

President Nishio's Speech at the 2016-2017 Spring Graduation Ceremony and Graduate School  
Commencement Ceremony

### **A Heart-felt Congratulations**

It is my pleasure to hold the 2016 Graduation Ceremony and Graduate School Commencement Ceremony with executive vice presidents, auditors, deans, faculty and staff in attendance.

Please permit me to extend my sincerest congratulations to each and every one of you who completed your studies at your respective schools and are embarking on a new life. As the president of Osaka University, I'd like to heartily congratulate you on your efforts that have led you to this day. I also would like to express my admiration for your parents who supported your achievement of these goals.

Over 200,000 individuals have graduated from Osaka University, and today, you all will join these ranks. With dreams and hope in your hearts, you are all about to set off on your own paths towards the future. I'm honored and overjoyed to be able to speak directly with you all on your day of departure into the world.

### **Looking Back at What Happened Close at Hand**

On April 14, 2016, a large earthquake occurred in Kumamoto prefecture. While still fresh in our memory, this earthquake heavily damaged many buildings and facilities while taking the lives of a number of individuals, some of whom were university students like you. They entered university full of dreams. Just as they were about to make new friends and take the next step in their lives, they suddenly lost it all. As an educator, thinking of that makes my heart sink.

Among those undergraduates in attendance are individuals who were born in 1995, the very same year as the Hanshin-Awaji earthquake. The earthquake also affected Osaka University and related individuals more than ever before. When natural disasters or accidents happen, especially when they happen nearby or to those closest to us, we are confronted with questions that we don't normally think of, such as, "What is happiness?" "What is wealth?" and "What is life?"

Our modern civilization has developed through our pursuit of better, more convenient things. However, I think that the pursuit of only material wealth will lead us to lose sight of true happiness. I think that human happiness lies not in simply possessing things through economic growth and the development of science and technology, but in cherishing something that is living and valuing love by benefitting from such development. In other words, spiritual wealth brings happiness to humans. I strongly feel that societal development must not tarnish the well-being of society and that this development must contribute to the happiness of human beings.

### **Towards a Super Smart Society**

The Japanese government publishes an essential part of science and technology policies in the form of a 5-year basic plan. The 5<sup>th</sup> Science and Technology Basic Plan, which was proposed for the 5-year period between the 2016-2017 academic year and the 2020-2021 academic year, aims for the creation of new worth and services in a "super smart society" as a shared vision for a future society.

The super smart society found in this plan is described as being "a society that can precisely respond to the various needs of society by providing the necessary amount of the necessary goods and services to the necessary people at the necessary time, and a society in which anyone can

obtain high quality services and live actively and comfortably while overcoming various differences such as age, gender, region, and language.”

This kind of society, one that brings wealth to the people, is also called “Society 5.0.” Society 5.0 is the fifth in the line of society in human history, which includes hunting society, agricultural society, industrial society, and information society. The basic plan advocates the importance of the science and technology innovation guiding the revolution to give birth to Society 5.0.

### **Breakthroughs in AI Technology**

As you already know, the core technology for realizing this “super smart society” is artificial intelligence (AI). In recent years, there have been huge advances in AI. For example, things that you could only see in the movies or in your dreams, such as autonomous cars, have become a reality. I’m sure you are all aware of advances in technology in daily life.

Speaking of artificial intelligence, in December 2015, a certain think-tank organization published an impactful report. The report stated that the jobs of 49% of workers in Japan, including office workers, assemblers, supermarket workers, taxi drivers, bus drivers, and train operators, can all be replaced by robots, which would take many jobs away.

However, if we take another look at the report, we can see that the increased production through artificial intelligence will lead to (1) a solution to a manpower shortage due to a declining population, (2) replacement of human workers (with robots) in menial tasks associated with our daily lives, and (3) investment of our free time in academia and hobbies. The report suggests the importance of having these perspectives.

And even if we are able to predict the jobs that will disappear, it’s difficult to predict jobs to come. Thus we should also expect that jobs which require creativity to make new things will appear in the future. In addition, I expect that methodologies of education and research at university, which require the most creativity, will change moving forward.

Victories of artificial intelligence over humans in *Shogi* and *Go* matches often come up in conversation as successful examples of AI. I’m sure you often hear the term “deep learning” as one kind of AI technology. Deep learning is a method of multi-layered machine learning that aims to simulate characteristics of brain function in machines. An individual who came up with one of the principles of deep learning was former Osaka University Professor FUKUSHIMA Kunihiro. This deep learning developed from his Neocognitron, published in 1979.

The *Go* program that utilizes “deep learning,” named “AlphaGo,” defeated a professional human *Go* player for the first time in 2015 without a handicap. In March 2016, the same program defeated Lee Sedol, 9th *dan Go* player and well-known as the strongest in the world, which made for some big news.

When I learned of this news, I was both shocked and a bit scared. It frightened me to think about what would happen if AI technology continued to develop at this rate, which was 5 years ahead of what I had originally assumed. In actuality, it has been said that there may come a time when humans will no longer be able to control the autonomous operation by artificial intelligence.

### **A Discussion on the Singularity**

From what I’ve been discussing here, I think that AI suggests not only directions of our

research and education, but also directions of our lifestyle and the development of new culture and civilization. In response to the trend of the times, what action should we take? I'd like to talk a bit about the singularity.

The Singularity is the hypothesis that artificial superintelligence will surpass all human intelligence in 2045, about the time you will be active in your careers. However, this hypothesis differs from the singularity defined by Dr. Ray Kurzweil. He defined that artificial intelligence and humans should be on the same team, and that humans will evolve while supplementing their abilities by using artificial intelligence. I firmly believe that this is the true role of AI as well as the ideal form of human happiness through science and technology.

Such a technological revolution cannot be achieved with information technology alone. Collaboration among people in various fields including science and technology, humanities, social sciences, medicine, and dentistry, for example, a fusion of the latest brain science and cognitive science, is necessary. Current AI technology represented by deep learning is based on brain science knowledge from the 1980s, and its practical use has become possible through the development of information technology.

The development of recent brain science has taken a dramatic step forward. What is necessary now is opening new frontiers of AI through a fusion of brain science and technology. By taking into account opinions from individuals in the humanities and social sciences as well, it will become possible to develop AI technology that enables the creation of a world in which there are no traffic accidents, disasters can be predicted, and people can understand each other beyond language barriers and cultural differences. Through these efforts, a singularity that is beneficial for humans will be achieved.

#### **Four Abilities and the Curiosity that Support You**

Today, I spoke about the development of AI technology. This kind of dramatic development of science and technology brings about a great revolution in industrial and societal structures. In manufacturing business, the move to industrial structure change, from conventional vertical integration<sup>1</sup> to horizontal integration<sup>2</sup>, is rapidly accelerating.

In such a setting, both companies and society have started to seek their own paths by asking basic questions such as "What should we do now?" and "Why?" as well as "Will this make people happy?"

Under such circumstances, in order to respond to the change, it is necessary to coalesce the wisdom of the people in all fields of science, engineering, medicine, dentistry, pharmacology, and social sciences. Also, on a personal level, not individuals who are concerned with deepening technical knowledge alone, but those who have both specialized knowledge and a comprehensive point of view are sought after. Of course, the communication ability to tie these two together is also important.

Osaka University has, for quite some time, carried out education with the aim of cultivating human resources in addition to providing high-level specialized education. We have performed human resource development by focusing on 4 abilities: "critical thinking," or societal decision-

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<sup>1</sup> Vertical integration -- a company owns an entire supply chain

<sup>2</sup> Horizontal integration -- strategic alliance between two or more companies

making ability based on a wide range of knowledge, “transcultural communicability,” or the ability to converse with people from different cultural backgrounds, “design prowess,” or a free and interdisciplinary imagination, and “communication ability.” I’m sure all of who will graduate today have acquired these 4 abilities.

From here on, you will all continue down your own paths, but society will continue to change forever. The society you may find yourselves in 15 years from now, after the singularity 30 years from now, and even further to a society 50 years from now, could be impossible for you to even imagine today. It's my sincere wish that no matter what changes you may face, you will utilize the knowledge and experiences you have gained at Osaka University and take the initiative in contributing to social development for human happiness.

I also want you all to continue to have curiosity. Earlier, I spoke about artificial intelligence, but what AI doesn’t have at the moment are the abilities to doubt and question. Just as Newton was interested in the phenomenon of objects falling to the ground, or rather, the phenomenon of objects being pulled towards the earth, so I do hope all of you continue to cultivate “curiosity” unique to humankind.

### **Best of Luck!**

Last but certainly not least, I want you to bring to mind once again your gratitude to your family members, friends, and research partners who have supported you on your path to graduation. I hope you will keep the memories at Osaka University close to your heart and you will lead healthy and happy lives to the fullest.

Once again, congratulations!

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Osaka University President  
NISHIO Shojiro