ICT Manpower Development and Software Technology in DPRK (ICSE 2020, ROK)

2020. 7. 8.

Prof. Chan-Mo Park
Professor Emeritus (Former President), POSTECH
parkcm@postech.ac.kr
Chancellor, PUST
parkcm.pust@gmail.com

CONTENTS

I. Recent Changes in DPRK

Beginning of 2000	After 2010
– So-called Hermit Country	– Slowly globalizing
• Strictly controlled society	• Market economy (Jangmadang)
• Printers, phones restricted	• Over 5 million mobile phones
– Strict control on foreigners	– Relaxing control on foreigners
• Use of different NK money	• Foreigners use NK money
• Leave mobile phones at airport	• Use own or rental mobile phones with Internet
• No contact of local people	• Easy contact in public places
• Controlling photos, videos	• Relaxed much due to Internet
• Checking luggage in China	• Possible to check-in at Gimpo and Incheon

A board on a wall in the foyer of KISU library

Distribution of Jangmadang (about 400 in2016, Dr. Koen, OECD)

Distribution of Jangmadang in PY(~ 30,OECD)


3G mobile advertisement
3세대이동통신
The First 3G Mobile Network
koryolink
03/15/2013 04:17 PM


My mobile phone used in DPRK
htc
2013/04/2
6:05 PM
koryolink
Messages
Phone
Settings
Clock
No notifications
04/02/2013 06:06 PM


Taking video at a subway station
03/29/2012


Meeting local people
05/02/2012


Children love to play roller skating with PUST professors
03/22/2013 03:24 PM

- Academic cooperation with communist nations (social sci. & basic sci.)
  - Social sci., physics, math and chemists from China and Russia
- Importing Pentium III computers (expensive)
  - Compaq, Fujitsu, Philips, etc.
- Inviting Western scholar including US (emerging tech & medicine)
  - Pres. of AAAS, Google of US and Nobel laureate of Europe, etc.
- Importing various types (Desk top & notebooks)
  - Lenovo, HP, Acer, Dell, etc.

– Inviting 3 Nobel Laureates to PY (April, 2016)

Dr. Richard Roberts (UK) – Bio-medicine Award, 1993
Dr. Finn Kydland (Norway) – Economy Award, 2004
Dr. Aaron Ciechanover (Israel) – Chemistry Award, 2004

April 30, May 1 – Touring the Future Scientists' Street, Mangyongdae Children's Palace, etc.
May 2 – Attending 70th Anniversary ceremony of KISU
May 3 – Keynote speech and discussion at KISU
May 4 – Keynote speech and discussion at KUT
May 5 – Keynote speech and discussion at PUST
May 6 - Departing

Arrival of Nobel Laureates in PY（4-29-2016)

Keynote speech by Dr. Aron Ciechanover at PUST

New Computers sold at PIC in September, 2000

Price unit Won (1 US dollar = 2 Won)

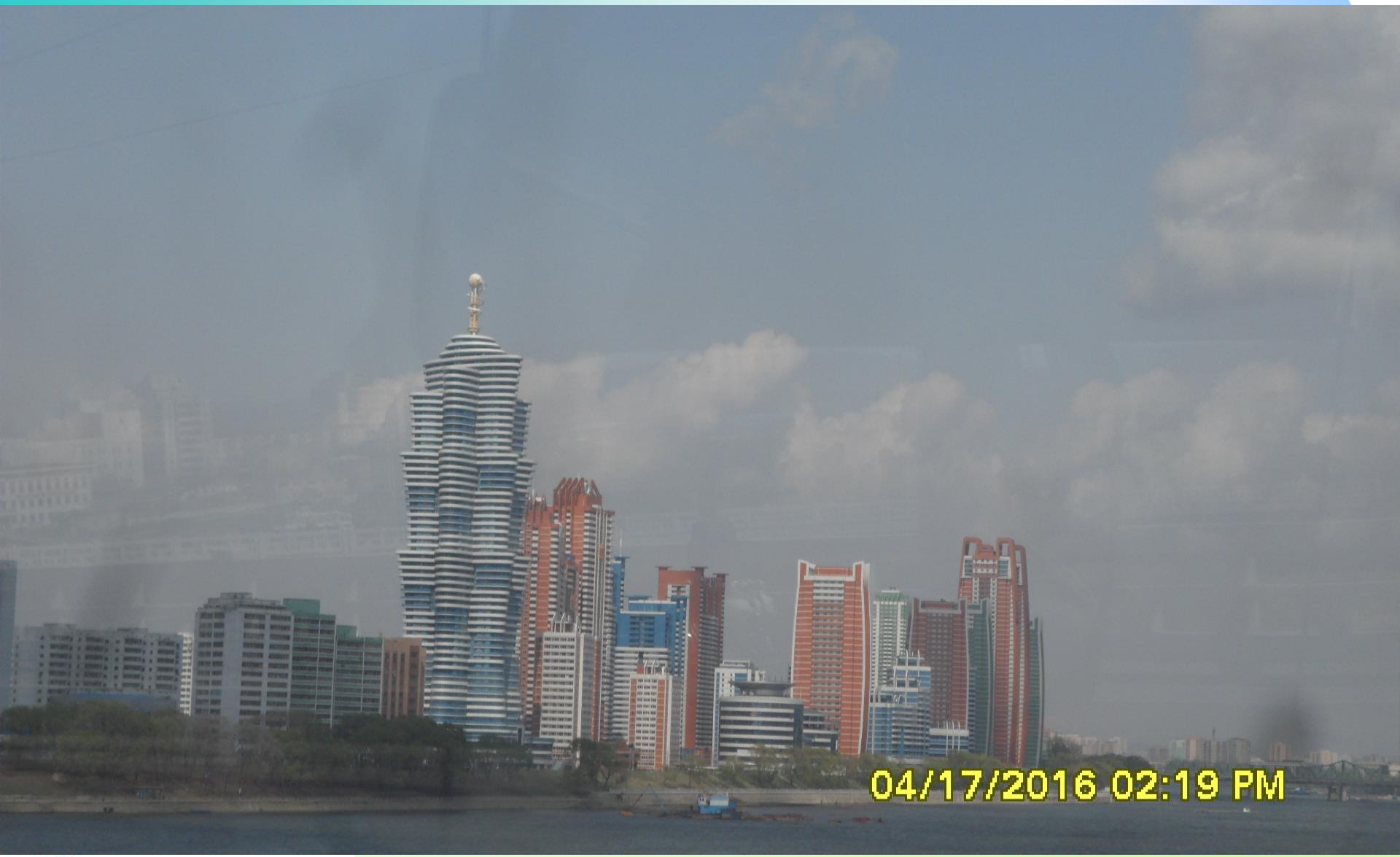
Sept. 2012

Ryusong store

Efforts of Kim Jong Un for Scientists & Engineers

- Completion of the Unha Scientists' Street (Sept. 2013) around the Defense Research Center
- Completion of residences for satellite scientists (Oct. 2014) at the State Academy of Sciences
- Completion of Future Scientists' Street (Nov. 2015) around KUT
- Completion of a Sci-Tech Complex (Jan. 2016) on Ssuk island in Daedong River
- Completion of Ryomyong Street (April 2017) around KISU.

Future Scientists' Street near Kim Chaek U of Technology



Sci-Tech Complex

A part of inside of Sci-Tech Complex

PUST

Ryomyong Street and Apartments with Solar Panel

Big Changes in 2018 – Declaring Completion of Nuc. Development & Emphasizing People Economy

II. National Policies on S & T and ICT in DPRK

National policies on Science and Technology – based on articles 27 and 51 of the Constitution of DPRK

- Article 27 : The technical revolution is vital to the development of the socialist economy. The State shall perform all economic activities by giving top priority to solving the problem of technical development, push vigorously ahead with a mass technical revolution movement by accelerating scientific and technical development and the technical innovation of the national economy, free the working masses from

backbreaking labor and narrow down the differences between physical and mental labor.

- **Article 51 :** The State shall draw up a proper plan for scientific research work, consolidate creative cooperation between scientists, specialists and producer masses.

– **Three Great Revolutions for Socialism – Ideology, Technology and Culture (사상, 기술, 문화)**

– **Three Goals – Self-reliance (Juche), Modernization and Scientification**

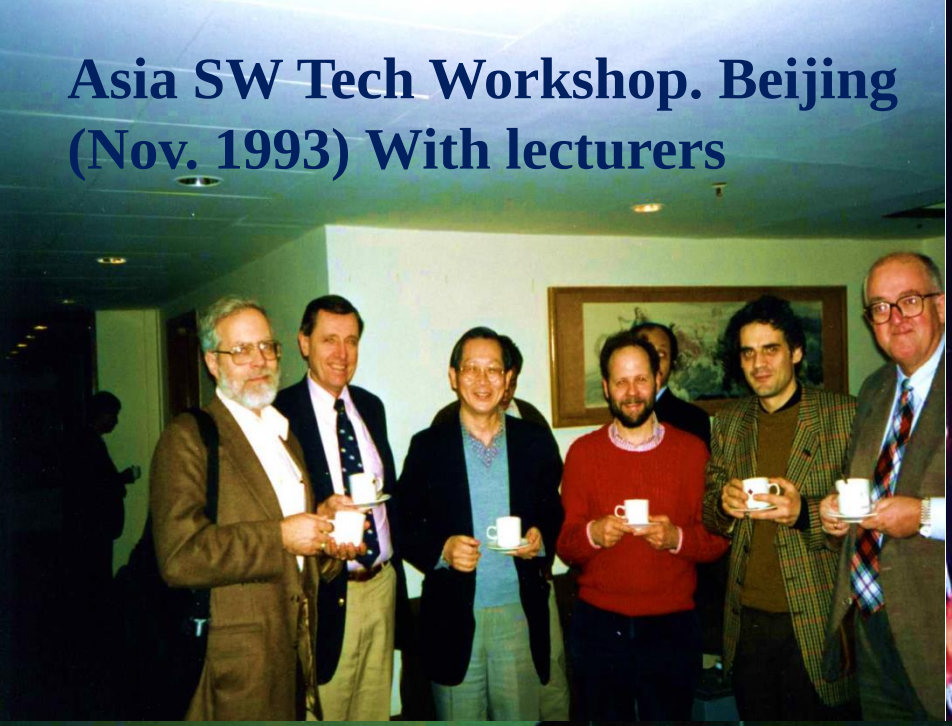
– **S & T to All People (전민과학기술인재화) by Kim Jong Un – Let all people apply S & T in daily work**

– **National policies on ICT – established a master plan after Kim Il Sung toured Eastern Europe in 1984**

- **Countries visited : Soviet Union, Poland, East Germany, Czechoslovakia, Hungary, Yugoslavia, Bulgaria and Rumania**
- **Realized electronics-related high technology is key to national economic development**
- **Technical cooperation contracts signed**
- **DPRK students sent to those countries**
- **Massive funding for information science & industry during the 1st three-year plan for promotion of science and technology (1988 – 1991) (computer network around KCC, software industry promotion)**

- Seeking help from UN organizations through International Cooperation Bureau of SCST (State Commission of Science and Technology)
  - UNDP (Patent DB project), UNIDO ($2.4 million to produce 20,000 units of 32-bit PCs annually in 1992)
  - MoU with International Institute for Software Technology of United Nations University (UNU/IIST Director- Prof. Dines Bjorner of Technical Univ. of Denmark in 1993) – inviting DPRK computer scientists to software workshop in Beijing and IIST
- Emphasizing software sectors over hardware due to poor economy and restrictions (e,g, COCOM, EAR, Wassenaar Agreement, USA and UN sanctions)

Asia SW Tech Workshop. Beijing (Nov. 1993) With lecturers



With DPRK and Chinese delegates

With DPRK delegates

UNESCO Beijing Office Director Kim of DPRK

- **International Collaborations on ICT (partial list)**
  - **Soviet Union – making 1st and 2nd generation computers (Jonjin-5500 in 1960's, Ryongnamsan 1 in 1970's), etc.**
  - **Japan – PIC & OIC, Silver Star JVC, Joint ICT seminars and conferences, etc.**
  - **Singapore – Branch office of PIC, research on computers and marketing software products**
  - **Republic of Korea – software development, joint conferences, joint research, etc.**
    - **KCC & Samsung – unified software development**
    - **Samcholli & Hanaro – computer animated cartoons (e.g., Pororo)**

- PIC & POSTECH – joint research and software development of ‘Construction (건설)’ a virtual navigation of a building before its construction
- KUT & Hanyang University – computer science education (OS & DB) at Graduate School of KUT
- Jointly holding ‘International Conference on Computer Processing of Korean Language’
- Jointly holding ‘Korean Conference on Science and Technology (KCST - IT, BT, NT and ET)’

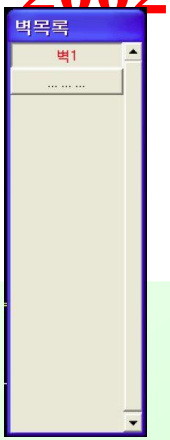
• USA – joint research on ICT and English teaching

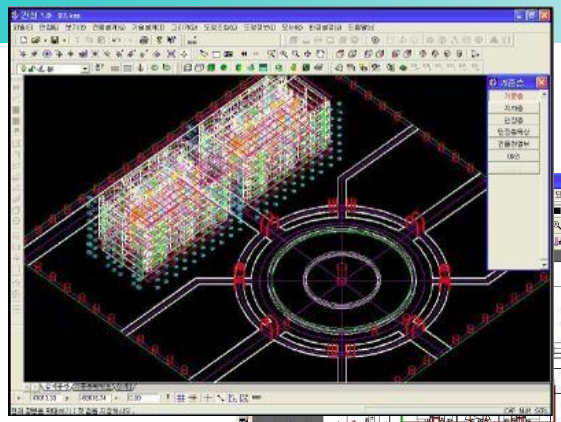
- KUT & Syracuse U.

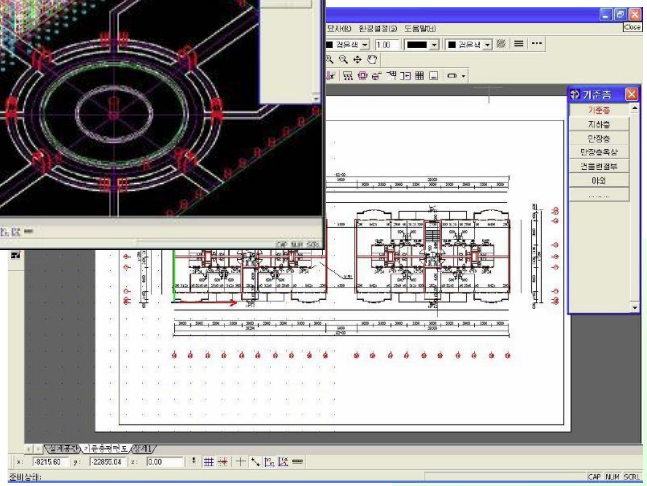
PUST

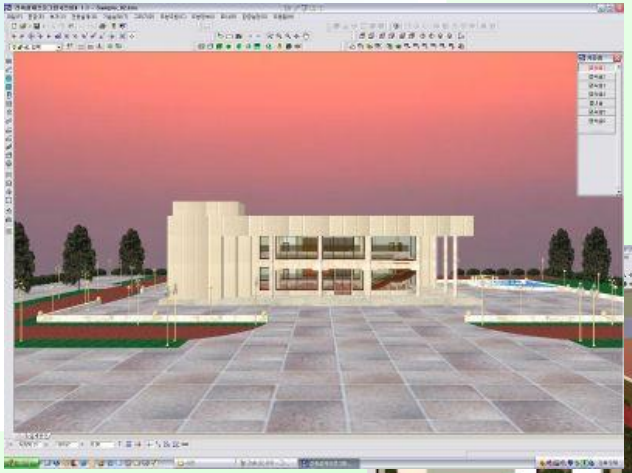
Result of PIC-POSTECH Joint Research

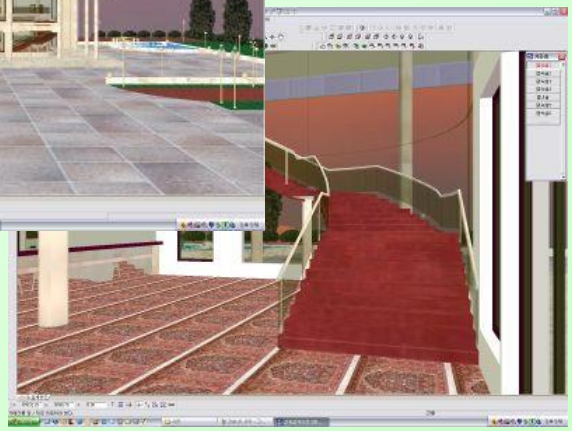
Won the 1st prize at 13th SW competition (Oct. 2002)











KCST Agreement (Nov. 2005)

"민족과학기술토론회" 조직에 관한 합의서

평양에 있는 민족과학기술협회 사무국 (이하 가측)과 오사카에 있는 국제고려학회 본부사무국 (이하 나측), 포항에 있는 포항공과대학교 (이하 다측), 중국에 있는 중국조선족과학기술자협회 (이하 라측)는 2006 년 3 월말에 평양에서 "민족과학기술토론회" (Korean Conference on Science and Technology)를 공동주최하는 문제를 토의하고 다음과 같이 합의한다.

.....

이상의 합의서는 4 부 작성되였으며 각측이 수표한 날로부터 효력을 가진다.

포항공과대학교를 대표하여

국제고려학회 본부사무국을 대표하여 송 재목

민족과학기술협회 사무국을 대표하여

중국조선족과학기술자협회를 대표하여

2005 년 11 월 15 일 중국 심양


KUT researchers in Syracuse Univ.


KUT researchers learning technical English in Beijing

III. ICT Manpower Development in DPRK

- **Education in DPRK – highest priority for Kim Il Sung, founding president of DPRK**
  - **Established Kim Il Sung University (KISU) in October, 1946, 2 years earlier than founding DPRK**
  - **Implemented universal 11-year compulsory education system in September, 1975**
  - **Reorganized into 12-year compulsory education system in September, 2012 by Kim Jong Un (1 year of kindergarten, 5 years of primary school, 3 years of middle school and 3 years of high school – similar to Western school system except primary school)**

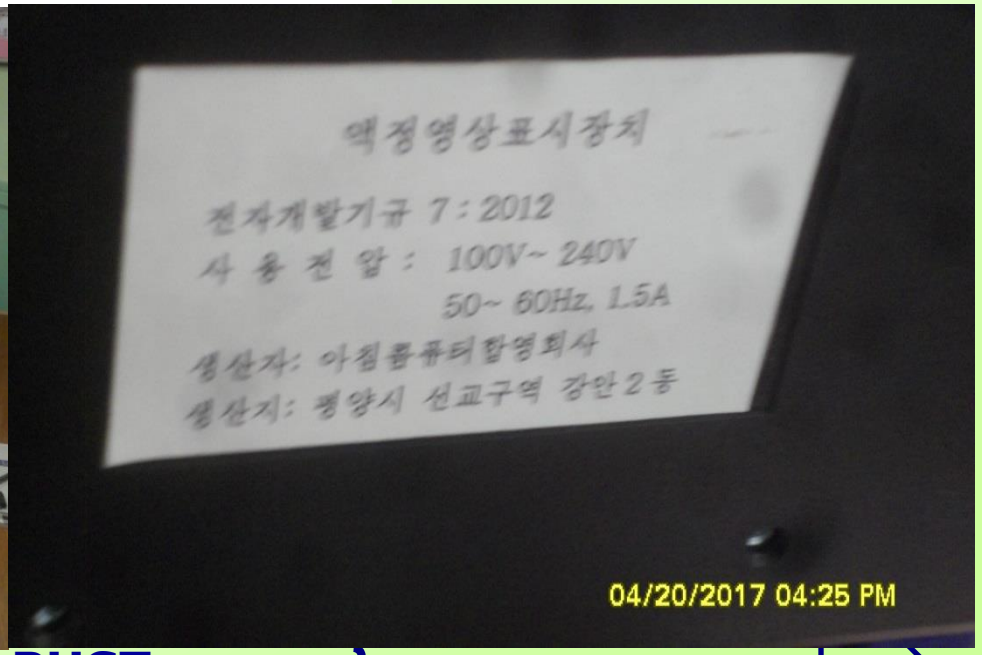
- National education system – divided into three different tracks; special track (specialized disciplines such as fine arts, languages, etc. as well as schools for descendent children of revolutionary army members), regular track and workplace track (continuing education at factories, farms, fisheries, etc.)
- Regular track – similar to Western system, 12 years of compulsory education, college/university and graduate school (Master and Doctor)
  - Extra-Curricula Education – In special places such as Mangyongdae School Children's Palace (Computer club, Music clubs, Dancing, Fine arts)

- Computer course – taught from 3rd grade of primary school before reorganization
- Establishment of Secondary School for Gifted Talents in 1984 - Pyongyang No. 1 High Middle School (평양 제1고등중학교)
  - To achieve Master or Ph.D. degrees in their 20s
  - To foster talents with creativity
  - To make 80% of 1,000 students to major in S & T
  - To possess knowledge for college teachers difficult to teach
  - To emphasize computer and foreign language education

만경대학생소년궁전

전자계산기소조 실

여기 소조에서는 새로운 프로그람을 개발하여 전자계산기프로그람 국가발명권을 받은 소조원들이 배출되었다.



– Spread of Secondary Schools for Gifted Talents

- One No. 1 High Middle School in each Province, City and County, respectively (In Pyongyang one No. 1 school in each District) - about 200 altogether
- The graduates from No. 1 High Middle Schools are normally admitted to prestigious universities such as KISU, KUT, PUST, etc. and exempted from Military Services (Normally 10 years for male, female 6 years)
- Establishing Classes for Computer Talented Students in 4 High Middle Schools such as Kumsong No. 1 and No.2 (April, 2001) – train 1,200 Computer Talented Students every year

Kumsong No. 1 and 2 merged to Kumsong Academy


Kumsong
Academy


5th grade students learning
Java language

Computer Curriculum at the Kumsong No. 1 High Middle School (6 Years)

Subject Name	Hours/Year	Level
Computer Circuits and Peripherals	80 hours	Basic
C and C++ Language Programming	280 hours	Basic
Windows Operating System	200 hours	Basic
Computer Mathematics	120 hours	Practicing
Data Structure and Algorithms	200 hours	Practicing
Visual dBase and Access	180 hours	Practicing
Linux Programming	180 hours	Practicing
AI Languages Lisp and Prolog	120 hours	Principles
Natural Language Processing and AI	160 hours	Principles
Computer Communication and Network	140 hours	Principles
Total	1,660 hours	

- **Other Changes in ICT in Secondary Education**
  - **Course name Computer - changed to Information Technology (IT)**
  - **Reduced number of No.1 High Middle Schools to about 30**
  - **After 3 years in Ordinary Middle School one should choose to go either to Ordinary High School or to No. 1 High School**
  - **Programming languages taught in No. 1 High School - from Gambas to C++, HTML, Java Script**
- **DPRK decided to set up 190 new ICT Technical High Schools to be ready for 4th Industrial Revolution era**

– **Renovating contents of Information Technology at No.1 High School after reorganization in 2012**

- **Grade 1 (Freshman)**

  Chapter 1 – Information and Our Life

  (Information Communication)

  Chapter 2 – Using Computers by Everybody

  (Computer Structure & Application)

  Chapter 3 – I can do it too

  (Our Reference books & Library)

  Chapter 4 – Smart Dolphins

  (Creating Multimedia Programs)

  Chapter 5 – What, When, How …

  (My Algorithms)

- Grade 2 (Junior)

Chapter 1 – Let's make Programs

(What to select, Number of iterations)

Chapter 2 – Programs in Every Place

(Macros in Business Processing Programs and ActionScript in Flash)

Chapter 3 – Web Documents we made

(Web Documents and HTML Documents)

- Grade 3 (Senior)

Chapter 1 – Programming for Real World Problems

Chapter 2 – Creation of Web Programs using JSP

(Creating a remote exam system)

– Computer Science Education in Universities

- Computer Science education is similar to Western countries
- Realizing the importance of nurturing ICT talents – Kim Il Sung established PUCT and HUCT in 1985
  - PUCT – Faculty of Computer Science (Dept. of Programming and Computer Engineering) and Faculty of Information Technology (Dept. of Information Systems, Computer Control Systems and Information Communications

    Graduates – IT organizations (KCC, PIC, STC etc.)
  - HUCT – Departments of Computer Science,

Programming, Information Processing, Numerical Control Devices, Robotics Engineering and Integrated Circuits Technology

Graduates – Mostly serving in the army

– KISU – founded College of Computer Science in 1997

Departments of Computer Network Systems, OS Development, Educational Support Software, Computer Science and Communications and Computer Hardware Systems

Research achievements – Network Management and Security, Modern Intelligence Information Processing based on AI, and Korean–style OS


KISU
e-Library

– KUT – founded College of Information Science and Technology in 1990s

Train to become special technical talents in solving practical problems

Faculty of Information Processing – Computer Systems, Information Systems, Programming, Multimedia Information Processing, Intelligent Information Processing, Language Information Processing, Bio-information Processing, Information Security

Faculty of Computer Engineering – Computer Systems, Computer Devices and Software Technology

– Course contents of Software Engineering at KUT

(Lecture 50 hrs., Practice 20 hrs., Test, Q & A 14 hrs.)

Chapter 1 Concept of Software Engineering

1. Software and Software Development Technology
2. Computer System Engineering
3. Software Process
4. Project Management
5. Computer-aided Software Engineering

Test, Q & A

Chapter 2 Software Requirement

1. Requirement Engineering
2. Requirement Analysis

3. Requirement Specification

4. Formal Specification Method

Test, Q & A

Chapter 3 Software Design

1. General Concept of Software Design

2. Technology-oriented Design

3. Object-oriented Design

4. Design of Real-time System

5. Design of User-interface

Test, Q & A

Chapter 4 Software Quality and Verification

1. Software Quality

2. Software Measurement

3. Software Verification

4. Software Reuse Technology

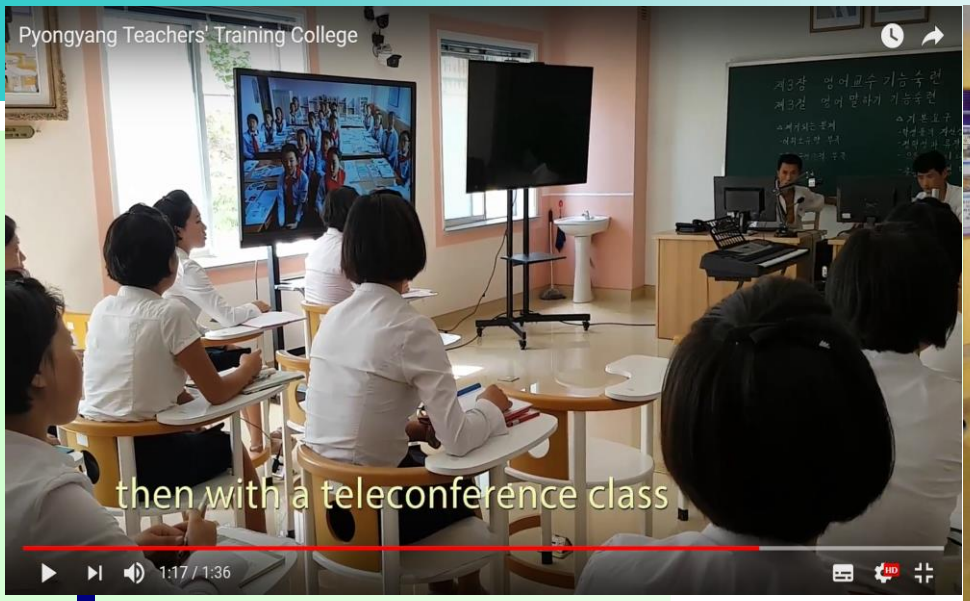
Test, Q & A

- KUT updated CDIO (Conceive, Design, Implement, Operate) teaching method to foster talented technical manpower needed in DPRK
- Science University in Pyongsong – used to foster manpower for State Academy of Sciences in DPRK

  Computer Science Department – well recognized for its superb fostering of high-quality programmers
- Pyongyang Teachers' Training College – trying to utilize VR in Education


KUT e-Library

– Efforts to utilize VR in Education


Pyongyang Teachers' Training College
then with a teleconference class
1:17 / 1:36


HTC
VIVE

NK SW

IV. Software Technology Development in DPRK

- Emphasis on Software rather than Hardware because
  - It requires less amount of capital but good human brain and creativity
  - Capable to nurture talented manpower in STEM from childhood – teaching hours for Mathematics is 1.5 ~ 2 times of South Korea
  - Effort to overcome poor Hardware with more creative and efficient algorithms
- Initiated National Program Competition and Exhibition in 1990 and held every year even during the period of 'March of Suffering (1994 ~ 1998)'

- The 1st National Program Competition and Exhibition held in December, 1990 in Pyongsong
  - 440 programs consisted of application, service and system areas submitted
  - Top-quality programs – accounting program by a bank employee, academic administration program by a KISU professor, an expert system for medical diagnosis by a student at Pyongsong Science College and a data compression program by a researcher at Mathematics Research Institute of Academy of Sciences

– Other programming contests held for university students and high school students

– Level of Software Technology in DPRK – similar to that of Western countries

- Silver star computer Go game developed in 1997 – won the 1st prize in global computer Go game competition in 1998 in Japan, six more first prizes since then

– Research and Development in Software Technology

- Characteristics of software developed in early stage
  - Word-processors and office automation (e.g., machine translation, automatic character recog.)
  - Edutainment (e.g., word-learning using games, Brownian movement through catching a ball)
  - Anti-virus and computer security systems

- Computerization of Koryo medicine (e,g, Golden Horse or Kumbitmal)
- Simulation system (e.g., SIMNAS, War Game)
- Computer-aided systems (e.g., Sanak (3-D CAD))
- Automatic fingerprint identification systems

• Recent software technology emphasized

- Computerized Numerical Control (CNC) system (e.g., industry automation)
- Computer Vision (e.g., missile guidance system
- System Software (e.g., Red Star)
- Remote education, medical and business systems
- 3-D printing, Intelligent robot, Autonomous vehicle Drone, AI, IoT, VR, Big Data, Cloud computing

– Major Software Research Organizations and Products

1. DPRK Academy of Sciences – Department of Computer Science (DCS) established in 1970
   - Theoretical and practical research in computer science
   - Develop computer programs for domestic use and export (Paeksong trading corporation)
   - Manpower training in software fields
   - Integration of software technology into economic sectors in DPRK
   - Table 1. shows partial list of products

TABLE 1. **Program Packages Developed by DCS (For IBM PC compatibles or NEC 9801 series)**

Name	*Brief Explanation*
KORYO	Korean electronic dictionary with 40,000 words
DOVE	Electronic conversation dictionary for travelers. Korean-English, English-Korean, Japanese-English, English-Japanese
Word-Mate	Korean and Japanese word-learning software using games(Korean-Japanese, Japanese-Korean)
Pearl	Word-processor to be used with mixture of Korean, Japanese, and Chinese characters
Eagle	Automatic recognition of Korean characters
Rainbow	Computer-assisted Japanese-English translation system
Study Tetris	Educational computer game for learning English words, physics formulas, etc.
Business	Expert system to aid in writing business letters in English
Hand	Korean chess program
Free Ball (Tree Frog 1)	Computer program for intelligence development for children, series 1. To catch a ball in a Brownian movement
Colcon (Tree Frog 2)	An intelligence game to arrange rectangles with colors
Magic Box (Tree Frog 3)	A game to arrange colored boxes horizontally, vertically, or diagonally
Dragon (Tree Frog 4)	To guide a dragon moving freely on a display into a fence
Foods-300	Electronic cookbook for more than 300 traditional Korean dishes

2. Korea Computer Center (KCC) - established in 1990 to promote computerization, developed many application programs for IBM PCs

- **Koryo Acupuncture** – expert system for traditional Korean medicine, used for education and treatment
- **ISDM (Integrated Service Digital Medicine)** system – predictive diagnosis, diagnosis and Koryo medicine system, supports Korean, English, Japanese, Chinese, Russian and Arabic
- **CAD/CAM system for textile pattern design**
- **KCR-HOPE – Korean, English, Japanese, Chinese Russian character recognition program**

- MOHO-37 – a fuzzy-based computer control system for ore-dressing processes for reducing cost
- Dancing Fountain – computer-controlled device for indoors and outdoors for decoration, can be connected to music system such as Karaoke to change the height and color of water with music
- Golden Horse (Kumbitmal) – human habitude classification and diagnosis system using automatic fingerprint identification program
- Air traffic control system for Pyongyang International Airport (they claim better than a similar product of Russia)
- Patent database system for UNDP

3. Pyongyang Informatics Center (PIC) – established in 1986, a leading institute in Korean language processing, word-processor development and VR

- DTP system – electronic publishing system for PCs
- Multi-lingual Word-processor – support Korean, English, Russian, German, French, Spanish, Latin and Portuguese characters with different sizes and calligraphic styles, maybe combined in a document
- Dangun for Windows 95 – a front-end processing program for Korean input/output (both NK & SK)
- Chang-Dok – word processor for DOS & Windows
- Table 2 shows PIC products displayed and sold at COMDEX-Asia exhibition in Singapore, Sept. 1996

Table 2. PIC software products displayed and sold at COMDEX-Asia 1996

< PIC-created Software Programs >

Program Description	Details
Chang-Deok	A software program for document editing and e-publishing It works with various languages: Korean, English, Japanese, Russian, etc.
Dangun	A word processor that supports Korean, Japanese and Chinese Over 200 calligraphic styles of Korean It won the most esteemed award at the 11th National Software Program Competition
Yongma	A spreadsheet calculation program for Windows
Electronic Publishing System	An electronic publishing system for Korean, English, Japanese and Chinese
Recognition	Automatic recognition program (the rate of recognition 97%)
Gohyang	A database management system (DBMS)
Dul	A two-dimensional computer aided design (CAD) system
San-Ak	A three-dimensional computer aided design (CAD) system
Dam-Jing	A machinery translation program for Korean and Japanese It has 200,000 words in its memory. A 300 Kbite Korean text can be translated into Japanese in just three minutes. It costs roughly rUS $20 per unit.
Body Type and Diet	A health management system
Typing School	A fun-oriented, learn-to-type program (Korean and English) designed to teach children how to type faster on keyboards
Samcheon-ri	A Choson atlas program
Pyongyang	A multimedia program designed for Pyongyang tours
Chosen's History and Customs	A multimedia program

4. Computing Center of Kim Il Sung University – established in 1985

- Developed many programs in cooperation with faculties from computer science, natural science, and social science departments
- Intelligent Locker (hard disc protection program)
- Worluf Anti-Virus (broadband anti-virus program)
- Source Master (high-level programming language conversion program)
- SIMNAS (simulation and analysis program)
- COMSAT (computer-aided teaching system)
- War Game Program
- Hepatitis Diagnosis and Prescription System

5. Unbyol (Silver Star) Laboratories – established in 1995

- Very active in producing and marketing its software products (branch office in Gifu, Japan)
- Researchers graduated from No.1 High Middle Schools and studied at prominent universities (e,g., KISU), 26 years old on average
- Silver Baduk (computer Go game program) –won the first prize at the Fourth Fost Cup World Computer Go Championships in Japan in 1998 (ref. https://www.silverstar.co.jp/information)
- World- top Silver Janggi (computer oriental chess game program) in 2010

6. Other Organizations

- Information Center of Kim Chaek University of Technology
  - Steganography system – sending pictures or other multimedia information concealed in a background information
  - Multilingual optical character recognition system – optical recognition of multiple language characters such as Korean, English, Japanese, etc.
- Pyongyang University of Computer Technology
  - Koryo medicinal foods and prescription

- University of Science – established in 1967
  - Machine translation between Korean and Japanese (Koryo-KJ version 1, etc.)
  - Signature identification program
- Aprokgang Technology Development Company
  - Strong research and development with automatic fingerprint identification system

– The First Inernational Computer Software Seminar of DPRK – held in Beijing, China in April, 2002

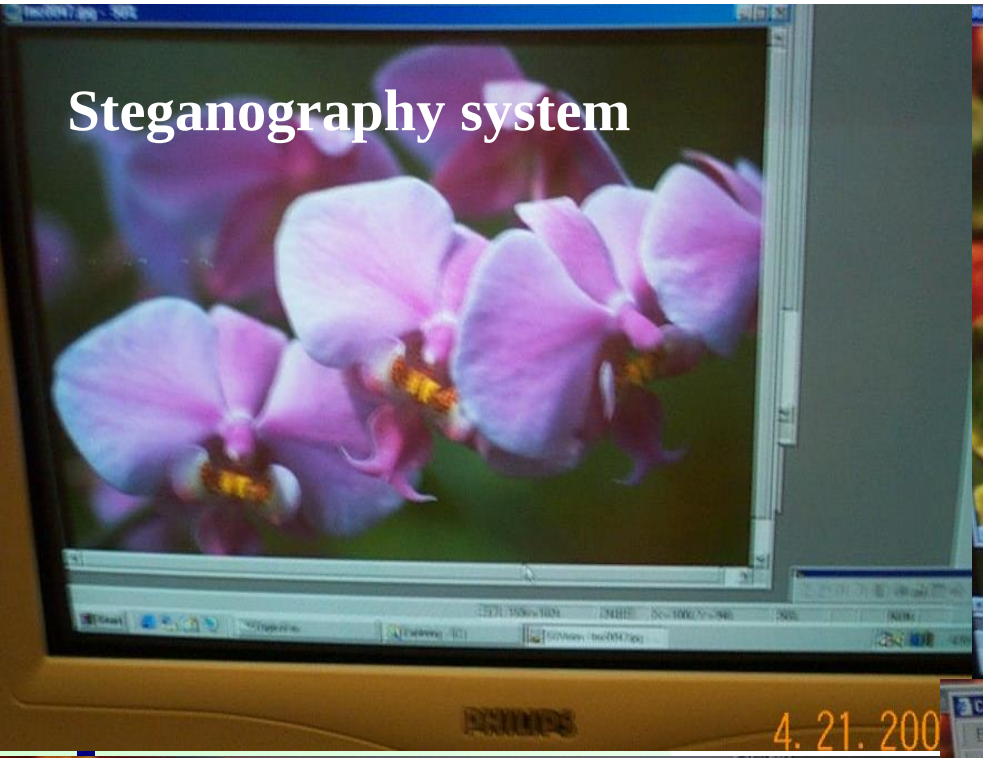
- Main purpose – to show DPRK capabilities in software technology and invite global collaborators
- Table 3 shows organizations and products exhibited

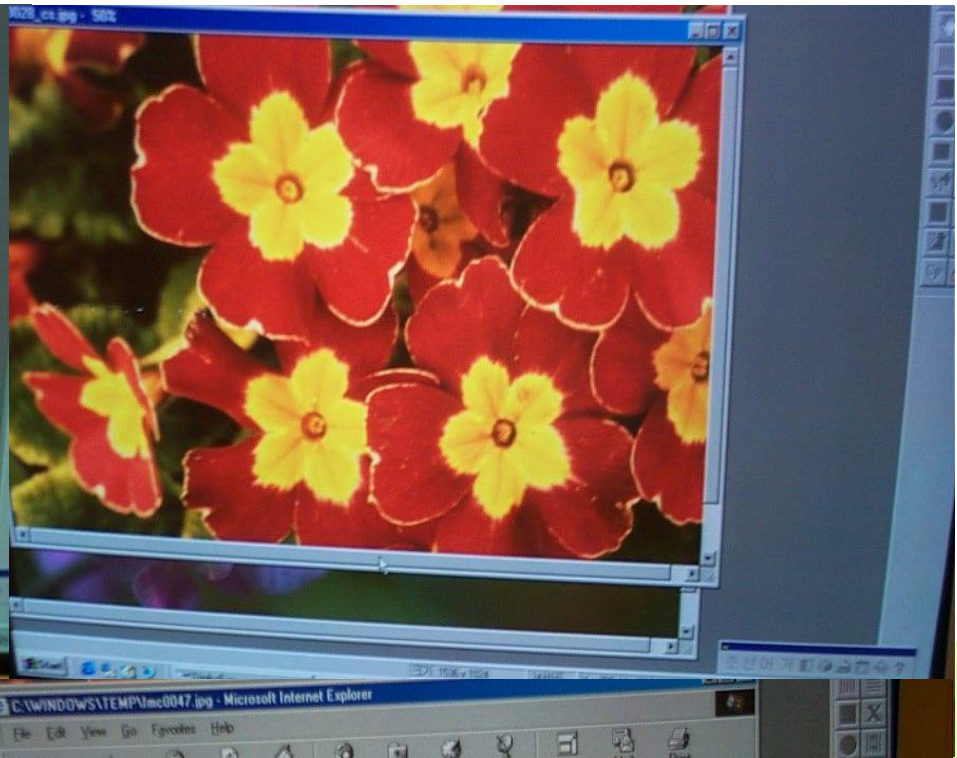

Opening ceremony of the 1st International Computer Software Seminar
4. 20. 2002

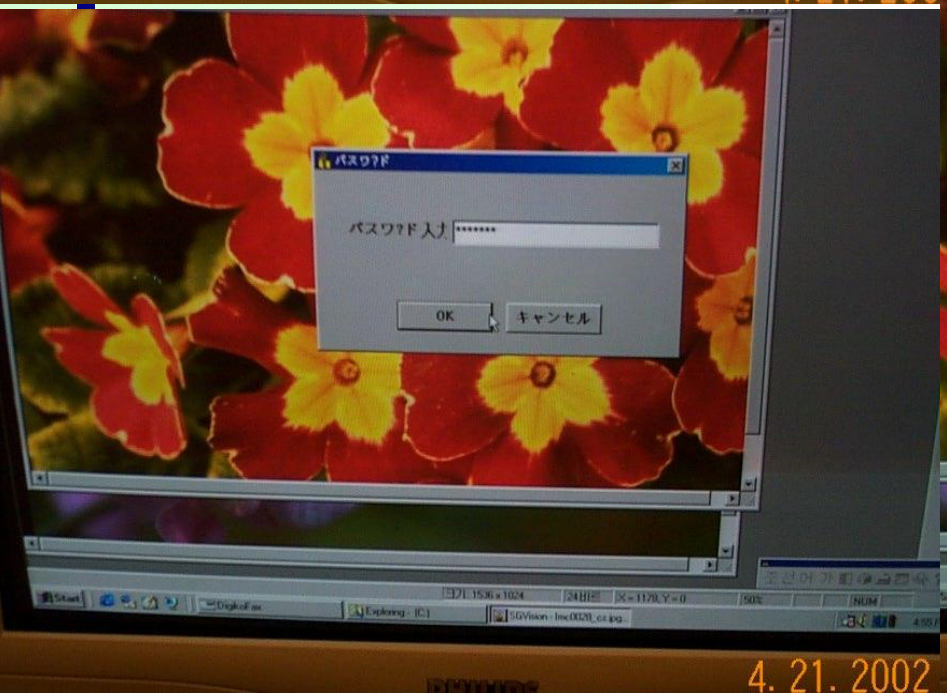
Table 3. Products exhibited at DPRK SW Seminar (16 organizations, 67 products)

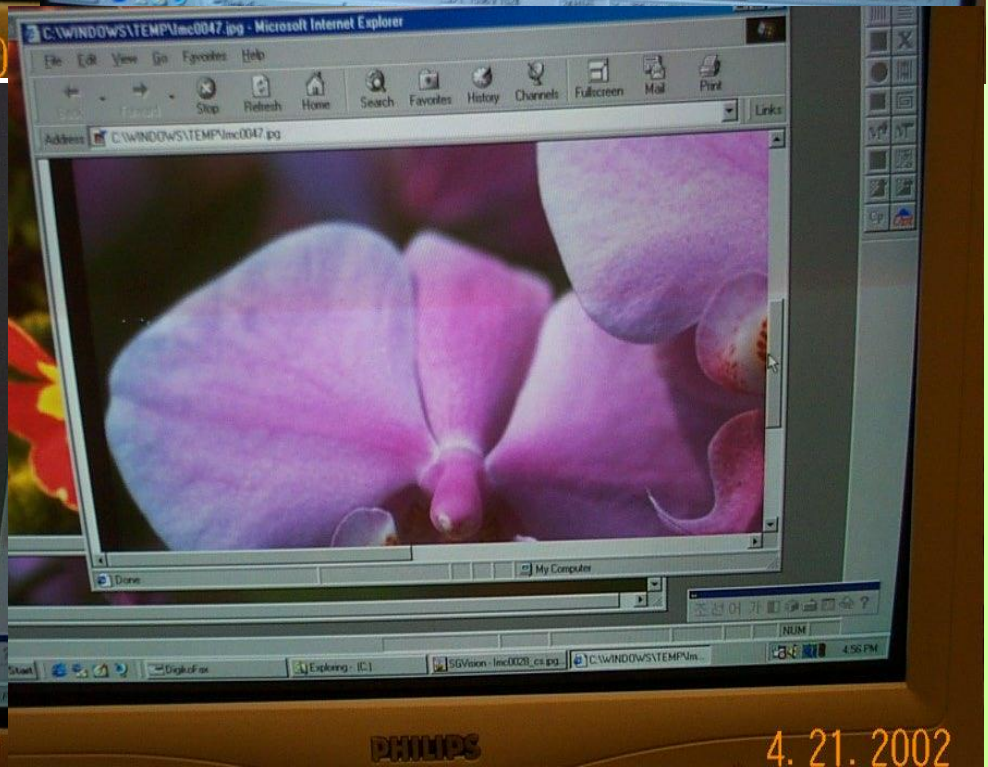
KISU (6)	Multimedia (Learning Korean)
	Recognition of auto-tag number (parking)
	Multimedia (24 divisions of Seasons), etc.
KUT (7)	Steganography system
	Photo editing program
	Multilingual OCR (Sindong)
	Automobile driver training system, etc.
KCC (12)	Korean character recognition program (Mokran)

Steganography system









Music score editing program (Eunbangul)

Handwriting input system (Koryopen)

Finger print retrieval system

Computerized body habitude classification system (Kumbitmal or Golden Horse)

Korean chess program, etc.

PIC (9)

3-D CAD system (Sanak)

Machine translation program (Damjing)

Typing training program (Tajahakkyo), etc.

AoS (Math Res. Ctr.) (8)

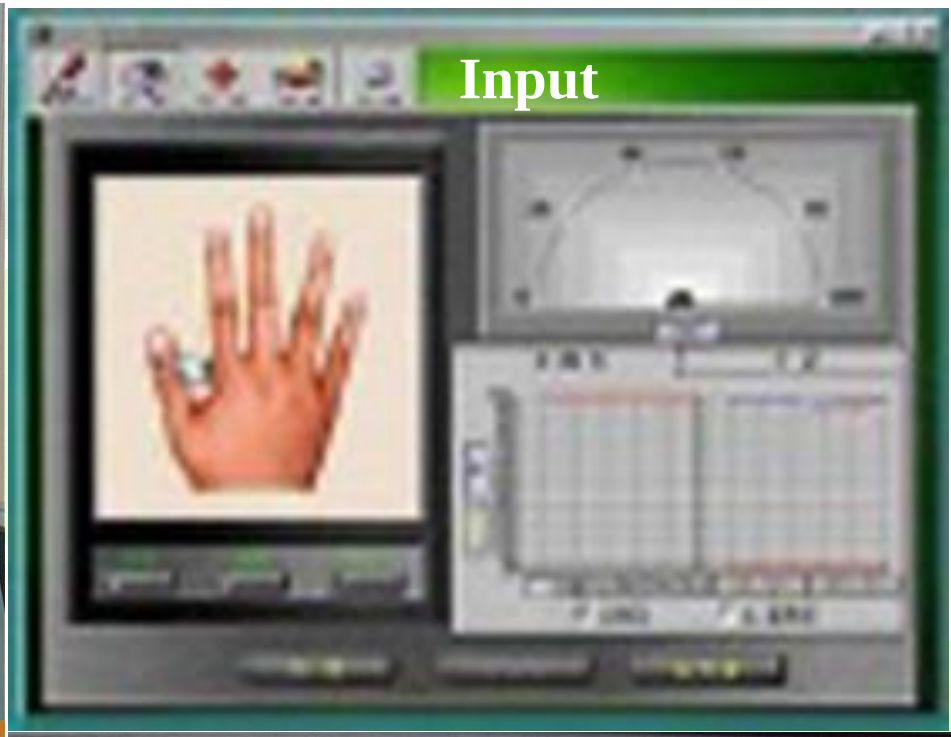
Soccer support system (Baeksung)

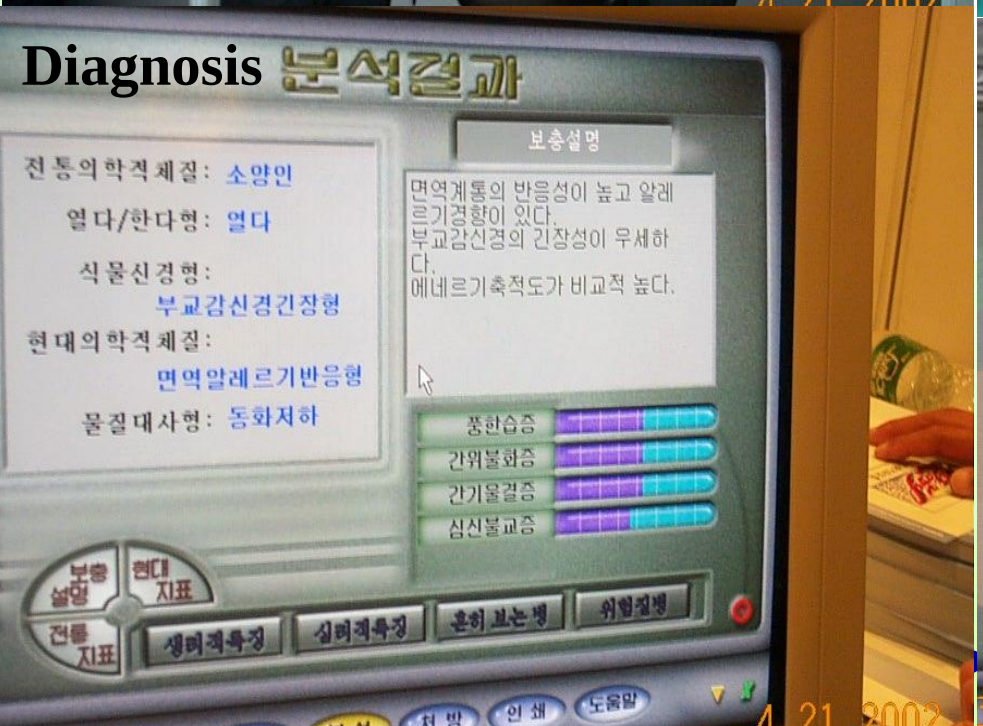
Intelligent games (Jinung Ssirum)

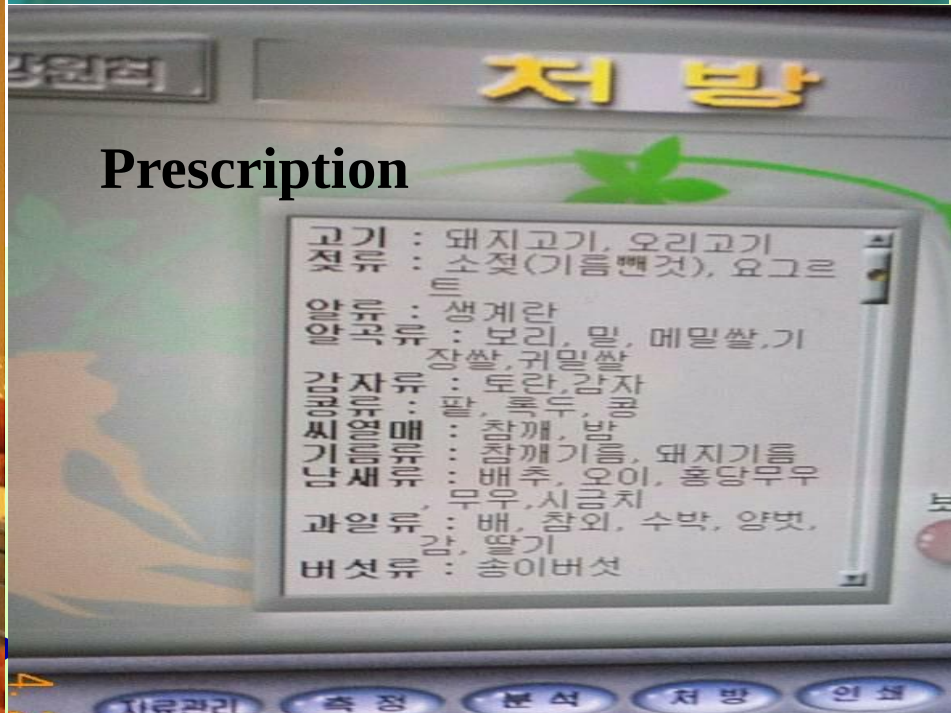
Digital voice recognition software

Gold dust and diamond explore system, etc.


Golden Horse system
4 21 2002


Input


Diagnosis 분석결과
보충설명
전통의학적체질: 소양인
열다/한다형: 열다
식물신경형: 부교감신경긴장형
현대의학적체질: 면역알레르기반응형
물질대사형: 동화저하
면역계통의 반응성이 높고 알레르기경향이 있다.
부교감신경의 긴장성이 우세하다.
에네르기축적도가 비교적 높다.
풍한습증
간위불화증
간기울결증
심신불교증
보충 설명
현대 지표
전통 지표
생리적특징
심리적특징
흔히 보는 병
위험질병
처 방
인 쇄
도움말
4 21 2002


Prescription
처 방
고기 : 돼지고기, 오리고기
젖류 : 소젖(기름뺀것), 요그르트
알류 : 생계란
알곡류 : 보리, 밀, 메밀쌀, 기장쌀, 귀밀쌀
감자류 : 토란, 감자
콩류 : 팥, 록두, 콩
씨열매 : 참깨, 밤
기름류 : 참깨기름, 돼지기름
남새류 : 배추, 오이, 홍당무우, 무우, 시금치
과일류 : 배, 참외, 수박, 양벗, 감, 딸기
버섯류 : 송이버섯
자료관리
측 정
분 석
처 방
인 쇄

AoS (Machine Control Res. Ctr.) (3)	Computer aided production system for animal husbandry processing
	CAD/CAM system for efficient shoe sole manufacturing
	Digital control lathe for military control program
CIAST (2)	Computer library (Revolutionary mountain Baekdu)
	Multilingual computer dictionary of scientific and technical terms
PUCT (1)	Koryo medicinal foods and prescription
Science U (2)	Korean-Japanese machine translation
	Signature identification program

PY Hantoksu	Multi-currency electronic calculator
U of Light	(Dollar, Euro, Yuan, Yen)
Industry (1)	
PY Constr. &	Korean traditional architecture (PY)
Material U (2)	Koguryo tombs with mural paintings
Jangcholgu	Korean traditional food
Business U (4)	Korean famous Mountain Kumgang
	Korean traditional clothes, etc.
GPSH (1)	Korean cuisine encyclopedia
Kimmanyu	Computer-aided X-ray test system
Hospital (2)	Computer-aided blood vessel test system

Ryukyong	Ophthalmology examination program
Computer	Karaoke system based on VRM
Edit Ctr. (2)	technology
Aprokgang	Independent type fingerprint key
Technology	Base board for fingerprint
Development	management system
Company (5)	Input system for live fingerprint
	Collection system for digital fingerprints (100 ~ 150 thousand)
	In and out of door management system

–The 25th National Program Competition and Exhibition

- Opening on Oct. 21, 2014 (3 Great Revolutionary Exhibition Hall)
- Program Competition - Program development tool, Computer virus vaccine, Simulation training, Distance education, Sports game analysis, CAD
- Program Exhibition – 17 sections including OS & security, AI, Korean language processing and CNC

– Earning foreign currency with CNC (2012 Choson Exchange report) – 30 million Euros per year on export to Europe, South America and Southeast Asia

CNC machine exhibited in 8th Fall Int'l Trade Show

–Achievements of DPRK College Students in International SW Competitions

2013 Results

-A team from KISU won International Coding Competitions organized by Directi, an Indian SW company, to become CodeChef in August, September and October 2013, respectively

-The same team won the programming contest held by Russian State University in July 2013 to become Code-Forces

- A team from KUT and a team from Science University also became CodeChef in June and March, respectively

V. Overview of PUST and its Globalization Efforts

a) Brief Overview

- A Unique Christian-based Private and International (Global) University in DPRK jointly established by ROK and DPRK
- Proposal submitted in 2001 and approved by DPRK & ROK
- September, 2009 – Opening ceremony
- October, 2010 – Students admitted and English classes began
- March 2011 – Spring semester began
- All classes taught in English by foreign Professors from more than 20 countries including USA, UK, Canada, China, India, Albania, Australia, New Zealand, France, Finland, Russia, Sweden, Spain, Switzerland, Cuba, Kazakhstan, Norway, etc.
- Students coming from 1st HS, KISU, KUT, PUCT, SU, etc.
- Schools – ECE, ALS, IFM, and Medical Sciences (since 2014)
- Academia-Industry Complex (R&BD Center)

Main Gate

PUST Campus

- Current Status

1. Students

Undergraduates : 520 (54 Female students)

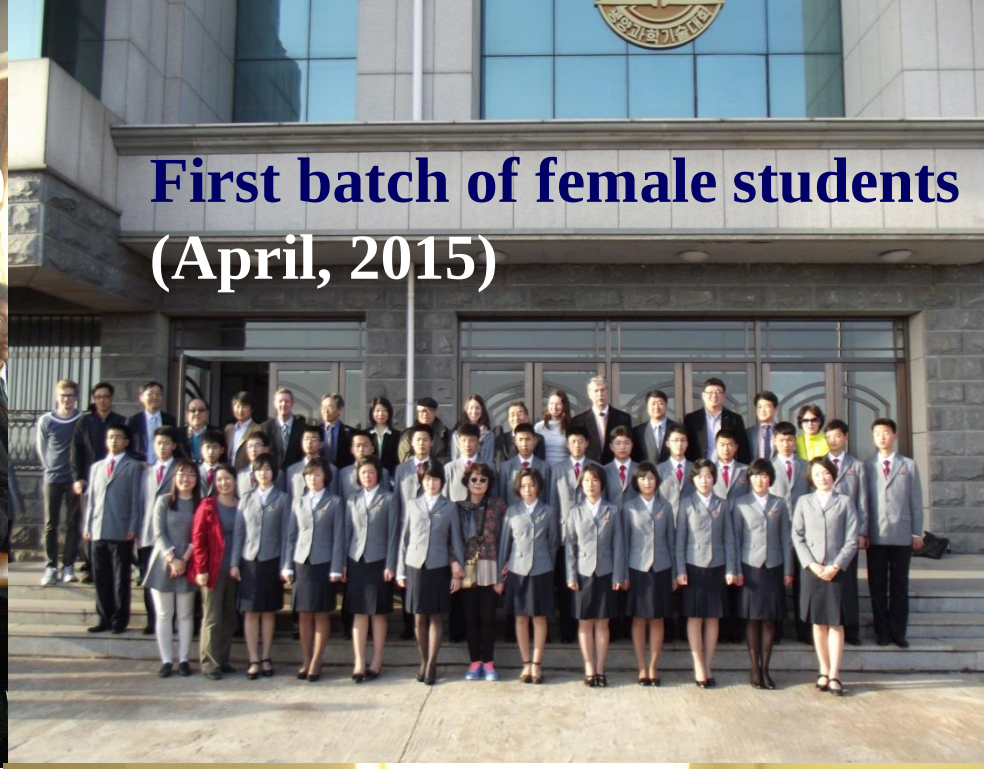
Graduates : 100 (MS) + 9 (PhD)

2. Foreign Faculty and staff : 126 (before travel ban) Now 65
3. Lab Equipment : Mostly imported from China and other donated by KAIST and individual professors - ALS lab, EE lab, Computer lab, ERP lab, Greenhouse, Paddy field, etc.
4. e-Library : Books donated by Asia Foundation, etc.

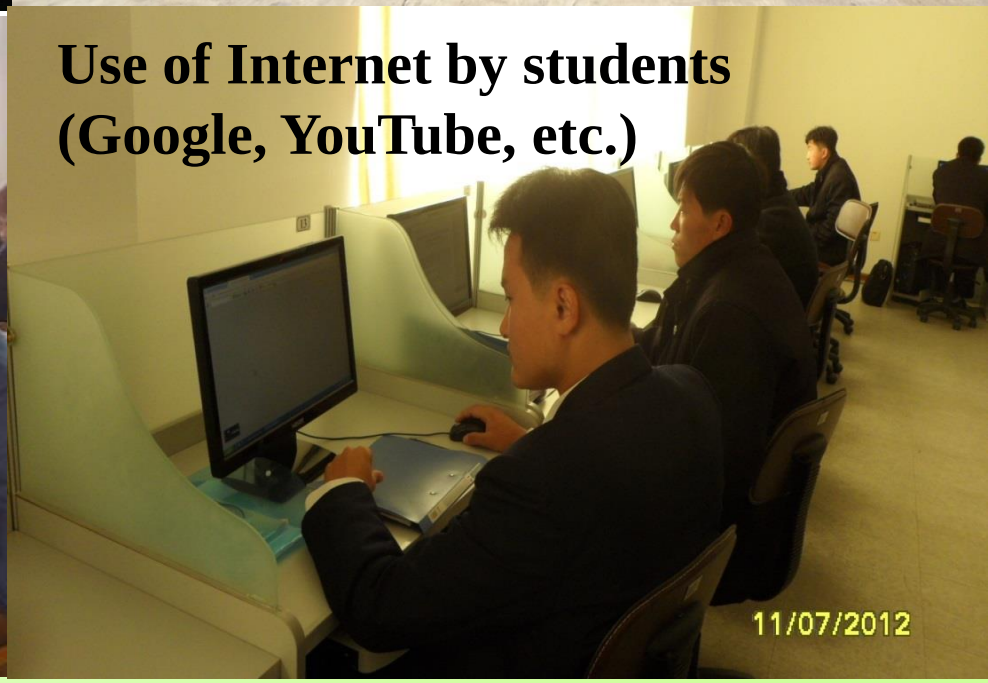
   e-Books (ALS – Cornel University), (OARE - UIUC), etc.
5. Adding Division of Medical Sciences (May, 2014)
6. Graduation Ceremonies : Graduate School (1st – May, 2014 Total Number of MS ~190)

   Undergraduate (1st – Nov, 2014 Total Number of BS ~600)


First batch of students (Oct, 2010)


First batch of female students
(April, 2015)


Chatting over a meal


Use of Internet by students
(Google, YouTube, etc.)
11/07/2012

1st Graduation ceremony of MS Graduates

Status of MS degree graduates

Total: 44

Returning to PUST: 18

- **Ph.D. Program: 5**
- **Instructor: 8 (Finance, Biotech, Breeding, EE, IA)**
- **Researcher at R&BD Ctr: 5 (Software)**


11/20/2014 10:26 AM

– Devotion by PUST Faculty and Staff Members

- Efforts to foster talented young people in S & T and business needed for economic development of NK (teach how to catch fish rather than give fish)
- Teaching soft skills such as ethics, virtues, trust, appreciation and patience
- Exemplifying in showing love, sacrifice and service by working as volunteers without salary
- Trying to bridge between North Korea and the Western World
- Guiding PUST graduates to contribute to the globalization of North Korea

– Computer Science Curriculum at PUST

- ECE (College of Electrical & Computer Engineering)

  Departments of EE, CS & IA (Industrial Automation)

  - Undergraduate Computer Science Courses

    Algorithm Design Artificial Intelligence

    C Programming Compiler Design

    Computer Hardware Computer Architecture

    Data Communication & Network

    Data Structures Database Systems

    Decision-Making Support Systems

    Image Processing I & II Machine Learning

    Natural Language Processing

Multimedia Coding
Network Security
Operating Systems
Pattern Recognition
Software Engineering
Speech Processing
Web Programming
Web Frameworks

- Graduate Computer Science courses

Cloud Computing
Electronic Commerce
Modern Intelligent Processes
Modern Software
Parallel Programming
Project Design and Research Methods
Virtual Reality

A Sample Course Syllabus at PUST
ECE – Computer Science (Fall, 2016)

Introduction to Virtual Reality
by
Prof. Chan-Mo Park

Course Objectives:

1. To review on computer graphics
2. To introduce basic understanding and the general architecture of the VR systems and applications of VR, AR and related topics.
3. To apply VR techniques in solving real world problems

Textbook: Burdea, Grigore C. and Coiffet, Philippe, Virtual Reality Technology, Wiley

References:

1. Foley, J. van Dam, A.. Feiner, S., Hughes, J. and Phillips, R., Introduction to Computer Graphics, Addison-Wesley
2. Scratch 2.0 - MIT
3. Alice 2.0 – A Programming Language for VR, Carnegie Mellon University

Course Outlines:

1. Review on Interactive Computer Graphics
   - Scope of computer graphics
   - Interactive computer graphics systems
   - Generation and transformation of pictures

2. Fundamentals of Virtual Reality
   - Definition of VR
   - History of VR
   - Key elements of VR system
3. Virtual Reality Systems
   - Virtual world
   - Interface to the virtual world - input
   - Interface to the virtual world - output
4. Rendering the Virtual World
   - Representation of the virtual world
   - Visual rendering systems
   - Aural rendering systems
   - Haptic rendering systems
5. Interacting with the Virtual World
   - Manipulating a virtual world
   - Navigating a virtual world
   - Shared and collaborative interaction

6. Virtual Reality Experience
   - Immersion in the virtual reality
   - Rules of the virtual world
   - Substance of the virtual world
7. Experience Design: Applying VR to a Problem
   - Creating a VR application
   - Designing a VR experience
   - Future of VR design
8. Augmented Reality
   - Definition of AR
   - History of AR
   - Applications of AR
   - AR systems overview
   - Mobile AR
9. Application of VR Techniques to Real World Problems
   - Application to education
   - Application to medicine
   - Application to other areas

Work Load:

Regular Homework Assignments (25%)

Computer Projects (35%)

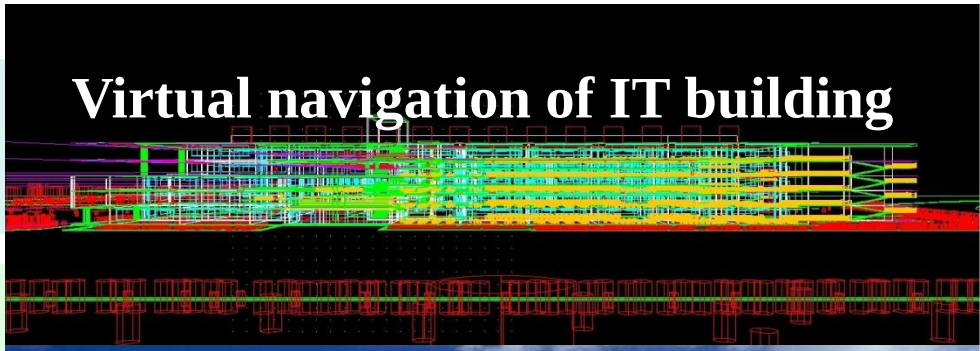
Midterm and Final Exam (40%)

– Some examples of student term projects

- Virtual Navigation of PUST Campus
- Virtual Navigation of Mangyongdae School Children's Palace
- Virtual Model of Turtle Ship
- Animation of Moranbong Band (in CG class)
- Animation of Hip-hop Dancer

CS VR (Fall, 2011)

Virtual navigation of IT building



~~CS CG (under) (Fall, 2012)~~

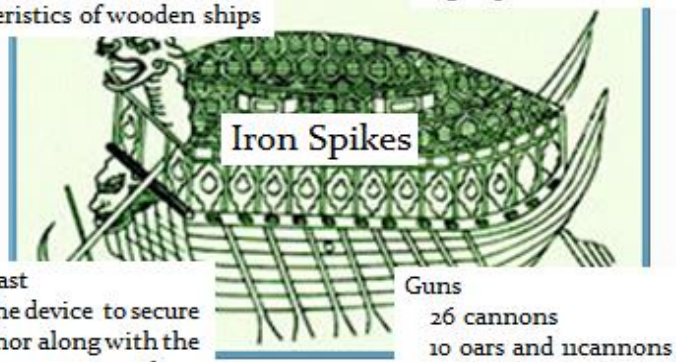
Animation of Moranbong band

VR class (Fall, 2014)

Virtual Model of Turtle Ship

Editable water & fire water
keg for editable water and fire water in consideration of the characteristics of wooden ships

Dragon head
Sulfur smoke and also gun porthole



Anchor mast
this is the device to secure the anchor along with the mast for supporting the anchor

Guns
26 cannons
10 oars and 11cannons on each side

Turtle ship which was in the regiment

Virtual Navigation

Virtual Education

KOREAN LEARNING

Virtual Reality Project

Team member:
Choe Un Bong
Lee **Chul**
Jong Hyok **Chul**

Date: November 17, 2014

Final Report (Excerpt)

By learning such things and practicing, we could turn them into the 'capital' for future struggles. We will make a constant effort to live up to his high expectations. Thank You!

b) Globalization Efforts

1. PUST International Conferences at PUST Campus

- The 1st (PICoSEP) – October, 2011 (Peter Agre, David Alton)
- The 2nd (ICoPUST2) – October, 2013 (N. Scolding, D. Hilmers)
- The 3rd (ICoPUST3) – October, 2015 (N. Neureiter, P. Agre)
- The 4th (ICoPUST4) - October, 2019 (K. Novoselov, V.Parserin)

2. Study Abroad and International Collaboration

- Sending graduate students abroad – UK (U. of Westminster, 3 in 2012, 3 in 2013), China (YUST, 4 in 2012),UK (Cambridge U., 2 in 2013), Sweden (Uppsala U., 2 in 2013, 3 MS, 2 PhD in 2015), Switzerland (ZHAW, 2 in 2014), Brazil (Sao Paulo U., 2 in 2015, 2 in 2017), China (Agri. Acad. of Sci. 2 in 2015), UK (U. of Surrey, 3 in 2018) , UK (Oxford U., 2 PhD in 2019)
- International Collaboration – Aennova in Brazil since 2014)

- Study Abroad Trips

- Dates: two weeks in June every year since 2014
- Destination: China
- Participants:
  - Selected seniors and graduate students
  - DPRK faculty
  - Foreign faculty
- Organizations visited: IBM, SAP, GE, Dell, HP, Liferay, Dalian U. of Tech. YUST, Beijing U. of Agriculture, Shanghai Free-Trade Zone, etc.
- Other activities – Workshops, Sports game, Sightseeing, etc.

1st PUST Conference

Dr. Peter Agre, Nobel Laureate

Lord David Alton

Lecture by a Nobel Laureate to PUST students

2nd PUST Conference

Ambassadors in PY

Prof. Neil Scolding

Prof. David Hilmers

3rd PUST Conference

South Korean participants

Cambridge U. (UK 2013)

U. of Westminster (UK 2013)

Uppsala U. (Sweden 2013)

Skype interview (Swiss 2014)

- Collaboration with Aennova of Brazil


cisis2014
第十二届中国国际软件和信息服务交易会
China International Software & Information Service Fair 2014
A
평양과학기술대학 수학려행
PYONGYANG UNIVERSITY OF SCIENCE & TECHNOLOGY


2014
PUST-YUST 학술토론회

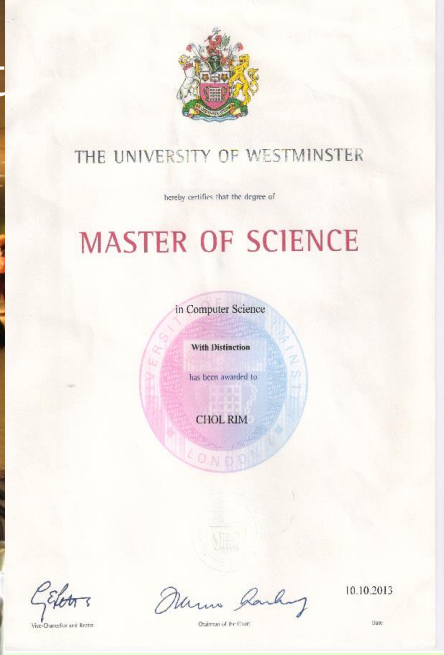
c) Typical Example

– Case of Mr. C. Rim

- Entered PUST Graduate School in 2010 (under – PUCT)
- Took VR course in Fall, 2011 - received a grade of A+
- Took iELTS in June 2012 – passed with 6.5
- Admitted to Computer Science Department of University of Westminster for Fall, 2012 - scholarship from a funding agent
- Received a M.S. degree with distinction in October, 2013
- Returned to PUST in October, 2013
- Admitted to Ph.D. Program at PUST in Fall, 2014
- Admitted to Zurich University of Applied Science as an intern– working on Cloud Computing for 6 months (2014-15)
- Gave a presentation in front of Nobel Laureates who visited PUST on May 5, 2016

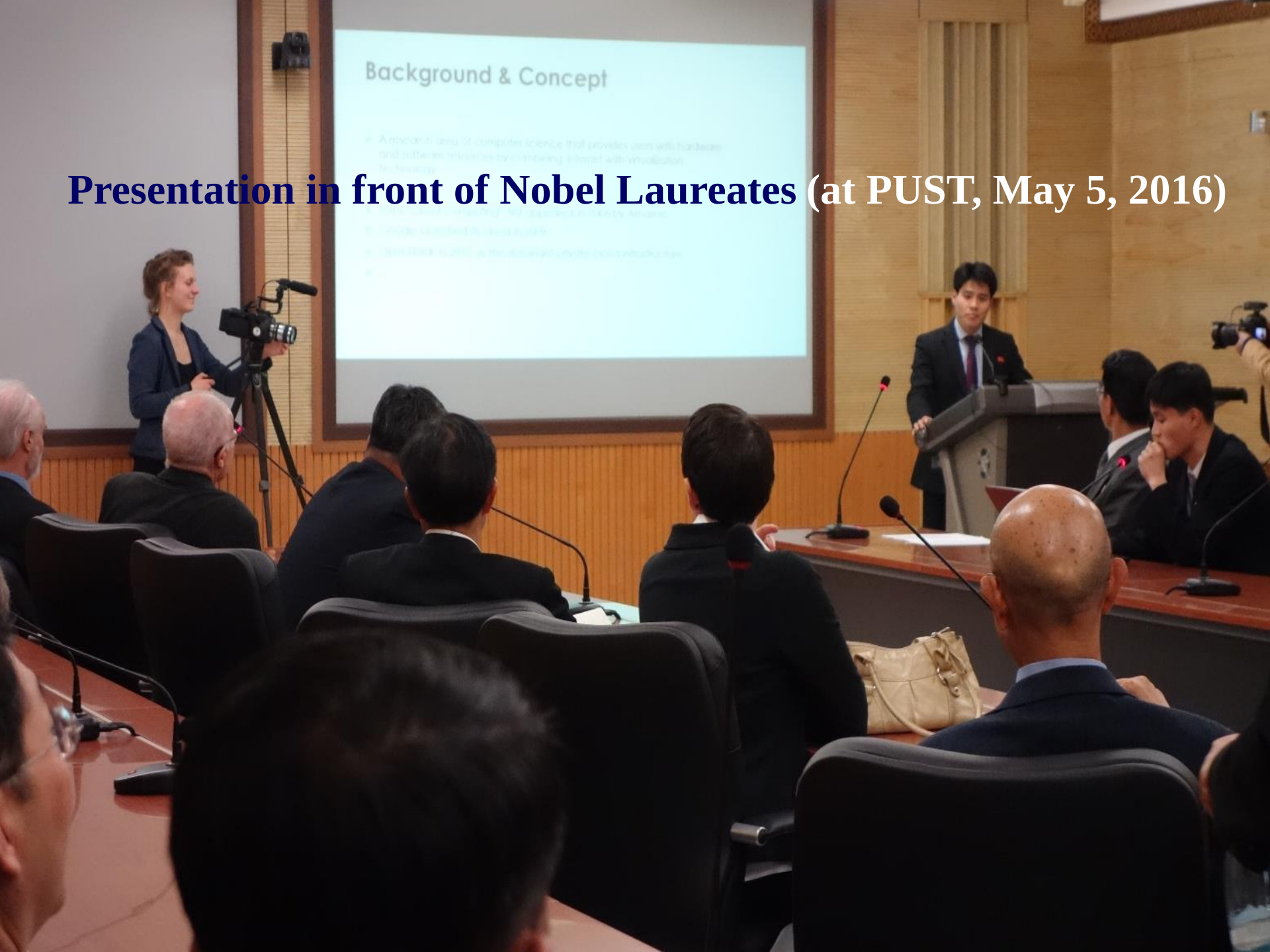

PY Airport
09/22/2012


Heathrow Airport


THE UNIVERSITY OF WESTMINSTER
hereby certifies that the degree of
MASTER OF SCIENCE
in Computer Science
With Distinction
has been awarded to
CHOL RIM
10.10.2013


Advisors at UW
01/11/2013


Dormitoty
01/13/2013



Presentation in front of Nobel Laureates (at PUST, May 5, 2016)

d) Role of PUST

- Foster globalized manpower with knowledge on IT, BT, Medical Sciences and Market Economy
- Act as a bridge between two Koreas (e.g., provide spaces for branch laboratories of ROK research institutes and companies at PUST R & BD Center)
- Provide opportunities to collaborate with UN and EU Organizations such as WHO and WFP in DPRK (PUST is a member of IAM (Inter-Agency Meeting) in Pyongyang)
- PUST has an access to Internet (WWW, e-mail, etc.)

VI. Conclusions

- Emphasis in DPRK – mathematics and computer education, nurturing computer-talented youngsters from a young age
- Level of software technology – compatible to that of advanced countries
- Level of hardware and communication technology – lower than ROK due to weak economy and various regulations as well as UN and US sanctions
- Narrowing the gap – very important for peaceful reunification of Korea
- PUST – trying to foster well-trained ICT professional with good character and global mind-set

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- **Articles and Brochures:**

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4. Park, C. M., 'Analysis of Functions of DPRK Software', Science and Technology, Jan., 2003, KOFST
5. Park. C. M., 'ICT Manpower Development and Usage Plan in DPRK', ARRC Colloquium, Nov., 2018, KAIST

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7. Colin Zwirko, “VR in North Korea”, NK News, October, 2018
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  2. www.kut.edu.kp
  3. www.pust.co
  4. www.rodong.rep.kp


Thank you very much !
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