C Davis Hall, North Campus, Buffalo, NY 14260
Office Hours	W 9:30 AM – 11:00 AM, F 12:00 PM – 1:00 PM or by appointment If you want to send any email, send it to “kwangoh@buffalo.edu” with a title “[EE 526] ...” from your buffalo.edu e-mail account (no google or other e-mails). Do not send your technical abstract and presentation files to my email. You need to upload the files on UBLearns. So I will not lose your e-mails into Junk E-mail directory.
Prerequisites	Graduate standing in engineering, medicine, biomedical sciences, and natural sciences.
Textbooks	Class notes and Handouts (see UBLearns)
TA	Mr. Domin Koh (dominkoh@buffalo.edu), Office Hrs: M/W 2-3 pm, 233 Davis Hall, or by appointment.
Grading	A. Sensor-related Android App Development & Demonstration (30%) B. Sensor-related Review Paper (30%) C. Final Exam (30%) D. Professionalism & attendancy (10%)
A. Android App (due: 03/28/18)	You have to build your own Android App and have to demonstrate it both on your own phone and/or Prof. Oh’s phone (Google Nexus 5X w/ Android version 8.1). Also have to upload your source code (.xml, .java, “StudentID_LastName.apk” → “12345678_Oh.apk”, etc.) at UBLearns. You have to build an App something similar to “Sensors Test (by Ettore Zaffaroni)”. More details will be provided during class. You have to do a self-study to build your own Android App. https://play.google.com/store/search?q=sensor%20test&c=apps&hl=en https://developer.android.com/training/index.html http://stackoverflow.com
B. Sensor-related Review Paper (due: 05/07/18)	Have to use the provided TEMPLATE. The page number should be at least 10 pages including images and references. See an example (Lab Chip, 2018,18, 217-248, http://dx.doi.org/10.1039/C7LC00914C). You can choose your own topic(s) related to Wearable/Implantable Sensors. You should submit your review paper (both “.docx” and “.pdf”) on UBLearns by the due date and submit a printed version too.

Schedule

W	Lecture	Date		Title	
1	[01]	01/29/18	M	Syllabus / Introduction	
	[02]	01/31/18	W	Sensors Characteristics	
2	[03]	02/05/18	M	Pressure Sensors	
	[04]	02/07/18	W	Accelerometers	
3	[05]	02/12/18	M	Gyroscopes	
	[06]	02/14/18	W	Magnetometers / GPS	
4	[07]	02/19/18	M	Proximity Sensors / Light Sensors / Cameras	
	[08]	02/21/18	W	Touch Screen and ID Sensors	
5	[09]	02/26/18	M	Acoustic Devices	
	[10]	02/28/18	W	Humidity / Temperature	
6	[11]	03/05/18	M	Electrochemistry	
	[12]	03/07/18	W	Epidermis as Information Barrier	
7	[13]	03/12/18	M	Biosignal	
	[14]	03/14/18	W	Batteries / Wireless Charging	
8		03/19/18	M	No Class (Spring Recess)	
		03/21/18	W	No Class (Spring Recess)	
9	[15]	03/26/18	M	Chemical / Gas Sensors	
	[16]	03/28/18	W	E-Nose / Electroanalytical Methods	Due: Android App
10	[17]	04/02/18	M	Bio Sensors	
	[18]	04/04/18	W	Nanobiosensors / Glucose Sensors	
11		04/09/18	M	Android App Demonstration	
	[19]	04/11/18	W	POCT	
12	[20]	04/16/18	M	IoT, Wireless Technologies and Sensors	
	[21]	04/18/18	W	Wearable Technology	
13	[22]	04/23/18	M	Wearable Sensors	
	[23]	04/25/18	W	Implantable / Ingestible Sensors (1)	
14	[24]	04/30/18	M	Implantable / Ingestible Sensors (2)	
	[25]	05/02/18	W	Implantable / Ingestible Sensors (3)	
15	[26]	05/07/18	M	Implantable / Ingestible Sensors (4)	Due: Review Paper
		05/09/18	W	Wrap-Up	
16		05/16/18	W	Final Exam (11:45AM - 2:45PM, Knox 04)	