

# Gwanmo Ku

## Extended Curriculum Vitae

### 1. Current position

Rank: Ph.D Candidate  
Department: Electrical and Computer Engineering  
Laboratories: Adaptive Signal Processing and Information Theory Research Group

### 2. Contact Information

Office address: Department of Electrical and Computer Engineering  
Drexel University  
3141 Chestnut Street, Bossone 604  
Philadelphia, PA 19104-2875  
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### 3. Education

2009 - present **Ph.D** Candidate  
*Drexel University*, Philadelphia, PA, USA  
Advisor: John MacLaren Walsh  
June 2007 **MS** in Telecommunication Networks  
*Polytechnic University*, Brooklyn, NY, USA  
February 2000 **BS, BS** in Electronics and Physics  
*Sogang University*, Seoul, Korea

### 4. Employment

Sep. 09 - present **Research Assistant**  
Department of Electrical and Computer Engineering  
*Drexel University*, Philadelphia, PA, USA  
Sep. 05 - Jun. 07 **Graduate Assistant**  
*Polytechnic University*, Brooklyn, NY, USA  
Apr. 09 - Aug. 09 & **Researcher**  
Apr. 05 - Jul. 05 *Korea Electronics Technology Institute (KETI)*, Korea  
Jul. 03 - Nov. 03 **Researcher**  
*LG Telecom (LG U+)*, Seoul, Korea  
Jul. 00 - Jun. 03 **Officer and Researcher**  
*Republic of Korea Air Force (ROKAF)*, Korea

## 5. Honors and Awards

Sep. 10 - Jun. 11	Dean's Fellowship from <i>Drexel University</i>
Sep. 05 - Jun. 07	Tuition Remission from <i>Polytechnic University</i>
Mar. 97 - Feb. 00	Fellowship from <i>LG Yonam Foundation</i>
Sep. 96 - Feb. 97	Partial Scholarship from <i>Sogang University</i>

## 6. Military Service

Mar. 00 - Jun. 03	Served as the officer in <i>Republic of Korea Air Force</i>
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## 7. Research Activities

### 7.1 Publications

Notation used for publications in this document is as follows:

R	Refereed Journal
S/R	Submitted Refereed Journal
P/R	Journal in Preparation
C	Refereed Conference
P	Patent invention disclosure

#### 7.1.1 Publications (*Refereed or Under Review*)

1. S/R-2013 **Gwanmo Ku** and John MacLaren Walsh, "Resource Allocation and Link Adaptation in LTE & LTE Advanced : A Tutorial," *IEEE Communications Surveys and Tutorials*, (*Under Review*)
2. C-2011 **Gwanmo Ku** and John MacLaren Walsh, "Power Amplifier Nonlinearity Effects on OFDM Subcarrier Transmit Beamforming," *IEEE Wireless Communications and Networking Conference (WCNC)*, Mar. 2011.
3. P-2006 Lee Min Goo, Kang Jeong Hoon, Yoon Myung Hyun, Yu Jun Jae, and **Ku Gwan Mo** [KR 1020050110582] "System of displaying used state by using sensor network, capable of checking used state of independent space in real time," *Korea Electronics Technology Institute (KETI)*, Nov. 2, 2006

#### 7.1.2 Publications in Preparation

1. P/R-2014 **Gwanmo Ku** and John MacLaren Walsh, "Computing the Rate Distortion Region for the CEO Problem with Independent Sources," *IEEE Signal Processing Letter*
2. P/R-2014 Jie Ren, **Gwanmo Ku**, Bradford Boyle, Steven Weber, and John MacLaren Walsh, "Overhead Performance Tradeoffs in Wireless Networks - A Resource Allocation Perspective," *IEEE Trans. on Information Theory*

## 7.2 Research Projects

### **DrexelP-1. Overhead-Performance Tradeoffs in Distributed Wireless Networks: A Unifying Framework, Fundamental Limits, and Practical Controllers**

*Sponsor : AFOSR (Air Force Office of Scientific Research)*

Contributions

#### **1. Evaluating the amount of control signaling overhead and system performance of the 4G wireless standards**

- Evaluate Control Signaling Overhead in LTE & LTE Advanced
  - Physical Aspects in LTE & LTE Advanced
  - Resource Allocation and Link Adaptation in LTE & LTE Advanced
- Study Cellular Standards (OFDMA)
  - 3GPP LTE & LTE Advanced : TS 36 Series in Release 8-11
  - WiMAX & WiMAX Advanced : WiMAX Forum Docs. + IEEE 802.16 (m)
  - WiFi : IEEE 802.11 (a/g/n)

#### **2. Fundamental Collaboration Efficiency Tradeoffs**

- Find Fundamental Limit by Information Theory
  - Computing Rate Distortion Region for the CEO Problem with Independent Sources
    - Adaptation of Blahut's Algorithm for Multi-user Independent Sources
  - Study Multi-terminal Information Theory

#### **3. Efficient Cross Layer Resource Controller Design**

- Controlling an OFDMA network via Resource Controller
  - Efficient Control Decisions for Resource Allocation in OFDMA Networks
    - Frequency-Time Resource Allocation
    - Adaptive Modulation and Coding (AMC)
    - Rate Control via Hybrid ARQ (HARQ)
    - Channel Quality Indicator (CQI) Feedback
    - Scheduler Design handling Quality of Service (QoS), Fairness, and Buffering/Queueing Statistics
  - Practical Distributed Source Coding for Resource Allocation
    - Distributed Source Coding for Function Computation needed Resource Allocation
  - Vector Quantizer Design
    - Quantizer Design under Capacity Loss Distortion Measure
    - Trellis Coded Quantization (TCQ) and Successive Refinable (SR)

### **DrexelP-2. Signal Processing for Communications**

*Sponsor : NSF (National Science Foundation)*

Contributions

#### **1. Signal Processing Techniques mitigating RF Hardware Impairments**

- Power Amplifier Nonlinearity Effects on OFDM Subcarrier Transmit Beamforming
  - Investigation of RF Hardware Impairments
  - Investigation of multiple Types of High Power Amplifiers supporting OFDM Broadband Bandwidth
  - Derivation of Analytical Expression of High Power Amplifier (HPA) Nonlinearity Model
  - Applying MIMO Frequency Selective Fading Channel Model
  - Simulations of System Performance Degradation due to the HPA Nonlinearity and Channel Mismatch

### **Contributions in Other Institutions**

Performance Analysis of motes in Sensor Networks (*Korea Electronics Technology Institute*)

Optimization of 3G Networks (*LG Telecom*)

Performance Analysis of Avionics Maintenance System (*Republic of Korea Air Force*)

## 8. Professional Service Activities

### 8.1 Professional Society Membership

2008 - pres.	IEEE
2008 - pres.	IEEE ComSoc
2009 - pres.	IEEE SPS

### 8.2 Reviewership

<b>Publication</b>	<b>Years</b>
<i>IEEE Transactions on Wireless Communications</i>	2013
<i>IEEE WCNC</i>	2013