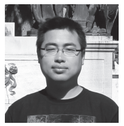
设计视角下人工智能的定义、应用及影响
DEFINITION, APPLICATION AND INFLUENCE OF ARTIFICIAL INTELLIGENCE ON DESIGN INDUSTRIES



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摘要

“人工智能”的出现大幅提升了人们的生产及生活效率，但与此同时，人类自身的就业环境也深受影响。那么，对于设计行业而言，人工智能又将带来怎样的挑战与机遇？由此，《景观设计学》邀请了6位来自建筑设计、城市规划、景观设计、工业设计等不同学科的学者、设计师，分别回答了什么是人工智能、人工智能可能对设计师的工作产生何种影响，以及人工智能会创造什么样的生活方式三个问题。多数受访者认为，当前的人工智能并非真正意义上的人工智能，其不具备自我意识，亦无法完成创造性行为。而在参与设计工作时，人工智能虽然可以大幅减少设计师的程序性劳动，但由于其采用的是权重叠加和“去少存多”的数据处理方式，运算结果缺乏伦理性和价值评判，因而还远远无法胜任创造性工作。而在未来，人工智能无疑会对人类的生活方式产生巨大影响，甚至远超出我们的想象。

关键词
人工智能；设计；机器；数据

ABSTRACT
Artificial Intelligence significantly promotes humans' production efficiency and facilitates our daily life. Meanwhile, the climate of people's employment is also under great impact. Through a group interview with six scholars and designers from the fields of Architecture, Urban Planning, Landscape Architecture, and Industrial Design, *Landscape Architecture Frontiers* attempts to provoke public attention on the challenges and opportunities (would be) brought by Artificial Intelligence (AI) by asking three questions: What is AI? How would AI influence on designers' working process and final results? And, what lifestyles would we have in the future under the influence of AI? Most interviewees agree that, though AI has largely helped us lessen workload on repetitive or routine tasks, nowadays it can neither intelligent enough to have self-consciousness or perform creative jobs, nor to offer ethical solutions or value judgments, because it is operated under weighted computing which is programmed by the majority rule. However, all the interviewees believe that AI will make a big change on people's future lifestyles, far beyond our imagination.

KEY WORDS
Artificial Intelligence; Design; Machine; Data

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如果向公众介绍什么是“人工智能”，您会怎么说？

蔡凌豪：迄今为止的“人工智能”并非真正的智能。真正的智能是具备自我意识前提下的创造性行为，而人工智能目前还停留在基于庞大数据库、高速运算力和人工逻辑链进行运作的层面。计算机的运作模式决定人工智能本质上是将复杂的现象和问题分解为无数细小的“是与否”，并通过权重叠加来获得可能的“答案”。它可以辅助人脑在人工设定的方向上更加快速、清晰地认知世界，并在此基础上预测可能性，却无法产生独立性或创新性的思考。我认为，在机器产生自我意识之前，尚不存在真正的人工智能。

辛向阳：从哲学角度来讲，人工智能是投射在具有机器学习能力的媒介上的人的意图。这是一种在不断增强的机器自身学习能力和由此启发的新的人类需求的相互作用下，不断进化和不断被重新定义的能力。因此，被认定为人工智能范畴的技术必定具有这种不断更新的能力。从技术角度来看，目前已有的人工智能已经可以尝试模拟复杂的人类推理和判断能力（比如具备模拟神经网络并应用了计划策略技术的“阿尔法狗”），以及通过技术更加高效和精准地完成某项既定任务（比如运用了大量感应和图形识别等技术的无人驾驶）。

龙瀛：现阶段的人工智能基本上属于以“人工”的投入换取“智能”，是以大量的基础数据工作（如人工标注）为支撑的。

王鹏：人工智能即是使计算机具备人类的思维决策能力，主要表现为机器可以做更多以往需要人来做的工作。

人工智能可能对设计师的工作产生何种影响？

范凌：很多人工智能领域的科学家会将取代人力劳动作为发展人工智能的目标，而另一部分思想家则对人工智能可能会对人类社会造成的危害表达了深深的担忧。我一直希望在讨论设计师和人工智能的关系时避免使用“替代”一词，以规避“人工智能可能对人类创造产生威胁”的隐含意思，以免造成偏见和误导。因此，我提出了“脑机比”（即人脑与机器的比例）这一概念，其可以更为恰当地表述人工智能与人类创造的关系。诚然，对于很多工作来说，机器成分的与日俱增会造成人脑成分越来越少，随着脑机比无限缩小，人类价值也会愈加弱化。但对于另一些工作，机器成分变大反而会激发人脑的潜能，使之进化甚至释放，而脑机比并不会因此而减少，人类价值也始终占据着重要地位。我想设计肯定属于后者。

设计师的工作不追求确定性，反而会受益于不确定性。因此，人工智能在设计领域的应用并不意在得到恰当的答案，其价值更在于创造“不确定”，进而启发设计师形成新的创意。人类创造的瓶颈在于自身的经验、逻辑和方法，期待有朝一日我们可以借

助人工智能突破这一瓶颈，让人类的创造力得到进一步释放。

赖文波：人工智能是未来科技发展的重要领域之一，而设计师作为艺术与技术的整合者，需要适应人工智能的发展，并积极学习相关知识。对于设计师而言，人工智能更像是一种工具，是一种“立体的”、组合式的数据库。它很“贴心”，因为它可以自主选择最优解，但何为“最优”往往仁者见仁，智者见智，人类尚不能达成统一意见，显然这个“聪明的数据库”也无法独自承担这项责任。以我们生活中的人工智能应用为例，比如“智能淘宝”，其中涉及的人工智能根据数据选择最优解的过程实际上是在“去少存多”，即丢弃少数性意见，使少变为零，而后将多数性意见作为最终意见。横向上它使少变得更少，纵向上也忽略了人的复杂性和发展性，所以人工智能作为工具所得出的最优解是不附带伦理性与价值判断的。因此可以说，人工智能难以提供真正的设计，因为设计创意具有明确的价值选择与伦理取向。单纯依赖人工智能只会局限人类社会发展的可能性，这无疑会带来灾难。因此，设计师在运用人工智能的同时，更需要关注自身艺术修养的提高以及正确价值观的培养等。

蔡凌豪：设计总体上是一种创造性行为，但在进行创造性工作之前，需要深入地获取、剖析、评价和预测设计所面对的现实世界。当代规划设计的对象本身往往已经是一个复杂巨系统，加之设计成果将面临多样化的使用场景，并产生“蝴蝶效应”般的连锁影响——面对如此庞大的数据量、复杂度和尺度效应，我们无法仅依靠人脑对其进行高效且相对客观的认知解析。而现代基于大数据和云系统的人工智能可以帮助我们使这些看似毫无关联的碎片化信息结构化和逻辑化，并深入挖掘后续创造性工作的研究基础和潜在方向。简而言之，人工智能并不能帮助我们创造，但可以帮助我们观察和思考。

王鹏：目前的人工智能技术普遍停留在机器学习阶段，即通过对大量数据的统计计算来归纳规律，尤其适合分类、趋势外推等工作。反观设计师的技能或工作内容，可分为程序性劳动和创造性工作两个部分。其中，占据设计师绝大部分工作时间的程序性劳动（俗称“力气活”），包括基础资料的收集和整理、对现实场景的分析和评价、对边界条件（包括形态上的限建区和指标上的阈值）的评估和判断等，其实很容易被人工智能所替代。而反映设计师核心价值的创造性工作还远不能被替代，因为创造的过程需要建立在对大量知识进行消化吸收的基础上，并依据现实场景进行综合判断和推演。但可以肯定的是，如果设计师能够从程序性劳动中解放出来，就会有更充裕的时间去思考和创造。

辛向阳：尽管人工智能在近两年才成为大众关注的热点，但人工智能在设计领域的应用研究却可以追溯到20世纪70年代在建筑和产品设计等领域运用的形态语法。阿里巴巴的鲁班智能设计平台和Ark Design公司的ARKie智能设计系统是国人较为熟知的人工智能在设计领域的商业应用案例，它们的出现使得平面设计师开始重新定位和思考自身的职业属性和范畴，也引起了部分设计师对当前设计美学和技术哲学的反思。在人类悠久的文明进程中，技术进步和社会认知的更新总是相辅相成。作为设计师，应该充分理解和运用人工智能所带来的便利和可能性，既为自身的职业发展寻求新的机遇，同时也通过恰当运用技术推动社会在合理的路径和方向上发展。

龙瀛：人工智能侧重于认识现状，而设计更多的是面向未来的创造。当前，规划支持系统设计的失败案例不在少数，大多是团队配合欠佳的结果。我所在的北京城市实验室（BCL）团队在数据增强设计方面有着多年的研究及实践经验，结合这些经验我们发现，某一系统或产品开发建设的整个过程都需要人工智能工程师与设计师双方紧密配合，甚至需要兼备两种知识和能力的人才，由此才能达到最为有效的增强效果。

徐蜀辰：当前的人工智能技术对环境设计的推动力仍十分有限。一方面，对于强人工智能在环境设计垂直领域的探索依然有待深入。事实上，现有的绝大多数研究都是由研究机构和科学家的兴趣驱动的，而鉴于研究者的学科知识和掌控资源（数据、实验设施和验证测试环境）往往存在局限，所以很难对物质环境与人类的互动关系进行全局性的研究与把控。另一方面，当前弱人工智能在环境设计领域的应用大多基于简单算法工具和简单模型（如空间句法），而这些工具和模型与大数据接入，以及与环境行为模拟和设计实践的对接能力都很有限。值得肯定的是，当前神经科学、环境行为学领域的新兴研究方法，以及大数据空间分析方法与工具，正为研究和实践人员提供新的探索方向和可能性。

作为一门实践性学科，环境设计对于高效易用的工具有着强烈需求。虽然我们可以通过对人类心理、行为和感知与所处物质环境之间的互动关系展开基础性研究，来获取必要的参数和运算公式，再借助被大部分专业人士认同的知识，开发支撑设计与实践的工具，但是这种“研究探索-获取知识与参数-工具研发”的过程极其缓慢，并且仰赖设计师、研究者、开发商、业主等多元利益主体的参与。即便如此，这是仍然是值得领域内专业人士关注的一条路径。此外，由于行业生态、投资模式、政府参与形式的差异，中国市场探索人工智能的方式和路线图与其他国家大有不同。例如，如何将人工智能与国内PPP 开发模式相结合应为国内研究学者密切关注的方向。

您认为人工智能会在未来创造一种什么样的生活方式?

龙瀛：与其探讨人工智能能为人类带来什么样的生活方式，不如关注由信息通讯技术等带动的第四次工业革命能为我们带来哪些影响。前三次工业革命的经验表明，人们往往会低估正在经历的事件或时代对当下及未来的影响，而我们目前即处在第四次工业革命的浪涛之中。无论是城市空间、城市生活，还是对荒野环境的空间体验，都受到了前沿科技的强烈影响，而未来这种影响也只会更为强烈。能够创造什么样的生活方式，也会远远超出我们当下的想象。

王鹏：人工智能将成为未来智慧城市的核心要素。随着人工智能计算能力被引入无处不在的边缘计算物联网硬件中，我们身边的所有物体都将具备一定程度的智能，以使我们的生活更加舒适便捷。比如当下盛行的共享经济，即是借助智能硬件可以长期实时在线的特质，实现所有权与使用权的分离和使用效率的最大化。可以想见，小到自行车，大到房间甚至建筑，都面临着运营方式上的颠覆式改变，而产品和空间的外在形态也会随之发生改变。

蔡凌豪：未来人们将拥有更加便捷、更富有针对性且具有场景化体验的生活方式——但在真正的人工智能产生之前，人类的生活方式不会发生革命性改变。LAF

How do you define Artificial Intelligence (AI hereafter) in simple words?

Linghao CAI: Nowadays, AI is not that “intelligent” yet. A true intelligence should have self-consciousness that can do creative work. But, at present the operation of AI is still based on big data, high-speed computing, and human logic chain, through which machines divide complicated questions into numerous simple “yes or no” questions to get possible answers after computing all the weights — it is also the essence of AI. AI can be used to help humans understand the world faster and more clearly in a given field or from a certain dimension, and to better predict possibilities; however, AI fails to offer original thoughts independently. I am afraid that there is no true AI before machines form self-consciousness.

Xiangyang XIN: From a philosophical perspective, AI is a projection of human intention on agencies of learning, which has evolved and been iteratively redefined by the interaction between machines’ increasingly stronger learning ability and humans’ new needs. Thus, the technologies in the realm of AI need to be able to upgrade themselves continuously. Technically, so far, AI is about imitating human’s reasoning ability, such as the neural networks and planning strategies applied in AlphaGo, and more efficiently and perfectly doing certain tasks by employing advanced technologies, such as the sensory and pattern recognition technologies used in autonomous driving.

Ying LONG: Current efforts on AI largely depend on human intelligence and are supported by massive data processing work such as manual annotation.

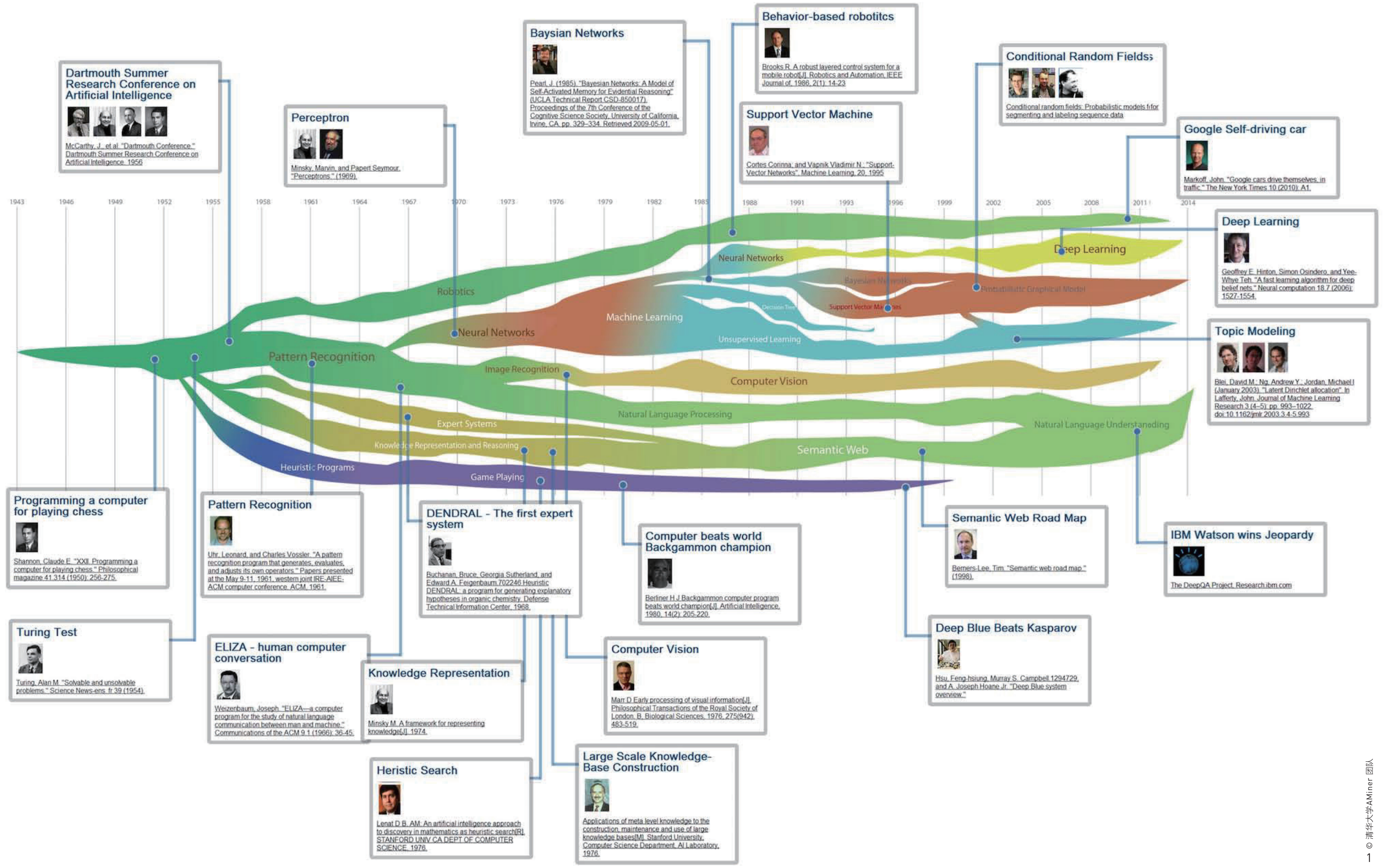
Peng WANG: AI means that machines can imitate human intelligence to think and to make decisions; AI makes machines capable of doing jobs that could only be done by humans in the past.

How would AI influence on designers’ working process and final results?

Ling FAN: Many AI scientists envision that AI will completely take over human labor in the future, while some thinkers have expressed their worry about the harm it might bring — When it comes to the relationship between AI and professionals in design industries, I am afraid that the wording “replace” or “take over” would imply that “AI might be a threat to human beings” which is likely to misguide public attention or provoke prejudice; “brain-machine ratio” is the phrase I suggest to describe the relationship between AI and designers — It is true that for many jobs, the increasing employment of machine would decrease brain effects and the indispensability of human labor. But for quite a few other jobs, the great help from machine can stimulate the potentials of human brain and further encourage creativity. Design is a typical example to the latter, for which the brain-machine ratio would not decline, and the important role of human would never be replaced.

Designers’ work is to embrace uncertainty. Therefore, the application of AI in design fields would nicely contribute to designers’ creativity, which is often limited by personal experience, conventional logic, and proved methods.

Wenbo LAI: AI is one of the key areas of future science and technological development. As professionals who work on combining arts with technologies, designers need to embrace AI by proactively learning related knowledge. For designers, AI is more like an effective tool, or a dimensional and modular database, because it can independently produce the “best” solutions. However, one of the paradoxes of AI is that the “best” solutions are not “smart” solutions since they are simply automatically generated results by weighted computing and lack ethic, aesthetic, or cultural considerations. For example, “Smart Taobao,” one of the most widely used AI applications in our daily lives, offers the “best choice” for its users basically under the majority rule — presenting the goods that are most bought by Taobao



1. 人工智能发展图谱

1. The development stages of AI

users. This application not only disregards minority preference, but also overlooks the shopping complexity and users' preference changes. In other words, AI cannot truly design, because design is an act with considerations of ethics and values. Moreover, our dependency on AI would limit the possibilities of human social development. Designers need to make more efforts in improving their own artistic and ethical cultivation.

Linghao CAI: Design in general is a work of creativity. But such creative work is supported by massive work of investigation, analysis, assessment, and prediction on real contexts. The targets of planning and design are often complicated giant systems, and design works need to meet different demands for diverse usage scenarios where "butterfly effects" would be easily caused in such intricate design process. The quantity, complexity, and scale effect of required data are too huge to be fully and objectively comprehend by human brains. In contrast, based on big data and cloud system, AI can help us scan and structure such vast information and explore the potentials and possibilities for future research and creative work. In brief, AI is to help us observe and think, but not to create.

Peng WANG: Currently speaking, AI is still at the stage of machine learning supported by massive data processing and statistics in order to derive or discover general rules and principles for classification and trend extrapolation tasks, for example. For designers, AI can take over most of their repetitive or routine tasks such as information collection and sorting, analysis and assessment on sites, and estimation on physical borders and effect thresholds. But, AI is inadequate in doing creative tasks, because creation is a process of absorbing, comprehending, and leveraging the knowledge what designers have, and also a process of producing new knowledge to respond to and interact with the real worlds. In other words, creation is what defines designers' role, which cannot be replaced by AI in a short time, insofar. But one thing is for sure: with AI's help on the repetitive and routine work, designers will have more time left to think, to conceive, and to create.

Xiangyang XIN: Although AI is widely discussed in recent several years, its application in design industries can be traced back to the 1970s when shape grammar was used in architectural and product design. Alibaba's Luban Intelligent Design Platform and Ark Design's ARKie Intelligent Design System are two well-known examples of such applications for commercial uses, which have inspired graphic designers to review their professional specialty and territory and to reflect the contemporary design aesthetics and technical philosophy. In the long history of human civilization, technical advancements always accompany with the changes in social development. Designers need to understand and make full use of the convenience and possibilities brought by AI. This requires designers not only to seek new opportunities for their professional development, but also to promote healthy social development by using technologies properly.

Ying LONG: AI is developed to solve today's problems, while design is to produce creative solutions for tomorrow. Currently, failure is commonly found among the design cases of planning support systems, mostly resulting from the underperformance of teamwork. Beijing City Lab (BCL), the institution I work for, has years of research and practical experience in Data Augmented Design. Our experience shows that the most effective augmented design works largely result from the close collaboration between AI engineers and designers throughout the development process of a certain system or product, which requires professions to equip themselves with knowledge and abilities related to both AI and design.

Shuchen XU: The current artificial intelligence technology is still very limited in driving the environmental design. On the one hand, the exploration of strong artificial intelligence in the vertical field of environmental design remains to be deepened. In fact, most of the existing research is driven by the interests of research institutions and scientists, and given the limitations of the researchers' knowledge and control of resources (data, experimental facilities, and verification testing environments), it is difficult to The overall study and control of the interaction between the physical environment and humans. On the other hand, the application of current weak artificial intelligence in the field of environmental design is mostly based on simple algorithm tools and simple models (such as space syntax), and these tools and models are compatible with big data access, and the ability to interface with environmental behavior simulation and design practices. Are very limited. It is worthy of recognition that the current emerging research methods in the fields of neuroscience and environmental behavior and the methods and tools for large data spatial analysis are providing new exploration directions and possibilities for researchers and practitioners.

As a practical discipline, environmental design has a strong demand for efficient and easy-to-use tools. Although we can conduct basic research on the interaction between human psychology, behavior and perception and the physical environment in which we are located, we can obtain the necessary parameters and calculation formulas, and then use the knowledge recognized by most professionals to develop support and design. Practical tools, but this process of "research-explore knowledge and parameter-tool R&D" is extremely slow and relies on the participation of multiple stakeholders such as designers, researchers, developers, and owners. Even so, this is still a path worthy of attention by professionals in the field. In addition, due to the differences in industry ecology, investment models, and forms of government participation, the approach and road map for exploring artificial intelligence in the Chinese market is very different from other countries. For example, how to combine artificial intelligence with domestic PPP development model should be the direction that domestic researchers pay close attention to.

What lifestyles would we have in the future under the influence of AI?

Ying LONG: This question is more about what influence would be brought by the Fourth Industrial Revolution driven by information and communication technologies. The history of the previous three industrial revolutions tells us that people tend to underestimate the influence of new technologies upon our lives and future. Now we are in the age of the Fourth Industrial Revolution. Urban space, city life, and even the spatial experience of wild places are all greatly changed by advanced science and technologies, and such influence will be increasingly stronger in the future. So, I believe that future lifestyles will be far beyond our imagination.

Peng WANG: AI will be the core of future smart cities. As it is being introduced and applied in the hardwares of Edge Computing-Internet of Things (EC-IoT), everything around us will be more or less "intelligent" that would substantially facilitate and benefit people's life. One example is the Sharing Economy: by using smart hardwares of real-time and online service, Sharing Economy separates the rights to own and to use, maximizing usage efficiency. It is imaginable that the operation or usage of objects — from bicycles to rooms or buildings — are under revolutionary changes which would further lead a big change of objects' form or shape.

Linghao CAI: In the future, people's lifestyles would be much more convenient, diverse, and scenario-experience-based. Yet, there is no big changes before the true AI comes into being. LAF