Programme Overview
B.Eng. Information Engineering

Prof. Wing C. Lau

Department of Information Engineering
The Chinese University of Hong Kong
What was the Mission-Statement of Microsoft?
What was the Mission-Statement of Microsoft?

A Computer on Every Desk and in Every Home
What is the Mission-Statement of Google?
What are these Services all about?
What is the Mission-Statement of Google?

To organize the World's Information and make it Universally Accessible and Useful.
Information Engineering

The Generation, Distribution, Analysis and Use of Information in Engineering Systems

Information
- Data, Voice, Image, Video, Multimedia
- Transmission Networking Processing

Engineering
- Understand the principles (fundamental)
- Solve large-scale problems (scientific and systematic)
- Create new technologies (innovation)

To train engineering leaders who can manage and create new information technologies to serve all disciplines.
What is Information Engineering?
## Information Engineering Programme

### Core Subjects
- Mathematics
- Computer Programming & Software Engineering
- Basic Circuits & Digital Systems
- Microcontrollers & Embedded Systems
- Signals & Systems
- Principles of Communication Systems
- Computer Networks

### Streams of Specialization
- Big Data: Systems & Application
- Communications
- Internet Engineering
- Cyber Security
- Enrichment

### Final Year Project
Four Mega Trends which will Dominate the Next Decade

Mobility

- 91% of organizations expect to spend on mobile devices in 2012
- In 2012, mobile devices will outship PCs by more than 2:1 and generate more revenue than PCs for the first time

85 BILLION mobile apps will be downloaded in 2012

Social

- Social networking will follow not just people but also appliances, devices and products

Cloud

- >80% of new apps in 2012 will be distributed/deployed on clouds
- 1/2 of companies expect to use internal social network apps in 2012

BI/big data

- 49% of CIOs rank BI as the top project priority for 2012
- 2/3 of mobile apps developed in 2012 will integrate with analytics offerings
- 32% of businesses are likely to invest in BI and analytics in 2012

Even more Flexibility!

5 out of the 17 units of the IE Major Elective Requirement can be fulfilled by other CUHK Engineering Departments’ courses at 3000 and above-level.
People of Information Engineering
Our World-Renowned Professors

21 Full-time Professors; 6 IEEE Fellows

Graduated from: MIT, Stanford, Berkeley, Caltech, Cornell, Harvard, Columbia, ETH, Northwestern, UT Austin, Purdue, CUHK...

Many have extensive Industrial Experience with Technology Powerhouses world-wide

• Bell Labs, Microsoft Research, HP Labs, Qualcomm, ...

Authors of Seminal, High-Impact Research; Prize Paper Awards from Top venues, including:

• USENIX Security / Facebook Internet Defense Prize 2018
• Top 3 Google Scholar Classic Papers in Computer Networks & Wireless Communications 2016
• IEEE Eric E. Sumner Award 2016 (for contributions in Network Coding)
• IEEE Information Theory Society Paper Award (Twice !! 2016 and 2005)
• IEEE Infocom Test-of-Time Paper Award 2015
• AAAI Outstanding Student Paper Award 2015
• ACM Multimedia Conference, Best Paper Award 2012
• IEEE Marconi Prize Paper Award in Wireless Communications 2011
• Neural Information Processing Systems, Best Student Paper Award 2010
• IEEE Computer Vision & Pattern Recognition Conference, Best Paper Award 2009
• IEEE Transactions on Multimedia Prize Paper Award 2009
Our World-Renowned Professors

Hold Key Patents on Innovations in various fields; Successful Technology Transfer, e.g.

• SenseTime - The most valuable AI Start-up in the World
• Image-Search for Microsoft Bing and Google
• X-Power (Commercial Adaptive Streaming Services) of Smartone HK

Awarded Area of Excellence by HKSAR Gov.:

• Information Technology
• Network Coding
with total funding exceeding HK$100 Million

Strong Ties with Local and Overseas Industries

• Set up the 1st Internet connection linking Hong Kong to the World
• Established Hong Kong SchoolNet to bring Internet to Primary and Secondary schools in HK
• Science Advisor of HK Innovation and Technology Commission (香港創新科技署)
• Former CEO and CTO of HK ASTRI (香港應用科技研究院)
Key Research Areas

- Information Theory, Network Coding
- Wireless Communication and Networking
- Optical Communication and Networks
- Network Economics, Internet and Applications
- Multimedia Processing
- Internet of Things, Cloud Computing, Social Networks
- Energy System, Power Grid Modernization and Optimization
- Cryptography, Security and Privacy
- Big Data Analytics, Deep Learning and AI
湯森路透社(Thomson Reuters)發佈《開放未來：2015年全球創新現況》

### Most Impactful Research Institutions In Telecomms (2004 - 2014)

<table>
<thead>
<tr>
<th>Institution</th>
<th>Country</th>
<th># of Papers (WoS)</th>
<th>Relative Citation Impact*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice University</td>
<td>U.S.</td>
<td>323</td>
<td>4.31</td>
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<tr>
<td>University of California Berkeley</td>
<td>U.S.</td>
<td>800</td>
<td>3.76</td>
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<tr>
<td>State University of New York (SUNY)</td>
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<td>341</td>
<td>2.89</td>
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<tr>
<td>Swiss Federal Institute of Technology</td>
<td>Switzerland</td>
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<tr>
<td>University of Texas, Austin</td>
<td>U.S.</td>
<td>1070</td>
<td>2.58</td>
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<tr>
<td>Carnegie Mellon University</td>
<td>U.S.</td>
<td>763</td>
<td>2.55</td>
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<tr>
<td>Princeton University</td>
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<tr>
<td>Chinese University of Hong Kong</td>
<td>Hong Kong</td>
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<tr>
<td>New York University</td>
<td>U.S.</td>
<td>421</td>
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<tr>
<td>University of Washington, Seattle</td>
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</table>

*Source: Thomson Reuters Web of Science*

*Citation impact normalized against average for field and year of publication (n = 1.00)*
Innovative Network Coding Techniques Revolutionize Wireless Communications

Named by Thomson Reuters as one of the 10 research institutions in the world with the most impact on telecommunications.
Deep Learning

With massive amounts of computational power, machines can now recognize objects and translate speech in real time. Artificial intelligence is finally getting smart.
Top Ten AI/ Deep Learning Pioneers in the World

- Announced at Global Technology Conference 2016 by Nvidia (the world leading GPU and AI platform production company with 70% of GPU world market).

Trevor Darrel
Russ Salakhutdinov
Xiaoou Sean Tang
Yann Lecun
Fei-Fei Li
Tomaso Poggio
Yoshua Bengio
Nando de Freitas
Geoffrey E. Hinton
Jurgen Schmidhuber

「認人」準過肉眼 中大系統冠全球 (文匯報)
看圖20萬張特訓 勝面書睇5億張 (文匯報)
中大搜集20萬名人照研發 全球最勁 人面識別系統 準確率99% (蘋果日報)
中大認人系統準確度冠全球 (大公報)
中大「人面識別系統」準繩度冠全球 (東方日報)
中大研發99%準確度人面系統 (太陽報)
中大人面識別系統準確度冠全球 (星島日報)
人面識別系統全球最準 (都市日報)

Our Face Technology

Science News
Nature News
Discover
The Register
Tech Xplore
Technology
Rootnotion
I Programmer

Face Recognition Algorithm Finally Beats Humans

For computers, identifying one person among many is tough. Researchers at a Dutch university have now found a way to identify people with 99% accuracy, a system that outperforms humans.

The system uses advanced algorithms to identify people in a computer generated with face recognition software.

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World’s most valuable AI start-up SenseTime raises US$620 million to spearhead China tech ambitions

China has made the development of artificial intelligence and other advanced technologies a core pillar of its efforts to reform its economy and secure leadership in what has been dubbed a fourth industrial revolution.

MIT and SenseTime announce effort to advance artificial intelligence research

Alliance will be part of new MIT Intelligence Quest.

Resource Development
February 28, 2018

MIT and SenseTime today announced that SenseTime, a
Experts reveal security flaw in net devices (The Standard)

Android社交網中大揭保安漏洞 (東方日報)

中大揭Android保安漏洞全球逾億用戶私隱堪虞 (am730)

中大程式揭手機社交網「黑」隱患 (文匯報)

中大揭秘Android漏洞憂泄個人資料 (星島日報)

中大團隊：Android和網站存保安漏洞 (成報)

黑客遙控語音功能盜私隱 (明報)

The little security flaw that enables you to immediately log into one billion Android app accounts

An OAuth 2.0 security bug makes it possible for hackers to steal data from Facebook and other ID providers.
Over $200 Million Granted for Pushing Knowledge Frontier

Prof. Wong Ching-ping, Dean of Engineering, and his team members study the new technology in energy harvesting, storage, and utilization.

Source: Sing Tao, 16 Oct 2017
Our World-Renowned Professors

Dedicated Educators

• Love to interact with Students
• Inspire Students to become Top-notch Engineers, Researchers, Entrepreneurs, and Leaders

Our Mission:
To help Our students to Achieve their Dreams!
Champion of Inter-University Hacking Competitions

For both 2018 and 2018, CUHK Team won the 1st Inter-University Cybersecurity Hacking Competition organized by PriceWaterhouseCooper (PwC) Hong Kong; also won VXCTF 2018!
• **Exchange Destinations** for our students in the past few years:

– MIT, UC Berkeley, Caltech, UIUC, U of Toronto, Purdue, Dartmouth, U. of Wisconsin-Madison, SUNY Buffalo, Stony Brook, Liverpool, U. of Hawaii, National University of Singapore, ...
IE Award to support Exchange Study

• **Eligibility**
  - IE and MIE full-time students who have completed at least 1 term in the IE Department and with cum. GPA $\geq 3.3$
  - Got Exchange offer from the Office of Academic Link, CUHK

• **Award**
  - For GPA $\geq 3.5$: HK$30,000 to support Exchange expenses
  - For 3.5$> GPA $\geq 3.3$: HK$20,000 for Exchange expenses

• **Application Procedure detailed in the IE website:**
After Graduation
**Employment..**

- NG Chung Yin, Arthur
  2015 IE
  Associate (Technology & Data)
  Morgan Stanley

- LEUNG Chi Wei, Augustine
  2018 IE
  Analyst
  Goldman Sachs

- LAM Ho Shan
  2015 IE
  Analyst
  PwC

- CAO Yuan
  2016 IE
  Assurance Associate

- LAI Yat Kan
  2018 IE
  Analyst Programmer

- YEUNG Hong Kiu
  2017 ME
  Electronic Engineering Graduate
  EMSD

- WANG Jingyu
  2017 IE
  Software Engineer
  Twitter

- ZHONG Xiang
  2014 IE
  Software Engineer
  Amazon

- YUAN Yuehao
  2015 IE
  Software Development Engineer
  Facebook

- HO Ka Man
  2015 IE
  Construction Engineer
  Juniper

- LIU Tanyu
  2015 IE
  Software Engineer
  HKT

- LAM Man Sze
  2016 IE
  Graduate Trainee
  IBM

**Further Study..**

- LEUNG Shing Yuet
  2018 IE
  Associate (Cybersecurity)

- HUANG Gen
  2018 IE
  MSc in Statistics & Data Science

- LIU Li Tian
  2015 IE
  PhD in IECS

- LIU Jiyao
  2018 IE
  MSc in Electrical Engineering

- LIU Zihan
  2016 IE
  PhD in IECS

- YUAN Jyao
  2018 IE
  MSc in Electrical Engineering

- LI CHENGHUI
  2018 IE
  MSc in Information Technology

- TI AN Peida
  2017 ME
  PhD in Electrical Engineering

- DAI Yanu
  2017 ME
  MSc in Computer Science

- SONG Jianhan
  2017 IE
  PhD in EE

- ZHOU Nan
  2015 IE
  PhD in IE

- LIU Hang
  2017 IE
  PhD in IE

- NC Ka Lok
  2016 IE
  MPhil in IE

- YU An Kun
  2016 IE
  PhD in IE

- MA Pui Kit
  2016 IE
  PhD in IE
<table>
<thead>
<tr>
<th>School</th>
<th>Program(s)</th>
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<tbody>
<tr>
<td>MIT (EECS PhD)</td>
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<tr>
<td>Stanford (EE)</td>
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<tr>
<td>UC Berkeley (EECS PhD)</td>
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<td>Caltech (EE PhD)</td>
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<tr>
<td>Cornell (ECE)</td>
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<tr>
<td>U of Texas at Austin (CS PhD, ECE PhD)</td>
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<tr>
<td>UC San Diego (CS, EE PhD)</td>
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<tr>
<td>U of Maryland (ECE PhD)</td>
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<tr>
<td>NYU (CS)</td>
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<tr>
<td>CMU (Data Science, ECE, Info Security, IT)</td>
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<td>Columbia (CS)</td>
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<td>Georgia Tech (CS)</td>
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<td>Rice (CS)</td>
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<td>Northwestern (CS)</td>
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<td>Yale (CS, Data Science)</td>
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<td>UCL (CS)</td>
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<tr>
<td>U of Edinburgh (Computational Finance)</td>
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<tr>
<td>CUHK, HKU, UST (IE, CS, Big Data, Finance, Math)</td>
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</tbody>
</table>
Career Prospects

**Stage 1: Professional**
- Project Engineers - hardware, software, networking
- System Engineers - systems, security, services
- Business Engineers - sales, marketing, product management
- Research/Training/Consulting

**Stage 2: Managerial**
- Technology Expert
- Project Manager
- Business Consultant

**Stage 3: Leadership**
- Chief Technology Officer
- Chief Executive Officer
- Entrepreneur

**Non-Engineering Positions**
- Business Education
- Marketing
- Government Management
- Others
2017 IE Graduate Employment Survey in March, 2018
Job Nature of Graduates

- Software Design & Development: 27.30%
- Service Science & Solution Architect: 13.30%
- Project Management: 9.40%
- Information Security & Assurance: 8.80%
- Data Science & Network Engineering: 8.10%
- IT Consulting: 7.80%
- Telecommunication: 5.60%
- Technical Sales & Marketing: 5.50%
- Hardware Development: 3.20%
- Teaching: 2.60%
- Others: 8.40%
YOUR CAREER

Information & Communications Technologies

Be an Engineer in Telecomm, Networking, System, Software, Cybersecurity or Solution Architect?
MODERN DATA SCIENTIST

Data Scientist, the sexiest job of the 21st century, requires a mixture of multidisciplinary skills ranging from an intersection of mathematics, statistics, computer science, communication and business. Finding a data scientist is hard. Finding people who understand what a data scientist is, is equally hard. So here is a little cheat sheet on who the modern data scientist really is.

MATH & STATISTICS
- Machine learning
- Statistical modeling
- Experiment design
- Bayesian inference
- Supervised learning: decision trees, random forests, logistic regression
- Unsupervised learning: clustering, dimensionality reduction
- Optimization: gradient descent and variants

PROGRAMMING & DATABASE
- Computer science fundamentals
- Scripting language e.g. Python
- Statistical computing package e.g. R
- Databases SQL and NoSQL
- Relational algebra
- Parallel databases and parallel query processing
- MapReduce concepts
- Hadoop and Hive/PySpark
- Custom reducers
- Experience with xaaS like AWS

COMMUNICATION & VISUALIZATION
- Able to engage with senior management
- Story telling skills
- Translate data-driven insights into decisions and actions
- Visual art design
- R packages like ggplot or lattice
- Knowledge of any of visualization tools e.g. Flare, D3.js, Tableau

DOMAIN KNOWLEDGE & SOFT SKILLS
- Passionate about the business
- Curious about data
- Influence without authority
- Hacker mindset
- Problem solver
- Strategic, proactive, creative, innovative and collaborative

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搞Gag市值破億
全球500大夠激
李英豪小檔案

2006 香港中文大學崇基學院工程學士
2009 首次創業，與團隊一同開發移動社交平臺「多樂趣」
2011 成立移動支付平臺「錢方」
2013 「錢方」被清科集團評為《2013年中國最具投資價值20強》
2013 「錢方」被美國著名科技博客Techcrunch譽為中國的Square
2014 「錢方」入選《中國企業家》雜誌「未來之星100強企業」
OurSky 創辦人
鄭斌彬 - 中大2007年信息工程畢業生
MAD Gaze - AR Smart Glasses & Solution
www.madgaze.com/
R-Guardian's anti-loss Solution

郭瑋

R-Guardian 防失的解決方案

1. Beyond safe pre-set distance
2. Vibration warning
3. Alarm tag buzzer (option)

產品：防遺失物件晶片連手機程式

創辦人：中大校友郭珍強（左起）、3年級生劉柏林和梁逸然

簡介：小晶片（透明盒內）有 GPS 定位、溫度感應等功能，當放置晶片的銀包等重要物品離開手機一定距離，手機程式會發聲或提示通知用戶。

郭瑋 - 中大2015年
信息工程畢業生
Thank you!

If you have further enquiries, please feel free to email us at:
info@ie.cuhk.edu.hk