

## Educational Background

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### **SKKU (Sung Kyun Kwan University), Suwon, KOREA (Advisor: Prof. Tae-Yong Kuc)**

M.S, School of Electrical and Computer Engineering, Mar. 1997-Feb. 1999

Thesis: Implementation of Simultaneous Localization and Mapping using Intelligent Hybrid Modular control Architecture.

Researched SLAM based on custom architecture at the ICon (Intelligent Control Lab) and ISRC (The intelligent Systems Research Center)

### **SKKU (Sung Kyun Kwan University), Suwon, KOREA**

B.S, School of Information and Communication Engineering, Mar. 1999-Feb. 2002

Thesis: Design of Capture Board System using NET ARM.

Received Best graduation student paper award.

### **SKKU (Sung Kyun Kwan University), Suwon, KOREA**

B.S, Department of physics, Sung Kyun Kwan University, Mar. 1999-Feb. 2002

**Majored in the science course, Yu-sung High School, KOREA, Mar. 1996-Feb. 1999** Studied science and math

## Research Interests

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- Intelligent Behavior: Artificial robot architecture, cognitive intelligence.
- Robot navigation: path planning algorithm, self-localization, obstacle avoidance, Mapping
- Multi-robot coordination: Robot soccer
- Sensor fusion and probabilistic position estimation.

## Background

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- **Specialty: Motion control of mobile robot and embedded system device driver development, robot hardware and software design.**
- Embedded system development: WinCE, Windows Mobile, Linux, BREW, Google Android platform, MAC OS.
- Electrical and electronic engineering: micro-processors, sensors, digital and analog system design.
- Computer Language skills: C++,C, other objective orient programming languages.

### **Software programming Capabilities** *(continued on Appendix page 7)*

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- Embedded software programming skills: Micro processors (MCS96 family, 8051, AVR series, VHDL, ARM-ASSEMBLE, X86-ASSEMBLE.
- Web programming skills: SQL, Object-C, Java, Java-script, PHP, Ruby on Rails, python.

### **Hardware design Capabilities** *(continued on Appendix page 7)*

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- Microprocessor circuit design and A/D circuit design including FPGA.
- Hardware design skills: A variety of hardware design tool are available.

## Academic Awards

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- [24] The **best student award** from the first academic-industrial cooperation research conference by Samsung Techwin Co, Jan. 2009.
- [23] The **best student award** from 2007 Conference on Information and Control System(CICS2007), Oct. 2007
- [22] The **second prize** in the SAMSUNG ELECTRONICS Robot Design contest by Samsung Electronics Co, July.2006
- [21] The **second prize** in Altera NIOS Embedded system design contest by Altera, Nov.2006
- [20] **Third prize** in the software competition of KOREA hosted by IPAK, Dec.2005
- [19] The **first prize** in the intelligent creative robot contest hosted by CHUNGNAM National University, Dec.2005
- [18] The **first prize** in the intelligent robot contest(IRC) hosted by POSTECH,Oct.2005
- [17] The **first prize** in the Korea Intelligent Robot Contest at KyungNam University, May.2005
- [16] Received **popularity award**, Microsoft Imagine Cup 2005 from Microsoft, Feb.2005
- [15] **Third prize** in Dept. of Information and Communications, GIST contest by GIST, Aug. 2004,
- [14] **Third prize** in Intelligent Electronics competition by KIPE, July.2004
- [13] The **first prize** in the national wireless internet software and contents contest hosted by KIPA(Korea SW industry Promotion Agency) and Juseong University, Jun.2004
- [12] **Third prize** in the 1<sup>st</sup> KOREA micro-controller competition from Comfile Technology Inc. , April.2004
- [11] The **first prize** in the central part Robot Soccer mirosot league by KRSA (Korea Robot Soccer Association) and KangNam University, Feb.2004
- [10] The **first prize** in 2003 FIRA Robot Soccer World Championship Middle League by FIRA (Federation of International Robot Soccer Association), Oct.2003
- [9] The **first prize** in 2003 FIRA Robot Soccer World Championship Large League by FIRA (Federation of International Robot Soccer Association), Oct.2003
- [8] The **first prize** in 2003 FIRA KOREA CUP Robot Soccer competition by KRSA (Korea Robot Soccer Association), Aus.2003
- [7] The **first prize** in 3<sup>rd</sup> the central part Robot Soccer mirosot league from KRSA (Korea robot soccer association) and Chung-ang University, July.2003
- [6] The **best student award** from the president of Sung Kyun Kwan University at the graduation, Feb.2003
- [5] **Third prize** in 2002 FIRA Robot Soccer World Championship by FIRA (Federation of International Robot Soccer Association), May.2002
- [4] The **second prize** in 2002 FIRA-POSCO Cup National Robot Soccer competition by KRSA(Korea Robot Soccer Association), Jan.2002
- [3] The **Best paper award** in the 2002 FIRA-POSCO Cup National Robot Soccer Conference by KRSA, Jan.2002
- [2] The **first prize** in Robot Soccer competition for commemoration of national athletic conference hosted by KRSA and Chung-Chung Namdo, Oct.2001
- [1] **Manner prize** in the first central part Robot Soccer competition hosted by KRSA and Sung kyun Kwan University, Aus.2001

**Publications****Paper-International**

- [8] **In-Kyu Sa**, Ho Seok Ahn, Kwang Moo Yi, Jin Young Choi, "Implementation of Home Automation System Using a PDA based Mobile Robot." IEEE ISIE 2009 International Symposium on Industrial Electronics, July, 2009.
- [7] Ho-Seok Ahn, Back-Young Min, **In-Kyu Sa**, Jin-Hee Na, U-Sung Kang, Jin-Young Choi, "Multi-Dimensional Emotional Engine with Personality Using Intelligent Service Robot for Children," SICE-ICASE International Joint Conference 2008 (ICCAS2008), pp. 2020-2025, Oct., 2008.
- [6] Ho-Seok Ahn, **In-Kyu Sa**, Back-Young Min, Jin-Hee Na, U-Sung Kang, Jin-Young Choi, "Design of Reconfigurable Heterogeneous Modular Architecture for Service Robot," IROS2008, pp. 1313-1318, Sep., 2008.
- [5] Beck-Young Min, Ho-Seok Ahn, **In-Kyu Sa**, Min-yo Lee, Chang-Kyun Lee, Tae-Hyun Kim, Jun-Young Choi, "Vision-Based Robot Manipulator for Grasping Objects," International Conference on Advanced Robotics (ICAR 2007), pp. 164-169, Aug., 2007.
- [4] Ho-Seok Ahn, **In-Kyu Sa**, Beck-Young Min, Min-yo Lee, Chang-Kyun Lee, Tae-Hyun Kim, Jun-Young Choi, "Modular System Architecture of Intelligent Service Robots Focused on Smart Adapted Services," International Conference on Advanced Robotics (ICAR 2007), pp. 1123-1128, Aug., 2007.
- [3] Ho-Seok Ahn, **In-Kyu Sa**, Beck-Young Min, Jin-Young Choi, "System Architecture of Store Service Robot, " The 22nd International Technical Conference on Circuits/Systems, Computers and Communications (ITC-CSCC), Jul., 2007.
- [2] Ho-Seok Ahn, **In-Kyu Sa**, Jin-Young Choi, "3D Remote Home Viewer for Home Automation Using Intelligent Mobile Robot," SICE-ICASE International Joint Conference 2006 (ICCAS 2006), pp. 3011-3016, Oct., 2006.
- [1] **In-Kyu Sa**, Sung-Min Beck, Tae-Young Kuc, "A Robust Real-Time Mobile Robot Self-Localization with ICP Algorithm" SICE-ICASE International Joint Conference 2005 (ICCAS 2005), Jun., 2005.

**Paper-Domestic**

- [15] **In-Kyu Sa**, Ho-Seok Ahn, Jun-Young Choi, "A Robust Real-Time Mobile Robot Self-Localization with ICP Algorithm", Korea Robotics Society Annual Conference, June. 2009.
- [14] Ho-Seok Ahn, **In-Kyu Sa**, Back-Young Min, Jin-Young Choi, "the game robot of paper, stone, scissors based on vision processing" the first academic-industrial cooperation research conference by Samsung Techwin Co, Jan. 2009.
- [13] **In-Kyu Sa**, Ho-Seok Ahn, Hyung-Kyu Lee, Jun-Young Choi, "A real-time face tracking method using fuzzy controller." 2008 Conference on Information and Control System (CICS2008), pp. 333-334, Oct., 2008.
- [12] **In-Kyu Sa**, Ho-Seok Ahn, Hyung-Kyu Lee, Jun-Young Choi, "A real-time path planning method for efficient movement of a mobile robot." 2008 Conference on Information and Control System (CICS2008), pp. 331-332, Oct., 2008.
- [11] Ho-Seok Ahn, **In-Kyu Sa**, Back-Young Min, Yun-Suk Ahn, Jin-Young Choi, "Stone and scissors robot based on image processing" 2008 Conference on Information and Control System (CICS2008), pp. 327-328, Oct., 2008.
- [10] Ho-Seok Ahn, **In-Kyu Sa**, Back-Young Min, Yun-Suk Ahn, Jin-Young Choi, "Low cost multi purpose Home service modular robot MF Junior " Korea Robotics Society (KRS), pp. 347-348, Jun., 2008.
- [9] Ho-Seok Ahn, **In-Kyu Sa**, Back-Young Min, Yun-Suk Ahn, Jin-Young Choi, "Knowledge information provider system according to schedule of users in Ubiquitous environments" The Institute of Electronics Engineers of

Korea.(KEES), vol. 57, no.3 pp. 480-487, Mar., 2008.

[8] Ho-Seok Ahn , **In-Kyu Sa**, Back-Young Min, Yun-Suk Ahn, Jin-Young Choi, “Service robot control system through the mobile phone” 2007 Conference on Information and Control System(CICS2007), Oct., 2007.

[7] Ho-Seok Ahn, **In-Kyu Sa**, Back-Young Min, Yun-Suk Ahn, Jin-Young Choi, “Knowledge information provider system according to schedule of users in Ubiquitous environments.” 2007 Conference on Information and Control System(CICS2007), Oct., 2007 (**Best Paper Award**)

[6] Ho-Seok Ahn, **In-Kyu Sa**, Back-Young Min, Jin-Young Choi “Store management robot system for unmanned shop in Ubiquitous environment” 2006 The Institute of Electronics Engineers of Korea.(KEES), pp. 937-938, Jun., 2006.

[5] Ho-Seok Ahn, **In-Kyu Sa**, Back-Young Min, Jin-Young Choi “The system architecture of intelligent unmanned shop management robot” The 1<sup>st</sup> Summer Conference of the Korea Robotics Society, pp.320-327, Jun., 2006.

[4] Ho-Seok Ahn, **In-Kyu Sa**, Jin-Young Choi “The system architecture of intelligent unmanned shop management robot” CASS2006, Jun., 2006.

[3] **In-Kyu Sa**, “Implementation of Frame grabber board using Net ARM Processor” Sung Kyun Kwan University graduation, **B.S degree thesis**, Feb., 2004. (**Best Student Paper Award**)

[2] Ho-Seok Ahn, **In-Kyu Sa**, Chang-Hyun Choi, “Vision processing under uneven illumination for progress of game.” Institute of Control, Robotics and Systems(ICASE), vol. 8, no.3, pp. 32-36, May., 2002. (**Best Paper Award**)

[1] **In-Kyu Sa**, “Implementation of Simultaneous Localization and Mapping using Intelligent Hybrid Modular Control Architecture”, Sung Kyun Kwan University graduation, **M.S degree thesis**, Feb., 2006.

### **Journal Paper**

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[1] Ho-Seok Ahn, **In-Kyu Sa**, Jin-Young Choi “PDA based mobile robot system with remote monitoring for home environment,” Transaction on consumer electronics, Sep., 2009.

### **Book Publication**

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[2] **In-Kyu Sa**, Ho-Seok Ahn, “Implementation of Home Automation System Using a PDA based Mobile Robot - PBMoRo” Cutting Edge Robotics 2009

[1] Ho-Seok Ahn, **In-Kyu Sa**, Back-Young Min, Jin-Young Choi, “Intelligent Unmanned Store Service Robot PartTimer,” Service Robotics, i-Tech Book, July, 2008.

### **Technical Papers**

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[4] The trend of domestic Home network service market, Electronics Information Center, Oct.11 2005.

[3] A prospect of the trend of Domestic and international technique and market of sensor industry, Electronics Information Center, Jun.16 2005.

[2] An analysis of the trend of Domestic and international technique and market of a small size high accuracy motor control, Electronics Information Center, Jun.10 2004.

[1] An analysis of the trend of Domestic and international technique and market of intelligent robots, Electronics Information Center, Apr.1 2004.

## Projects

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### Completed Project

#### [2009]

[13] Samsung first Google android phone GT-I7500(GSM850/GSM900/DCS1800/PCS1900) for Bouygues in France.

##### Project description

- Development description: WIFI device driver engineer, Sensor Hardware Abstraction Layer implementation on linux platform.
- Development Term: July.2007 ~ July.2009.
- Research Institute: Samsung Electronics CO.

#### [2008]

[12] HSPA (Y3100) device development.

##### Project description

- Development description: USB device driver engineer, Windows-XP and VISTA platform.
- Development Term: May.2008 ~ November.2008.
- Research Institute: Samsung Electronics CO.

[11] Mobile projector development (MBP-200).

##### Project description

- Development description: Battery device driver engineer, Windows CE 5.0 platform
- Development Term: July.2008 ~ November.2008.
- Research Institute: Samsung Electronics CO.

#### [2007]

[10] CDMA&WCDMA Terminal devices development.

##### Project description

- Development description: Wireless Internet Platform for Interoperability (WIPI) engineer, V9000,W290,W2900,W240 mobile phone development, BREW platform
- Development Term: June, 2006 ~ July, 2007.
- Research Institute: Samsung Electronics CO.

#### [2005]

[9] Human robot Interaction with ETRI

##### Project description

- Development description: cognitive interaction, multimodal user identification, Windows platform
- Development Term: July.2005 ~ December.2005.
- Research Institute: ISRC, ETRI.

[8] DNW modification and USB device driver.

##### Project description

- Development description: Modification of DNW Tool memory dumping and debugging, WINDOWS DDK platform.
- Development Term: July.2005 ~ October.2005.

- Research Institute: Samsung Electronics System LSI.

[7] Store manager robot system development

Project description

- Development description: Motion planning and navigation, design robot, Windows platform.
- Development Term: January.2005 ~ December.2005.
- Research Institute: Samsung software membership.

**[2004]**

[6] Robot soccer system development.

Project description

- Development description: Small, middle and large league robot soccer design and controller programming, C and IAR IDE platform.
- Development Term: July.2000 ~ March.2004.
- Research Institute: Sung Kyun Kwan Univ. Institute of Robot.(SIOR)

[5] 21C FRONTIER project

Project description

- Development description: Development of Human Living Assistant Intelligent Robot, Windows platform.
- Development Term: November.2003 ~ March.2004.
- Research Institute: 21C Frontier Project Group, ISRC, Advisor: Suk-Han Lee, Tae-Yong Kuc.

[4] Gas sensor detector and analysis system development.

Project description

- Development description: Hardware design and firmware programming.
- Development Term: July.2004 ~ November.2004.
- Research Institute: Samsung electronics Digital appliance department.

[3] A small size mobile robot system development.

Project description

- Development description: Robot control and low level hardware programming. Windows platform and IAR IDE
- Development Term: February .2004 ~ April.2004.
- Research Institute: Sung Kyun Kwan Univ. Institute of Robot.(SIOR)

[2] Wireless Mobile Robot System development.

Project description

- Development description: Motion planning and low level motor control, Robot Hardware design. Windows platform.
- Development Term: January.2004 ~ December.2004.
- Research Institute: Samsung software membership.

**[2001]**

[1] Embedded vision system development.

Project description

- Development description: Embedded vision monitoring system on the purpose of security.

- Development Term: April.2001 ~ December.2001.
- Research Institute: Samsung software membership.

### Computer Capabilities

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Software skills: Visual C++, C/C++, Java, Java-script, PHP, Python, Object-C, Ruby on Rails, X86-ASM, MCS96-ASM, ARM-ASM, Mathlab.

Hardware skills: OrCAD (including Layout, PSpice Schematic), P-CAD, Solid works.

APIs: OpenGL, DirectX, PhysX, OpenAPI(Google,Amazon), OpenCV.

Platform: Linux 2.6 kernel later, Windows XP and Vista, Windows Mobile5.0, Windows CE 5.0 and 6.0, VxWorks, Brew, SHP, Symbian.

### Language Capabilities

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Korean (Native), English.

### References

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#### □ Educational Aspect

[1] Professor, Tae-Yong Kuc (Graduate)  
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Sung Kyun Kwan University(SKKU)  
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#### □ Personal Relation Aspect

[1] Ph.D student, Ho-Seok Ahn  
Department of Electrical Engineering  
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[2] Ph.D student, Changhyun Choi  
College of Computing (CoC)  
Georgia Institute of Technology (GaTech)  
[cchoi@gatech.edu](mailto:cchoi@gatech.edu)

**October 2009**

**In-Kyu Sa**