物联网工程专业人才培养方案

Undergraduate Program for Internet of Things Engineering Major

学科门类：工学   国标代码： 08

Discipline Type: Engineering   Code: 08

专业类：计算机类   国标代码：0809

Type: Computer   Code: 0809

专业名称：物联网工程   国标代码：080905   校内代码： 63

Title of the Major: Internet of Things   Code: 080905

Engineering

一、学制与学位　　Length of Schooling and Degree

学制：四年   Duration: Four years

学位：工学学士   Degree: Bachelor of Engineering

二、培养目标　　Educational Objectives

本专业培养品德优良、身心健康，具有高度社会责任感，理论基础扎实、创新意识强、具有一定的国际视野和良好发展潜力，掌握物理信息系统的标识与感知、网络通信与传输、数据分析和智能处理等领域的专业知识，具备良好的外语运用能力，能在物联网技术领域从事科学研究、技术开发、技术管理工作的应用型高级人才。

This major purposes to cultivate students to obtain good moral character, physical and mental health, with a high degree of social responsibility, a solid theoretical foundation, a strong sense of innovation, with a certain international perspective and good potential for development, grasp the physical information system identification and perception, network communications and transmission, data analysis and intelligence processing and other fields of expertise, have a good ability to use foreign languages; and to become senior professional and technical personnel engaged in Internet of Things Engineering research, technology development and technology management.

学生毕业 5 年左右能够达到的职业和专业成就：

（1）具备良好的理工基础与人文素养，具有健全的人格和正确的价值观，能够正确认识计算机软硬件工程实践对环境、社会可持续发展的影响；

（2）能够系统运用物联网理论与技术，综合考虑社会、健康、安全、法律、文化以及环境等因素，具有从事物联网系统的分析、设计、应用和集成能力，能从事软硬件设计与开发工作，针对计算机及能源电力相关行业领域复杂工程问题，设计开发相应的解决方案；

（3）具有良好的团队合作精神与项目管理能力，遵守法律法规，具有工程职业道德，遵守职业规范，有社会责任感；

（4）能够跟踪物联网领域的前沿技术和相关行业国内外发展趋势，具备良好的主动发展意识、创新精神与自主终身学习能力；

（5）具备良好的表达与沟通能力，能够承担国际交流与对外合作工作。

Graduates are expected to have the following professional achievements after 5 years of work practice:

(1) They will have a good scientific and technological foundation and humanistic literacy, and have a sound personality and correct values;

(2) They can systematically use Internet of Things theory and technology, comprehensively consider social, health, safety, legal, cultural and environmental factors, have the ability to engage in Internet of Things system analysis, design, application and integration, and be able to engage in software and hardware design and development, and design and develop corresponding solutions for complex engineering problems in computer related industries;

(3) They will have a good team spirit and project management ability, abide by laws and regulations, have engineering professional ethics, abide by professional norms, and have a sense of social responsibility;

(4) They are able to track the cutting-edge technology in the Internet of Things field and the development trend of related industries at home and abroad, with a good sense of initiative development, innovative spirit and self-learning ability;

(5) They will have good expression and communication skills. They will be able to undertake international exchanges and foreign cooperation.

三、专业培养基本要求 Skills Profile

本专业学生毕业时应达到以下要求：

（1）工程知识：掌握数学、自然科学、工程基础和计算机专业知识，能够用于解决物联网系统及能源电力相关行业计算机领域的复杂工程问题。

（2）问题分析：具有良好的科学素养和强烈的工程意识或研究探索意识，能够将物联网系统相关的基础理论知识用于物联网系统的抽象、分析，并通过文献研究分析物联网系统中的复杂工程问题，以获得有效结论，为系统方案设计提供依据。

（3）设计/开发解决方案：能够应用物联网系统的基本原理和方法，设计满足特定需求的合理方案，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

（4）研究：能够利用计算机学科的基本概念、知识结构，典型方法，建立数字化、算法、模块化与层次化等核心专业意识，对物联网系统中的复杂工程问题进行研究，并通过信息综合得到合理有效的结论。

（5）使用现代工具：针对实际工程问题，能够选择、使用合适的开发工具和测试技术，对物联网系统进行设计、模拟或实现，解决计算机工程实践中的复杂问题，并能理解工具和技术的局限性。

（6）工程与社会：能够基于工程相关背景知识进行合理分析、评价计算机专业工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

（7）环境和可持续发展：能够理解和评价针对复杂工程问题的计算机工程实践对环境、社会可持续发展的影响。

（8）职业规范：具有人文社会科学素养、社会责任感，熟悉国家信息产业政策及国内外有关信息安全和知识产权的法律法规，在工程实践中能够综合考虑经济、环境、法律、法规、安全、健康、伦理等制约因素。

（9）个人和团队：能够在多学科背景下的团队中承担个体、团队成员或负责人的角色。

（10）沟通：能够就复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

（11）项目管理：理解并掌握工程管理原理与经济决策方法，并能在物联网系统的设计、运行及管理中应用。

（12）终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力，能及时了解计算机科学与技术最新理论、技术及国际前沿动态。

The graduates should meet the following requirements:

(1) Engineering knowledge: they should possess mathematics, natural science, engineering foundation and professional knowledge to analyze and solve the complicated engineering problems in computer field of energy and power related industries.

(2) Problem analysis: they will have good scientific literacy and strong engineering consciousness or research and exploration consciousness, be able to comprehensively use the knowledge and technology and basic thinking methods and research methods of Internet of Things, solve complex practical problems and analyze the results.

(3) Solutions design/development: they will design and develop Internet of Things, provide effective solutions, be able to engage in the analysis, design, application and integration of Internet of Things systems, and consider legal, safety, environmental protection and cultural factors.

(4) Research: they will have the ability to use the basic concepts, knowledge structure and typical methods of Internet of Things to establish core professional consciousness such as digitization, algorithm, modularization and hierarchy, study complex engineering problems in Internet of Things, and obtain reasonable and effective conclusions through information synthesis.

(5) Modern tool usage: they will be able to select appropriate tools and information technology tools for Internet of Things engineering problems, and be able to understand the limitations of tools and technologies.

(6) Engineer and society relations: they will be able to reasonably analyze and evaluate the impact of Internet of Things engineering practice and complex engineering problem solutions on society, health, safety, law and culture based on engineering related background knowledge, and understand the responsibilities.

(7) Environment and sustainable development: they will be able to understand and evaluate the impact of professional engineering practice on the sustainable development of environment and society.

(8) Professional standard accomplishment: they will have the quality of Humanities and Social Sciences, sense of social responsibility, be familiar with the national information industry policy and the laws and regulations related to information security and intellectual property at home and abroad, and be able to comprehensively consider the restrictive factors such as economy, environment, laws, regulations, safety, health and ethics in the process of system design.

(9) Individual and team competence: they will be able to play the role of individual, member or person in charge in a multidisciplinary team, and have certain organization and management ability, interpersonal skills and team cooperation ability.

(10) Communication: they will be able to effectively communicate with peers in the industry and the public on complex engineering problems, including writing reports and design

manuscripts, making statements, clearly expressing or responding to instructions; Have preliminary foreign language application ability, can read the foreign language materials of this major; And have a certain international vision, be able to communicate, exchange, compete and cooperate in the cross-cultural background.

(11) Project management: they will be able to understand and master the principles of engineering management and economic decision-making methods, and be able to apply them in a multidisciplinary environment.

(12) Lifelong learning: they will have the awareness of independent learning and lifelong learning, have the ability to constantly learn and adapt to development, and be able to timely understand the latest theories, technologies and international cutting-edge trends of computer science and technology.

四、学时与学分　　Hours and Credits

类别 Category		学时 Hours	学分 Credits	比例 Percentage
必修课 Required course	公共基础教育 Public infrastructure	644	33	19.53%
	学科门类基础 Basis of discipline	640	40	23.67%
	专业类基础 Basis of major	464	29	17.16%
	专业核心 Core of major	160	10	5.92%
	集中实践 Intensive practice	208 学时+20 周 208 classhours +20 weeks	32	18.93%
必修课小计 Subtotal of Required course		2116 学时+20 周 2116 class hours + 20 weeks	144	85.21%
选修课 Elective courses		320	20	11.83%
课外实践学分 Practice of extra-curricular		5 周	5	2.96%
总计 Total		2436 学时+25 周 2436 class hours + 25 weeks	169	100%

说明：

必修实践环节学分包括：集中实践课程 32 学分，课外实践课程 5 学分，学科门类基础、专业基础课程中的实验课程 4 学分，学科门类基础、专业基础、专业必修课程中的实验、上机学时折算 1.5 学分，共计 42.5 学分，占总学分 25.15%。

Note:

Total of 42.5 credits for required practice training, accounting for 25.15% of the total credits, including: 32 credits for Intensive practice, 5 credits for practice credits of extra-curricular, 4 credits for basis of discipline and basis of major, 1.5 credit for experiment and computer practice in basis of discipline, basis of major, and required courses of major.

五、专业主干课程　Main Courses

　　计算机组成原理 Computer Organization and Structure；操作系统 Operating Systems；计算机网络 Computer Network and Security；物联网通信技术 Communication Technology of Internet of Things；汇编语言与接口技术 Assembly Language Programming and Interface Technology；传感器原理与应用 FundamentalsofSensorsandApplication；RFID 原理与应用 Fundamentalsof RFID andApplication；无线传感器网络 WirelessSensorNetwork；物联网信息安全 Information Security of IOT；物联网控制系统 Controlling System of IOT。

六、总周数分配　　Arrangement of the Total Weeks

总周数分配

教学环节 ＼ 学期	一	二	三	四	五	六	七	八	合计
理论教学	17	16	16	16	17	16	15	2	116
复习考试	2	2	1	2	3	2	2	0	14
集中进行的实践环节	3	2	3	2	1	2	4	16	32
小计	22	20	20	20	21	20	21	18	162
寒假	5		5		5		5		20
暑假		6		6		6			18
合计	27	26	25	26	26	26	26	18	200

物联网工程专业必修课程体系及教学计划
Table of Teaching Schedule for Required Course and Teaching Plan

类别 Type	课程编号 Course ID	课程名称 Course name	学分 Credits	总学时 Hours	课内学时 In class hours	实验学时 Lab hours	课外学时 Off class hours	开课学期 Semester
公共基础教育	00700975	中国近现代史纲要 Chinese Modern and Contemporary History Outline	3	48	32		16	2
	00701353	思想道德与法治 Ideology and Moral Cultivation & Law Basis	3	48	32		16	1
	00700983	毛泽东思想和中国特色社会主义理论体系概论 Mao Zedong Thought and the theory of building socialism with Chinese characteristics	3	48	32		16	3
	00700971	马克思主义基本原理 Marxist theory	3	48	32		16	3
	00700988	习近平新时代中国特色社会主义思想概论 Outline of Xi Jinping's New China's Socialist Ideology	3	48	32		16	2
	00701661 -00701668	形势与政策 Current Events and Policy	2	64	64			1-8
	J100010	现代电力工程师	2	32	32			2
	01390011	军事理论 Military Theory	2	36	24		12	1
	00801410	通用英语 English for General Purpose	4	64	64			1
	00801400	学术英语 English for Academic Purpose	4	64	64			2
	01000011	体育(1) Physical Culture (1)	1	36	30		6	1
	01000021	体育(2) Physical Culture (2)	1	36	30		6	2
	01000031	体育(3) Physical Culture (3)	1	36	30		6	3
	01000041	体育(4) Physical Culture (4)	1	36	30		6	4
		公共基础教育小计 Subtotal of public infrastructure	33	644	528		116	
学科门类基础课	00900130	高等数学(1) Advanced Mathematics (1)	5.5	88	88			1
	00900140	高等数学(2) Advanced Mathematics (2)	6	96	96			2
	00900462	线性代数 Linear Algebra	3	48	48			3
	00900111	概率论与数理统计 Probability and Mathematical Statistics	3.5	56	56			4
	00900053	大学物理(1) College Physics (1)	3.5	56	56			2
	00900064	大学物理(2) College Physics (2)	3	48	48			3
	00900440	物理实验（1） Experiments of Physics（1）	2	32		32		2
	00900450	物理实验（2） Experiments of Physics（2）	2	32		32		3
	04100300	高级语言程序设计 Advanced Language Programming	3.5	56	56			1
	04101700	计算机导论 Introduction to Computer Science	1	16	16			1
	00600460	离散数学 Discrete Mathematics	4	64	64			1
	10410221	面向对象程序设计 Object Oriented Programming	3	48	40	8		3

类别 Type	课程编号 Course ID	课程名称 Course name	学分 Credits	总学时 Hours	课内 学时 In class hours	实验 学时 Lab hours	课外 学时 Off class hours	开课 学期 Semester
		学科门类基础课小计 subtotal of basis of discipline	40	640	568	72		
专业类基础课	00600600	数据结构 Data Structure	3.5	56	56			2
	00600651	数字逻辑与数字系统设计 Digital Logic and Digital System Design	3	48	48			4
	00600100	操作系统 Operating Systems	3.5	56	56			4
	10410560	计算机组成原理 Principles of Computer Organization	3.5	56	56			5
	10410160	计算机网络 Computer network	3	48	48			3
	00600621	数据库原理 Principles of Database	2.5	40	40			5
	00601350	物联网通信技术 Communication technology of Internet of Things	2	32	32			4
	00601030	汇编语言与接口技术 Assembly Language Programming and Interface Technology	3	48	32	16		5
	10311721	传感器原理与应用 Theory and Application of Sensor	2	32	32			5
	00601730	物联网嵌入式系统 Embeded System of IOT	3	48	48			6
		专业类基础课小计Subtotal of basis of major	29	464	448	16		
专业类核心课	00601050	RFID原理与应用 Fundamentals of RFID and Application	2	32	32			5
	11111494	无线传感器网络 Wireless sensor network	2	32	32			6
	00601090	分布式系统与云计算 Distributed system and cloud computing	2	32	32			6
	00601070	物联网信息安全 Information Security of IOT	2	32	32			7
	00601080	物联网控制系统 Controlling System of IOT	2	32	32			7
		专业核心课小计 Subtotal of Core of major	10	160	160			
		必修课学分合计 Subtotal of Required courses			112			

物联网工程专业集中实践环节设置及教学计划

Table of Teaching Schedule for Main Practical Training

类别 Type	课序号 ID	环节名称 Name	学分 Credits	周数 Weeks	学时数 Hours	开课学期 Semester
必修 Required	01390012	军事技能 Military Training	2	2		1
	00690270	程序设计实验 Programming Experiments	1	1		1
	00690210	数据结构课程设计 Course Project of Data Structure	1	1		2
	00690130	认识实习 Acquaintanceship Practice	1	1		3
	00690380	数字逻辑与数字系统设计综合实验 Comprehensive experiment of Digital Logic and Digital System Design	1	1		4
	00690190	数据库原理课程设计 Course Project of Database Principle	1	1		5
	00690750	物联网嵌入式系统课程设计	1	1		6
	00690340	无线传感器网络综合实验 Comprehensive Experiments of WSN	1	1		6
	00690350	物联网应用综合设计 Comprehensive Experiments of IOT Application	2	2		7
	00690290	计算机网络综合实验 Experiments of Computer Networks	1	1		3
	00690061	操作系统综合实验 Experiment of Operating System	1	1		4
	00690331	物联网安全综合实验 Comprehensive Experiments of IOT Security	2	2		7
	00690031	毕业实习 Major Practice	2	2		8
	00690021	毕业设计 Graduation Project	13		208	7-8
	J100060	劳动教育 Labor Education	2	2		3
	00690010	毕业教育 Graduation Education	0	1		8
集中实践小计 Subtotal of major practical training			32	20	208	

物联网工程专业选修课程体系及教学计划

Table of Teaching Schedule for Elective

类别	课程编号	课程名称	学分	总学时	课内学时	实验学时	上机学时	课外学时	开课学期	必修选修
选修课	00601380	软件工程 Software Engineering	2	32	32				5	至少选修12学分
	00601010	数据仓库与数据挖掘 Data warehouse and data mining	2	32	32				6	
	10141070	智能硬件概论 Introduction to Smart Hardware	2	32	32				6	
	00600521	人工智能及应用 Principle of Artificial Intelligence and Application	2	32	32				4	
	10310620	自动控制理论基础 Introduction to Automatic Control Theory	2	32	32				6	
	00600940	电力信息化 Electric Power Informationization	2	32	32				6	
	00601100	专业英语阅读(物联网工程) IOT Specialty English	2	32	32				6	
	00600661	算法设计与分析基础 Basic Algorithm Design and Analysis	2	32	32				4	
	00600561	软件中间件技术及应用 Middleware technology & Application of Software	2	32	32				4	
	00600040	LINUX系统编程 LINUX Architecture and Programming	2	32	32				5	
	00601671	Python语言高级编程 Advanced Programming in Python	2	32	32				3	
	00601600	纳米智能机器人 Nano Intelligent Robot	2	32	32				7	
	00601110	移动计算技术 Mobile Computing Technology	2	32	32				6	
	00600770	虚拟现实 Virtual Reality	2	32	32				5	
	01100010	科技文献检索基础 Fundamentals of Scientific document retrieval	1.5	24	24		8		7	
	00200260	电力生产技术概论 Introduction to Power Generation Technology	2	32	32				5	
	通识教育选修课程		建议							
	跨专业课程		建议							
	研究生学位课程		建议							
	选修小计		至少选修20学分							

（类别列"选修课"跨全部选修课行；专业选修模块1包含00601380至00601100；专业选修模块2包含00600661至00600770；专业选修模块3包含01100010、00200260）