



2012

Enjoy Embedded: Embedded Education in WHU

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IA based Embedded Curriculum Summary

Course Name: Embedded System Design

Course Type: (presentation/hands-on practice/both PPT & Hands-on)

Target Student/Semester: undergraduate & graduate / Fall Semester

Student Number (per year): 240

Course Duration: 90 - 3 credits; 1 credit for lab projects; 1 credit for innovation

Prerequisite Courses: Operating System, Digital Circuits, Microcontroller Principle and Interface Technology

IA based Embedded Curriculum Characteristic

Course Characteristic:

- 1) The course is re-designed for the new development of embedded technology
- 2) Practice plays an important role in this course with a variety of types
- 3) Atom based content is integrated into our course seamlessly
- 4) New hands-on labs are designed for updated teaching content and devices
- 5) Plenty of resources are provided to improve the effects

IA based Embedded Curriculum Key Points

Course Key Points:

- 1) The design methodology of IA based embedded systems
- 2) Embedded architecture / Embedded IA architecture
- 3) Power-aware computing of IA based embedded technology
- 4) Embedded operating systems on IA based embedded technology

IA based Embedded Curriculum Difficult Points

Curriculum/Course Difficult Points:

- 1) Micro-architecture of ATOM
- 2) Characteristics of IA based embedded technology
- 3) Design methodology of IA based embedded technology for embedded systems
- 4) Boot of embedded platform
- 5) Power of embedded systems

IA based Embedded Curriculum Experience Sharing - Course Re-Design

Teaching content (54 hours, 3 credits)

- The Development of Embedded System & Processor
- Atom-based processor architecture
- Atom-based Instruction System Implementation
- Atom-based embedded system develop platform
- Atom-based embedded operation system – MeeGo & VxWorks & Android & Embedded Linux
- The driver development for atom-based embedded platform
- Boot up lab projects (include boot loader compiling & flashing, etc.)
- Model based software system engineering
- Operating system specific platform development
- Atom specific system design and applications – MeeGo & VxWorks & Android & Embedded Linux
- Intel Multi-core platform based development
- Several levels of atom-based lab projects (see next session for details).

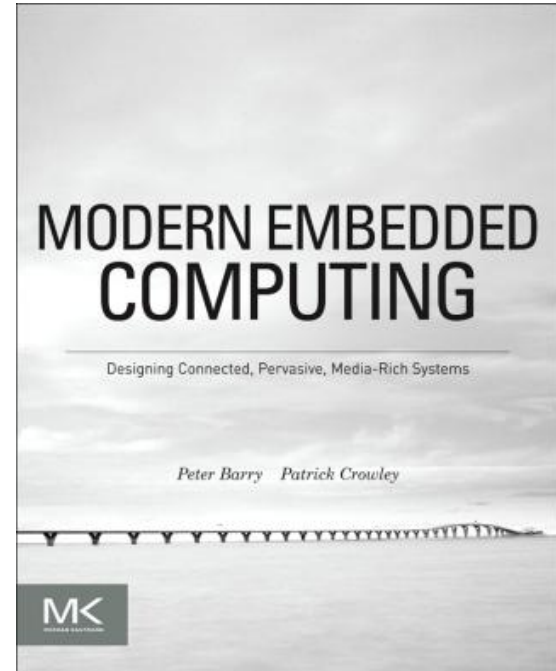
IA based Embedded Curriculum Experience Sharing - Update from Translated Textbook

New contents from translated textbook is melt into the teaching content, including

- Embedded Platform Architecture
- Embedded Processor Architecture
- Power Optimization
- Selected content from other chapters

Modern Embedded Computing:
Designing Connected, Pervasive,
Media-Rich Systems

- Peter Barry and Patrick Crowley, Morgan Kaufmann Publishers



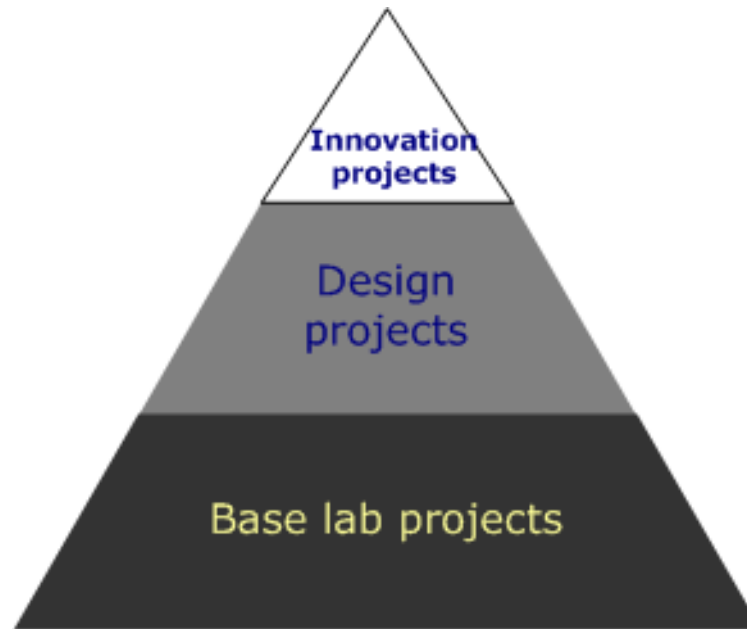
IA based Embedded Curriculum Experience Sharing - Lab Construction 1/4

WHU-Intel joint embedded technology lab (60 sites)

20 suits with Intel donation.

Hands-on Labs Design (1 credit for lab projects and 1 for innovation)

- Basic hands-on labs
- Design projects
- Innovation projects



IA based Embedded Curriculum Experience Sharing - Lab Construction 2/4

Lab Construction

- Atom-based Processor Architecture
- IDE Configuration
- Atom-based Embedded System Development Platform
- I/O control of Atom-based Processor
- Boot loader (Compiling & Flashing)
- Interrupt Control
- Base knowledge of developing drivers
- LCD / Audio / Net / USB Interface
- Embedded system OS design – Midinux & VxWorks, by MeeGo SDK, & Android.
- The design of UI and application program – Midinux & VxWorks, by MeeGo SDK, & Android.
- Intel Programming Tools
- Multi-threaded programming

IA based Embedded Curriculum Experience Sharing - Lab Construction 3/4

Advanced Lab Projects

- Transplant Midinux or VxWorks OS to Atom-based platform
- The design of application program based on Midinux and MeeGo
- The design of application program based on VxWorks
- Multi-threaded Programming based on Midinux & VxWorks
- Driver design
- The design of data gather controller system via USB interface
- The design of multi-channel video broadcast system via Ethernet interface

IA based Embedded Curriculum Experience Sharing - Lab Construction 4/4

Innovation Lab Projects

- Multi-Camera image Processing
- Intelligence image track and vision distinguish system based on atom processor.
- The solar energy electronic control system design based on atom processor.
- Mobile Remote sensing system design
-

IA based Embedded Curriculum Experience Sharing - Embedded Contests

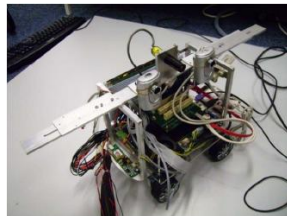
Practice: embedded contests

- Special types of practice

Students are encouraged for embedded contests

Achievements

- 5 national student innovation projects
- 1 first prize, 3 second prize, 6 third prize in national embedded design contests for undergraduate



IA based Embedded Curriculum Experience Sharing - Faculties Training Workshop

70+ faculties from 40+ Universities

Announcement of CFP of E2 (Enjoy Embedded) in central of China.



IA based Embedded Curriculum Experience Sharing - Enjoy Embedded Paper Contest

Feedback of Advantages of Atom

- Easy to use
- Easy for students to overcome the fear of difficulty of embedded design and development
- Welcomed by students

论文主题

- 课程体系改革
 - 滚动课程体系重构
 - 滚动与已有课程的融合
 - 全新课程的设计
- 教学方法与教学手段
 - 滚动教学方法
 - 滚动教学经验分享
 - 滚动国际合作
 - 滚动产学研结合
- 课程内容建设
 - 滚动课件建设
 - 滚动知识点分布
 - 滚动教学工具建设
- 案例教学
 - 滚动案例设计与实现
 - 实验教学工具
 - 学生创新
- 注：
 - 优秀教学案例将被收集并发布于教学网站及英特尔学术社区

计算机教育 8

对我国早期计算机教育的点滴回顾
中国信息理论在高校计算机教学中的应用
工学专业O2O混合课程(理论与实践)
翻转课堂的探索
——某职业院校计算机专业“订单班”的实践研究
计算机基础教学案例
——案例/启发式的巧点应用

中华人民共和国教育部主管 清华大学主办

1st prize

- Promoting the Development of Embedded Education through Students' Associations, Dr. Wei Hu from Wuhan University of Science & Technology.

2nd prize

- Architecture Construction of Embedded Curriculum Based on ATOM, Dr. Jing Wu from Wuhan University
- The Design and Implementation of Network Storage Teaching Case Based on Atom Platform, Dr. Rui Zhou from Lanzhou University

3rd prize:

- Analysis of Cooperating Intel Atom Platform into Different Majors' Embedded System Curriculum, Dr. Lijia Chen from Henan University
- Some Analysis based on the embedded teaching of intel Atom platform, Dr. Qingzhi Gong from Dalian University of Foreign Languages
- Embedded system application development curriculum reform and creative ability of students to explore, Chengbing Wei from Qing Dao University.

IA based Embedded Curriculum Experience Sharing - Promotion with Research Projects

“Data Communication in Vehicular Ad hoc Network” (Intel sponsored projects)

- Focus on Wireless connection between cars in movement

Achievement:

No	Research focus	Finding
1	The transport frame for data stream.	Cross-layer framework
2	monitoring and modeling for signal ch	modeling
3	The information publishing mechar	CEiPA
4	The routing mechanism.	LGGR
5	The transport algorithm.	BCRT

IA based Embedded Curriculum Experience Sharing - ESEA Portal

ESEA: Embedded System Education Alliance

- Interaction Platform for Universities from both of USA and China

WHU has designed and implemented the ESEA portal online

- Online resource and experience sharing

The screenshot displays the ESEA Portal website. The header features the text "2012 Intel SINO-US Higher Education Curriculum Forum-Intelligent Embedded System" and the Intel logo. A navigation menu includes "Home", "News", "Curriculum", "Forum", and "About". A login section is present with fields for "UserName" and "Password", and "Login" and "Register" buttons. The main content area is divided into three sections: "Notice", "Curriculum", and "News".

Notice More >>

- The official opening of Sino-US embedded affiliate
- Enjoy Embedded: Embedded Education in WHU
- ISUHECF2012-Call For Presentation

Curriculum More >>

- Huazhong University of Science and Technology
- Zhejiang University
- Xiamen University
- Wuhan University
- Tsinghua University
- South China University of Technology
- Shanghai Jiaotong University
- Peking University
- Nanjing University
- Beijing University of Technology
- Beijing University of Posts and Telecommunications
- University of Notre Dame
- University of Washington
- Cornell University
- Arizona State University

News More >>

- The Intel Cup Winners of 2012 Intel Cup Embedded System Design Invitation Contest
- The beautiful Wuzhen
- Summer Travel Guides from Intel AppUp™ Center
- Intel and the Futures Group Collaborate to Transform Healthcare in Africa

IA based Embedded Curriculum Hands-on Practice Case Sharing (1)

Please use the following pages to share at least 2-3 the most effective hands-on practice cases of your IA based embedded curriculum. Each case should include the following items:

Case Name:

Case Attribution: (Please specify the relationship with the whole curriculum)

Case Objective:

Case Content: (Please attach the hands-on lab document/code. You are encouraged to share some great student work based on their permission)

IA based Embedded Curriculum Hands-on Practice Case Sharing (2)

Please use the following pages to share at least 2-3 the most effective hands-on practice cases of your IA based embedded curriculum. Each case should include the following items:

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Case Attribution: (Please specify the relationship with the whole curriculum)

Case Objective:

Case Content: (Please attach the hands-on lab document/code. You are encouraged to share some great student work based on their permission)

IA based Embedded Curriculum Hands-on Practice Case Sharing (3)

Please use the following pages to share at least 2-3 the most effective hands-on practice cases of your IA based embedded curriculum. Each case should include the following items:

Case Name:

Case Attribution: (Please specify the relationship with the whole curriculum)

Case Objective:

Case Content: (Please attach the hands-on lab document/code. You are encouraged to share some great student work based on their permission)

IA based Embedded Curriculum Resource

Textbook: Peter Barry and Patrick Crowley, Modern Embedded Computing: Designing Connected, Pervasive, Media-Rich Systems, Morgan Kaufmann Publishers

website: <http://es.whu.edu.cn/es/>

Thank You!



Some Intel Resource For Your Reference:

Intel Academic Community

<http://software.intel.com/zh-cn/academic/>

Intel Education

<http://www.intel.com/education/highered/Embedded/Embedded.htm>

[Blog: "Embedded" University Program Reloaded from China!](#)