

# Lung-Pan Cheng

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## RESEARCH INTEREST

Human-Computer Interaction; large-scale haptics in VR; sensing techniques; mobile interactions

## EDUCATION

- Ph.D., Human-Computer Interaction, *Hasso Plattner Institute*, Potsdam, Germany 11/2012 – present
- M.S., Computer Science, *National Taiwan University*, Taipei, Taiwan 09/2011 – 11/2012  
GPA: 92.32/100
- B.S., Computer Science, *National Chiao Tung University*, Hsinchu, Taiwan 09/2006 – 01/2010  
GPA: 96.7/100 (last 60), 95.1/100 (major), 89.8/100 (overall), Rank 3/56.

## WORK/INTERNSHIPS

- Interaction Architecture Intern, *Apple Inc.*, www.apple.com 10/2014 – 03/2015
- Built tracking devices and designed 3D user interfaces.
- Software Developer, *Wantoto Inc.*, www.wantoto.com 07/2011 – 07/2012
- Developed iOS apps and web applications on Google Cloud.
- Chief Counselor, *R.O.C Army*, Compulsory Military Service, Taiwan 08/2010 – 07/2011
- Network Test Engineer, *Network Benchmarking Lab*, www.nbl.org.tw 07/2008 – 07/2010
- Tested functionality, compatibility, and performance of switches and routers by simulating different protocol on Spirent SmartBits®.

## PROFICIENCY

- Programming languages: Objective-C, C/C++, C#, Python, PHP SQL, Javascript
- iOS app, tweak (jailbroken app) and external device communication.
- Unity 3D apps and plugins (Windows, OSX, iOS) development.
- Hardware prototyping (Arduino, Processing, PCB design, soldering, laser cutting)
- Tracking system (OptiTrack, Razor Hydra and IMU data processing)
- Cloud app development (Node.js, MongoDB, JQuery)

## PUBLICATIONS

- [1] Lung-Pan Cheng, Thijs Roumen, Hannes Rantzsch, Patrick Schmidt, Sven Köhler, Robert Kovacs, Johannes Jasper, Jonas Kemper, Patrick Baudisch. TurkDeck: Physical Virtual Reality Based on People, in *proceedings of the 28th annual ACM symposium on User interface software and technology* (UIST '15). Charlotte NC (November 8-11, 2015). ACM, New York, NY, USA. 417-426.
- [2] Dominik Schmidt, Robert Kovacs, Vikram Mehta, Udayan Umaphathi, Sven Köhler, Lung-Pan Cheng, Patrick Baudisch, Level-Ups: Motorized Stilts that Simulate Stair Steps in Virtual Reality, in *Proceedings of the 2015 annual conference on Human factors in computing systems* (CHI '15). Seoul, Korean (April 18 - 23, 2015). ACM, New York, NY, USA. 2157-2160
- [3] Lung-Pan Cheng, Patrick Lühne, Pedro Lopes, Christoph Sterz, Patrick Baudisch, Haptic Turk: a Motion Platform Based on People, in *Proceedings of the 2014 annual conference on Human factors in*

*computing systems* (CHI '14). Toronto, Canada (April 26-May 1, 2014). ACM, New York, NY, USA. 3463-3472.

- [4] Lung-Pan Cheng, Hsiang-Sheng Liang, Che-Yang Wu, Mike Y. Chen, iGrasp: Grasp-based Adaptive Keyboard for Mobile Devices, in *Proceedings of the 2013 annual conference on Human factors in computing systems* (CHI '13). Paris, France (April 27-May 2, 2013). ACM, New York, NY, USA, 3037-3046.
- [5] Lung-Pan Cheng, Fang-I Hsiao, Yen-Tin Lin, Mike Y. Chen, iRotateGrasp: Automatic Screen Rotation based on Grasp of Mobile Devices, in *Proceedings of the 2013 annual conference on Human factors in computing systems* (CHI '13). Paris, France (April 27-May 2, 2013). ACM, New York, NY, USA, 3051-3054.
- [6] Lung-Pan Cheng, Fang-I Hsiao, Yen-Tin Lin, Mike Y. Chen, iRotate Grasp: Automatic Screen Rotation based on Grasp of Mobile Devices, in *Adjunct proceedings of the 25th annual ACM symposium on User interface software and technology* (UIST '12). Boston, MA, USA (October 7-10, 2012). ACM, New York, NY, USA, 15-16.
- [7] Lung-Pan Cheng, Fang-I Hsiao, Yen-Tin Lin, Mike Y. Chen, iRotate: Automatic Screen Rotation based on Face Orientation, in *Proceedings of the 2012 annual conference on Human factors in computing systems* (CHI '12). Austin, TX, USA (May 5-10, 2012). ACM, New York, NY, USA, 2203-2210.
- [8] Neng-Hao Yu, Li-Wei Chan, Seng Yong Lau, Sung-Sheng Tsai, I-Chun Hsiao, Fang-I Hsiao, Lung-Pan Cheng, Mike Y. Chen, Polly Huang, Yi-Ping Hung, TUIC: Enabling Tangible Interaction on Capacitive Multi-touch Displays, in *Proceedings of the 2011 annual conference on Human factors in computing systems* (CHI '11). Vancouver, BC, Canada (May 7-12, 2011). ACM, New York, NY, USA, 2995-3004.
- [9] Neng-Hao Yu, Li-Wei Chan, Lung-Pan Cheng, Mike Y. Chen, Polly Huang, Yi-Ping Hung, Enabling tangible interaction on capacitive touch panels, in *Adjunct proceedings of the 23rd annual ACM symposium on User interface software and technology* (UIST '10). New York, NY, USA (October 3-6, 2010). ACM, New York, NY, USA, 457-458.

## RESEARCH EXPERIENCE

The HCI Lab, *Hasso Plattner Institute*, Prof. Patrick Baudisch

- TurkDeck: Physical Virtual Reality Based on Human[1]:** 12/2013 – present  
Using human to simulate virtual space by instructing them to rearrange physical props. Combined a laser projector (for instructions), a top-tracking camera and razor hydra controllers (for tracking) and a self-designed Oculus Rift experience together in Unity3D.
- Haptic Turk: A Motion Platform Based on Human[3]:** 11/2012 – 09/2013  
Using human power to actuate and give force feedback by instructing them on their mobile phones. Designed and implemented haptic hang glider, car racing experience and instruction system on Unity3D.

Mobile and HCI Lab, *National Taiwan University*, Prof. Mike Y. Chen

- iThumb Menu: Supporting Thumb-based Interactions on Large Mobile Devices:** 08/2012 – 11/2012  
Designed bezel-activated marking menus that are dynamically positioned next to users hands and are sized for thumb-based interactions. Evaluated with a 24-user experiment. 50% of the users performed faster than direct touch and 92% of the users preferred iThumb Menu.
- iGrasp: Grasp-based Adaptive Keyboard for Mobile Devices [4]:** 06/2012 – 11/2012  
Designed and implemented a grasp-sensing tablet using capacitive sensors, Arduino, and a jailbroken iPad. Used machine learning (Linear regression, SVM regression) to predict keyboard position according to users' grasps. Evaluated with an 18-user experiment. The initial typing time was shortened by 42%.

**iRotateGrasp: Automatic Screen Rotation based on Grasp of Mobile Devices [5][6]:** 09/2011 – 11/2012

Designed and implemented grasp-sensing phones using light sensors, capacitive sensors, Arduino and jailbroken iPod Touches. Used LIBSVM to achieve 90.4% accuracy when classifying users' viewing orientation based on their own grasps using. Evaluated with a 15-participant experiment based on a 6-user grasp model, which outperformed current gravity-based approach by 26%.

**iRotate: Automatic Screen Rotation based on Face Orientation [7]:** 07/2011-05/2012

Proposed a new approach that uses front-camera face detection to rotate screen automatically (outperformed current gravity-based approach by 18% (78% vs. 60%,  $N=20$ )). Reported a 513-user survey that 42% users experienced auto-rotation that leads to incorrect viewing orientation several times a week. Implemented a functional prototype on iOS devices.

**TUIC: Tangible Interaction on Capacitive Multi-touch Displays [8][9]:** 01/2010-08/2010

Enabled tangible object interaction on capacitive multi-touch devices without requiring any hardware modifications. Designed the frequency approach that identifies objects on touch screen. Implemented TUIC tag recognition system and a demo application on iOS devices.

**Gesture Keyboard:** 01/2010-08/2010

Implemented \$1 gesture recognition system that overlays on the native iOS keyboard, allowing users draw numbers and type characters at the same time. Evaluated the prototype by a 20-participant study, which users increased their alphanumeric entry speed by 30% than mode switching.

**Flora:** 01/2010-08/2010

Designed and implemented a cloud-based flower recognition app on iOS for Taipei International Flora Expo.

**Embedded System Lab, National Chiao Tung University, Prof. S.L. Tsao**

**Design and Integration of Low Power Multimedia Wireless Communication Device:** 09/2008-12/2009

Designed a power-saving protocol using adaptive beacon interval for Wi-Fi connection. Implemented a low power Wi-Fi phone by integrating Linux on WARP FPGA board.

## AWARD AND SCHOLARSHIPS

- Studying Abroad Scholarship (US\$ 32,000), Ministry of Education, Taiwan, 2015
- Conference Grant (NT\$ 40,000), National Science Council, Taiwan, Oct. 2012
- Conference Grant (NT\$ 40,000), Foundation For The Advancement of Outstanding Scholarship, Taiwan, May. 2012
- **1st place (NT\$ 20,000)**, Wargame Competition, Hacks In Taiwan Conference, Taiwan, 2012
- **1st place (NT\$300,000)**, Chung Hua Telecom Mobile Apps Competition, Taiwan, 2010
- Lin Hsiung Chen scholarship (NT\$100,000), Taiwan, 2009  
(GPA in the **top 50** of all university students in Taiwan)
- TSMC scholarship (NT\$100,000), Taiwan, 2008  
(GPA in the **top 3** of EECS students in NCTU)
- 4 Academic Achievement Awards (NT\$6,000), National Chiao Tung University, Taiwan, 2007-2009  
(GPA in **top 5%** of the students in a class of 56 students.)
- 4 Core Curriculum Awards (NT\$6,000), National Chiao Tung University, Taiwan, 2007-2009  
(awarded to **top 5%** of the students in Operating System, Algorithm, Assembly Language and Linear Algebra)