



“AI+X”  
BLENDED  
LEARNING

“人工智能+ X ” 融合式学习

## 前言

# “AI + X” 人才 核心能力群



学术能力  
Academic Background



科研能力  
Research Capability



实践应用能力  
Practical Skills



社会责任  
Social Responsibilities

## SPOC

小规模在线课程

Small Private Online Course

+

## PBL

项目制学习

Project-based Learning

+

## Bootcamp

波士顿线下训练营

+

## GTC

全球人才计划

Global Talent Community

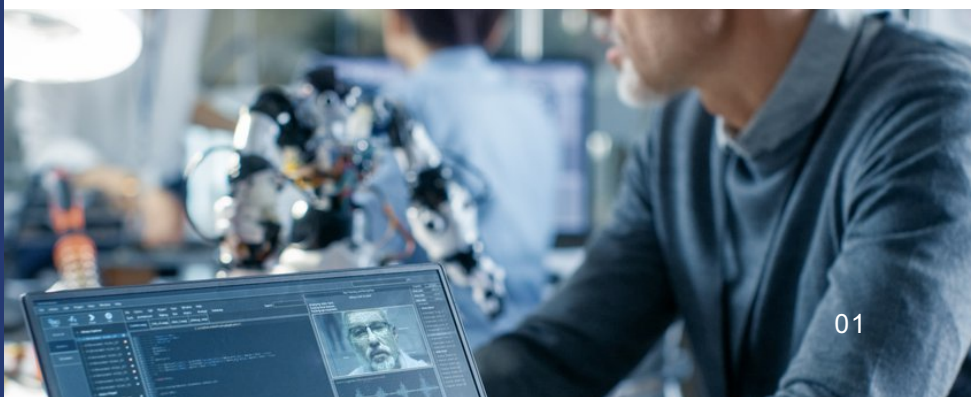
## “AI+X” Blended Learning 麻省理工学院官方课程项目

“AI+ X” Blended Learning ( “人工智能+X” 混合式学习) 麻省理工学院官方课程项目集合了麻省理工学院 (MIT) 众多顶尖教研资源, 旨在为全世界的大学生提供一次近距离接触 MIT 在 “AI+X” 领域最前沿科研学术成果的机会。

“AI+X” Blended Learning MIT official Online Program integrates many top teaching and research resources of the Massachusetts Institute of Technology (MIT), aiming to provide college students all over the world with a close encounter Opportunities for MIT's cutting-edge scientific research and academic achievements in the “AI+X” field.

课程项目将通过SPOC (小规模在线课程)、PBL (项目制学习)、Bootcamp (线下训练营)、GTC (全球人才计划) 四大模块全面提升学生在学术、科研、实践方面的核心竞争力, 同时培养其作为 “AI+X” 国际人才的社会责任感。对 “AI+X” 人才的培养将会落实到每一天的教学中。

The Program will comprehensively enhance the core competitiveness of students in academic, scientific research, and practice through the three modules of SPOC (Small Online Course), PBL (Project-based Learning), and GTC (Global Talent Program), while cultivating them as an “AI+ X” the social responsibility of international talents. The training of “AI+X” talents will be implemented every day of teaching.



# "AI+X" Blended Learning

## 授课学院



### 麻省理工学院

Massachusetts Institute of Technology

麻省理工学院在2021年QS世界大学排名中位列全球第一。  
MIT ranks first in the world in the 2021 QS World University Rankings.

截至2020年10月，麻省理工学院的校友、教授及研究人员中共有97位诺贝尔奖得主、8名菲尔兹奖获得者、26位图灵奖得主，以及52位国家科学奖章获得者、45位罗德学者、38名麦克阿瑟奖得主。

As of October 2020, MIT alumni, professors and researchers have won 97 Nobel Prize winners, 8 Fields Medal winners, 26 Turing Award winners, and 52 National Science Medal winners, 45 Rhodes Scholars, 38 MacArthur Award winners.

截至2014年，由MIT校友所创办的公司利润总值相当于全球第十一大经济体。

MIT also has a strong entrepreneurial culture. The total profit of the company founded by its alumni is equivalent to the world's eleventh largest economy (as of 2014).

### 苏世民计算机学院

MIT Stephen A. Schwarzman College of Computing

苏世民计算学院成立于2018年，是麻省理工学院计算机、人工智能、大数据以及各个应用领域的跨学科研究中心。

Schwarzman School of Computing was established in 2018 and is an interdisciplinary research center for MIT's computer, artificial intelligence, big data, and various application fields.

通过计算和AI的发展，苏世民计算学院致力于推动各交叉学科群的发展。同时，各学科领域的需求和进步也不断重塑计算和AI领域的未来。苏世民计算学院的使命即解决无所不在的计算问题，以及应对风起云涌的AI所带来的全新机遇和挑战。

Schwarzman School of Computing promotes the development of other disciplines through computing and artificial intelligence, and on the other hand, it also reshapes the future of computing and artificial intelligence through the needs and insights of other fields. Schwarzman Computing Institute is committed to responding to the new opportunities and challenges brought by ubiquitous computing and the surging artificial intelligence.



### MIT Open Learning

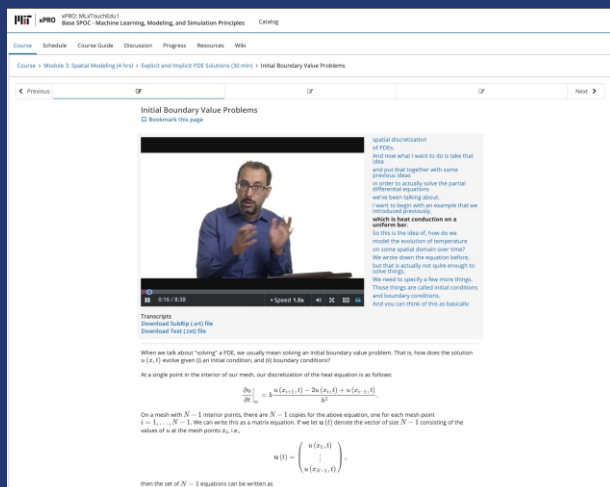
"AI+X" Blended Learning 官方部门

作为MIT负责全球教学事务的校级部门，MIT Open Learning 通过以下方式实现自我使命：1. 支持麻省理工学院的教职员工和学生进行大胆的实验；2. 促进和实现定量，严格，跨学科的教学研究；3. 为数字化教育提供平台；4. 与学校，大学，公司，非政府组织和政府达成合作，分享研究成果和最佳实践案例；5. 将麻省理工学院的知识扩展到全世界

MIT Open Learning fulfill its mission by: Supporting MIT faculty and students in bold experiments to enhance our residential education; Promoting and enabling quantitative, rigorous, inter-disciplinary; research on teaching and learning; Providing platforms for digital education; Sharing research and best practice by convening and partnering with schools, universities, companies, NGOs and governments; Extending MIT's knowledge to the world



# 什么是 Small Private Online Course - SPOC?



“AI+X” Blended Learning - SPOC在线学习平台录播课程截图

## SPOC小规模在线教学 Small Private Online Course

- 学习平台：麻省理工学院官方线上学习平台  
Learning platform: MIT's official online learning platform
- 模块时长：6周  
Module duration: 6 weeks
- 模块构成：顶尖教授亲授直播课、MIT官方学习平台录播课程、平台课后测验  
Module composition: live lectures taught by top professors, recorded and broadcasted courses on MIT's official learning platform, after-class tests on the platform
- 必修定义：学生须至少完成以下基础SPOC 或高阶SPOC中的一门课程以进行后续PBL、Bootcamp的学习，及参与GTC 相关活动。  
Prerequisite definition: Students must complete at least one of the following base SPOC or advanced SPOC courses in order to participate in PBL, Bootcamp, and GTC related activities.

## 基础SPOC：机器学习，建模和仿真原理

Base SPOC: Machine Learning, Modeling, and Simulation Principles

模块课程时间花费：6周，6-10小时/每周。（具体时长视课程安排）  
Module course time spent: 6 weeks, 6-10 hours/week. (Depending on the actual schedule)

课程内容：

该SPOC的重点是向学生介绍机器学习的基本技术，例如建模基础，优化和概率方法。通过学习平台上课程、模拟练习以及互动式教授直播课程，学生将在机器学习和人工智能打下坚实的基础，这些基础可用于此融合学习计划和现实世界中的更高级课程。

The focus of the SPOC is to introduce students to the basic techniques of machine learning, such as the basics of modeling, optimization and probability methods. Through the courses on the learning platform, simulation exercises and interactive teaching live courses, it will lay a solid foundation in machine learning and artificial intelligence for the students. The knowledge can also be used in this integrated learning plan and more advanced courses in the real world.

6周时间，学生将完成以下知识点的学习：

The 6-week SPOC will cover all topics below:

机器学习概念，线性代数矩阵运算的介绍  
Introduction, Review of Linear Algebra and Matrix Operations

- 建模基础及更多建模与仿真优化  
Modeling Fundamentals and More Modeling and Simulation
- 数据驱动建模  
Optimization and Data-Driven Modeling
- 从优化到机器学习概率方法  
From Optimization to Machine Learning Probabilistic Methods
- 具体案例研究与总结  
Case Studies and Summary

## 高阶SPOC：将机器学习应用于工程和科学

Advanced SPOC: Applying Machine Learning to Engineering and Science

模块课程时间花费：6周，6-10小时/每周。（具体时长视课程安排）  
Module course time spent: 6 weeks, 6-10 hours/week. (Depending on the actual schedule)

课程内容：

该SPOC会将在基础SPOC中获得的机器学习知识应用于各种主题，这些主题展示了人工智能在现实世界中的广泛应用。学生将与世界知名教授一起探索诸如计算成像、几何表示、计算材料探索和复合设计等主题，这将使学生对机器学习技术正在革新的许多领域有更深入的了解。

This SPOC will apply the machine learning knowledge obtained in the base SPOC to various topics, which demonstrate the wide application of artificial intelligence in the real world. Students will work with world-renowned professors to explore topics such as computational imaging, geometric representation, computational material discovery, and composite design. This will enable students to have a deeper understanding of many areas where machine learning technology is being revolutionized.

6周时间，学生将完成以下知识点的学习：

The 6-week SPOC will cover all topics below:

- 锂离子电池寿命预测中的特征工程  
Feature Engineering in Li-Ion Battery Life Prediction
- 计算成像的机器学习  
Machine Learning for Computational Imaging
- 地震深造假：神经网络生成丢失的数据  
Seismic Deep Fakes: Neural Nets to Generate Missing Data
- 油气产量预测  
Prediction of Oil and Gas Production
- 几何表示中的机器学习  
Machine Learning in Geometric Representations
- 使用机器学习量化复杂系统中的风险  
Quantifying Risk in Complex Systems Using Machine Learning
- 机器学习加速计算材料发现  
Machine Learning in Accelerating Computational Materials Discovery
- 复合设计中的实用机器学习  
Practical Machine Learning in Composite Design
- 航空航天中的机器学习  
Machine Learning in Aerospace

# 什么是 PBL 项目制学习 Project-Based Learning

PBL的全称为Project-Based Learning，即项目制学习

PBL is short for Project-Based Learning

由项目导师带领指导，学生选择其感兴趣的PBL科研项目进行12周的线上学习。

Guided by a project lead, students can choose PBL projects they are interested in for 12 weeks of online learning.

每个项目将被分为不同的细分方向（Tracks），学生择一进行深入研究，并在项目时间内完成一篇可发表的高质量科研论文。

Each project will be divided into different Tracks, where students can choose one to conduct in-depth research and produce a high-quality paper that can be published within the project's time frame.

PBL模块可选10大项目方向：

10 project directions available for PBL module

**A 机器学习在临床诊断中的应用 - Enlitic 项目**

AI: Machine Learning in Healthcare

**B 复杂经济系统交互模拟项目**

DA: Engineering Online Behavior

**C 数据分析在推荐系统中的应用 - Netflix 项目**

DA: Recommendation Systems - Netflix Project

**D 适用于下一代AI应用程序的新型硬件-自动驾驶汽车项目**

AI: Designing Machine Learning Hardware - Autonomous Vehicles Project

**E 自然语言处理- Apple Siri 项目**

AI: Natural Language Processing - Apple Siri Project

**F 卷积神经网络在计算机视觉&自然语言处理中的应用项目**

AI: Convolutional Neural Networks for Computer Vision & Natural Language Process

**G 计算机视觉与图像处理 - Microsoft 项目**

AI: Computer Vision and Image Processing - Microsoft Project

**H 原子模拟 - Schrödinger 项目**

AI: Atomistic Simulation - Schrödinger Project

**I 机器学习在量化金融中的应用 - J.P. Morgan 项目**

AI: Machine Learning in Quantitative Finance - J.P. Morgan Project

**J 机器学习与智能交通项目**

AI: Machine Learning and Smart Transportation





# Bootcamp

## 波士顿线下训练营

### Boston Bootcamp

#### 训练营内容： Bootcamp content

MIT学术研讨  
MIT Faculty Seminars

科研创新项目实践  
Innovation Workshops

顶级专家行业研讨  
Seminars with industry experts

MIT企业联合实验室工作坊  
Enterprise Workshops

校园文化交流活动  
Cultural Experience

#### 训练营形式： Bootcamp format

Bootcamp以交流学习体验为主，学生需前往美国波士顿进行为期2-3周的线下访问学习。作为MIT官方课程项目中的一部分，学生将与MIT顶尖教授、专家面对面进行各类学术、行业的研讨。

Bootcamp focuses on communication and learning experience. Students need to go to Boston, USA for a 2-3 week onsite study. As part of the official MIT curriculum project, students will meet face-to-face with top MIT professors and experts to conduct various academic and industry seminars.

同时，学生也将有机会走进波士顿本地如哈佛大学等世界名校校园以及顶尖科技企业进行访问学习，这将对提前了解美国高校特别是MIT的学习及科研环境、感受学术氛围有极大的帮助。

At the same time, students will also have the opportunity to visit the campuses of world-renowned universities such as Harvard University and top technology companies in Boston for onsite study. This will greatly help students understand the learning and scientific research environment of American universities, especially MIT, and feel the academic atmosphere in advance.

项目最后，学生需与小组同学共同完成一个创新实践项目，并撰写相应报告完成展示。完成项目同学将获得相应证书。

At the end of the Bootcamp, students need to complete an innovative practice project with their group students, and write a corresponding report to complete the presentation. Students who complete the Bootcamp will get the corresponding certificate.

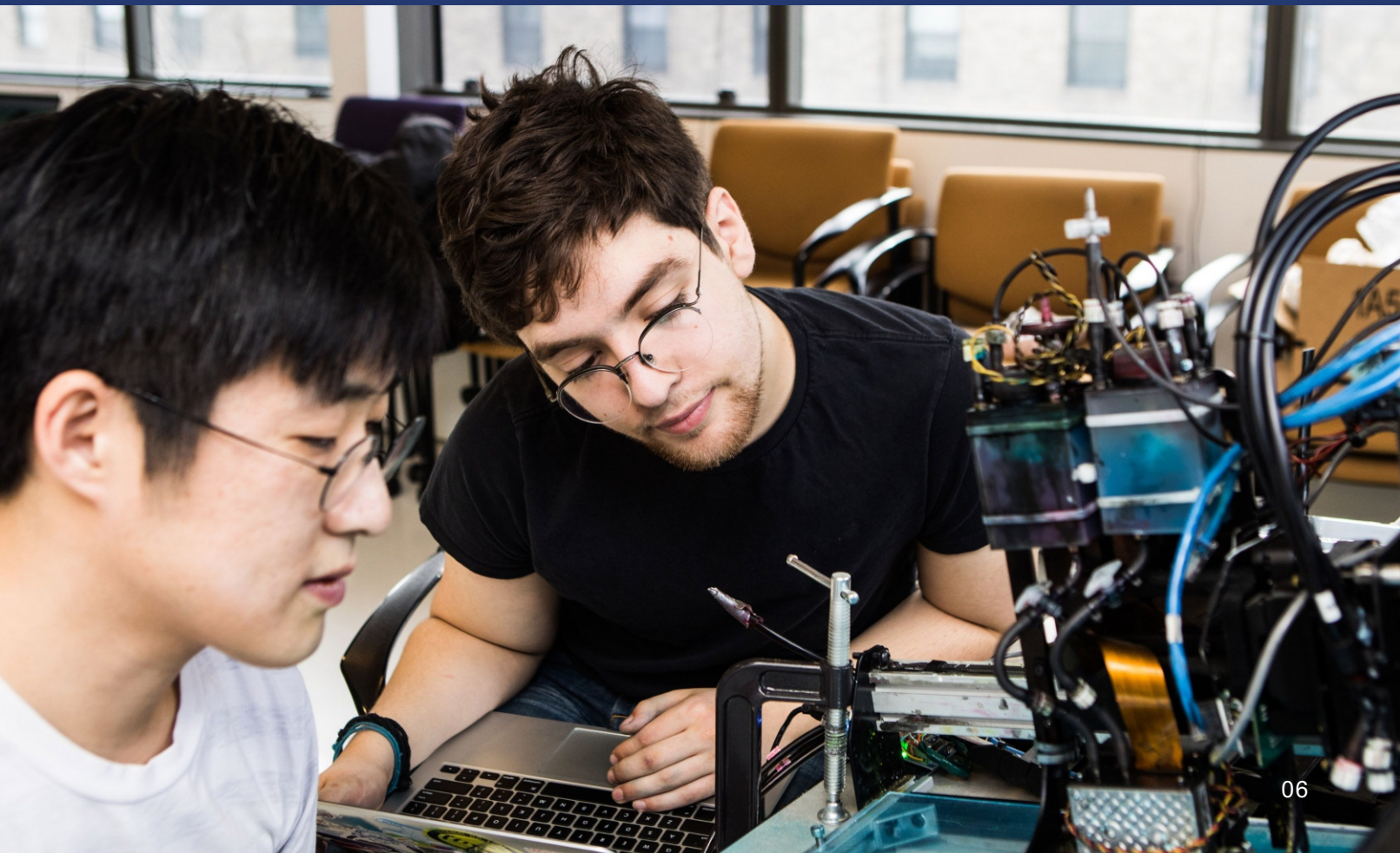
#### 项目时间： Project Time

预计2022年开始  
Expected to start in 2022

#### Bootcamp 先导条件： Bootcamp Prerequisites

学生须至少完成基础SPOC 或高阶SPOC中的一门课程以进行Bootcamp的学习。

Students must complete at least one of the base SPOC or advanced SPOC courses in order to participate in the Bootcamp.



# "AI+X" Blended Learning

## 课程成果

Blended Learning Outcomes

### 完成SPOC:

Complete SPOC

#### 1. 麻省理工学院官方证书 MIT Official Certificate

完成 SPOC 课程项目学生可获麻省理工学院官方证书，每一份证书均含有单独链接可链接至MIT官网档案查询。

Students who complete the SPOC program will obtain an official MIT certificate. Each certificate contains a separate link that can be linked to the MIT official website file for query.

#### 2. 美国高校实践类学分认可 Credits Recognitions

SPOC课程会授予2学分的“实践类学分”，全美通用。中国部分高校可认证并转换为本校相应学分。

SPOC courses will grant 2 credits of "practical credits", which are universal in the United States. Some universities in China can be accredited and converted into corresponding credits.

#### 3. SPOC 学习轨迹分析报告 & 综合表现评价 Learning Analytics Report & Performance Summary

取代传统成绩单，学习者将获得数据化、可视化的学习轨迹分析报告，清楚了解、比较自身与班级平均水平的差异。同时，报告还将综合评价在SPOC学习期间的整体表现，总结其习得知识和技能。该报告可直接用作学生简历或Personal Statement（个人陈述文书）素材。

Instead of traditional transcripts, learners will get a data-based and visualized learning trajectory analysis report to clearly understand and compare the difference between themselves and the average level of the class. At the same time, the report will also comprehensively evaluate the overall performance during the SPOC study period and summarize the acquired knowledge and skills. The report can be used directly as a student's resume or Personal Statement material.

#### 4. "AI+X" 综合软实力分析报告 "AI+X" Soft Skill Analysis Report

"AI+X" Blended Learning 课程组与剑桥大学 (University of Cambridge) 心理研究中心合作，为有求职需求的同学免费提供综合软实力分析测试，其报告结果将极大程度的帮助学习者求职提供专业的软实力支持。

The "AI+X" Blended Learning course provider cooperates with the Psychological Research Center of the University of Cambridge to provide free comprehensive soft skill analysis tests for students with job requirements. The report results will greatly help learners provide professional soft power support for job hunting.



### 完成PBL:

Complete PBL

#### 1. 导师指导下完成的可发表高质量科研论文 A high-quality publishable paper

通过PBL课程模块，麻省理工学院顶尖教授、研究院团队将带领学习者在“AI+X”领域下的某一方向（在这里了解进行12周的科研项目，从立项选题、提案审查、应用拓展直到论文发表一路指导。学习者完成PBL，即完成一篇完整的、高质量的、可供发表的科研论文）。

Students who complete the SPOC program will obtain an official MIT certificate. Each certificate contains a separate link that can be linked to the MIT official website file for query.

#### 2. 教授研究员推荐信 Recommendations

PBL阶段，如学习者表现优秀，教学团队会根据对其实际表现的观察亲自撰写相应推荐信。表现优异者有机会获得实验室助理实习等工作机会。

At the PBL stage, if the learner performs well, the teaching team will personally write the corresponding recommendation letter based on the observation of their actual performance. Outstanding performers have the opportunity to get job opportunities such as laboratory assistant internships.

### GTC全球人才计划:

Global Talent Community

GTC的全称为Global Talent Community，即全球人才计划。课程组将为GTC计划内学生提供各类长期帮扶计划，学生参与并完成SPOC模块即入选人才库计划，无需支付任何额外费用享有以下福利。

GTC is short for Global Talent Community. Students participating in the SPOC can join this community. Our career coaches will provide all types of assistance for students under the Program at no charge.

#### 1. MIT 线上公开课 & 免费学习资料：课程组不定期发放学习资料，并为学生免费开放MIT线上公开课入场名额。

MIT Online Open Courses & Free Learning Materials. Study materials are distributed from time to time and MIT online open courses are available to students free of charge.

#### 2. 中国顶尖科技企业实习岗位推荐：课程组将提供简历修改、投递、直推、面试技巧分享等各类帮扶。

Internship Positions at Top Tech Companies in China. Our team will provide a variety of resume revisions, referrals, interview skills and other career support.

#### 3. 出国留学申请经验分享：课程组团队成员分别来自麻省理工学院、哈佛大学、康奈尔大学、纽约大学、波士顿大学等世界名校，可为学生进行文书写作技巧、申请注意事项等免费指导。

Experience in applying for study abroad. Our team members are from MIT, Harvard, Cornell, New York University, Boston University and other world-renowned universities who can give students free guidance on writing skills, application essays and so on.

#### 4. 美国顶尖科技企业实习岗位推荐：学生在美留学期间，课程组可推荐学生在顶尖科技企业进行实习。

Internship Positions at Top Tech Companies in the United States. While the student is studying in the U.S., our team can refer the student to intern at a top technology company.



# "AI+X" Blended Learning

## 往期参与学生评价

Valuation of Participating Students in the Past

“学习Base SPOC 激发了我去探求的欲望，使我对人工智能有了全新的认知。我现在也更适应在全英文环境下的学习了。”

—— 段同学 哈尔滨工业大学 计算机与科学技术学院 本科一年级 | 参加Base SPOC

“Learning Base SPOC stimulated my desire to explore and gave me a new understanding of artificial intelligence. I am now more adapted to studying in an English-only environment.”

—— Student Duan, Harbin Institute of Technology, School of Computer and Science and Technology, freshman | Participated in Base SPOC

“我高效地了解了人工智能相关技术在科学和工程中的多个交叉应用实例，也悟出了一些本专业研究的新思路。”

—— 徐同学 清华大学航天航空学院 博士生三年级 | 参加Advanced SPOC

“I have effectively learned about multiple cross-application examples of artificial intelligence-related technologies in science and engineering, and I have also realized some new ideas for research in this specialty.”

—— Student Xu, Tsinghua University, School of Aeronautics and Astronautics, third-year doctoral student | Participated in Advanced SPOC

“本次PBL由我和组员以及我们的导师共同完成。我们成功在IEEE ICCSEC 2021会议上刊发了名为 Environment and Speaker Related Emotion Recognition in Conversations的论文。我们用3个月完成了PBL并刊发了论文，这对我2021年的求职非常有益！”

—— 钟同学 同济大学汽车工程学院 研究生二年级 | 参加NLP PBL项目

“This PBL was completed by me, the team members and our mentor. We successfully published a paper called Environment and Speaker Related Emotion Recognition in Conversations at the IEEE ICCSEC 2021 conference. We completed the PBL and published the paper in 3 months, which is very beneficial to my job search in 2021!”

—— Student Zhong, Tongji University, School of Automotive Engineering, second year of graduate study | Participated in the NLP PBL project

