



Key Findings

Strengthening ROK-United States Science & Tech Partnership on Critical Technologies Dialogue

Session 1: Exploring US and South Korea's Prospects and Challenges in AI and Robotics

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On August 24, 2022, with support from the Consulate General of the Republic of Korea in Honolulu, and in partnership with the George Mason University Korea's Center for Security Policy Studies, the Pacific Forum hosted the first session of *Strengthening ROK-United States Science & Tech Partnership on Critical Technologies*, "Exploring US and South Korea's Prospects and Challenges in AI and Robotics." Over 30 participants (excluding speakers and staff) from the government, private sector, academia, and other non-governmental organizations participated in this virtual event.

Emily S. Weinstein, Research Fellow at Georgetown's Center for Security and Emerging Technology, **Dr. Alice Oh**, Professor in the School of Computing at KAIST, and **Dr. Boyoung Kim**, postdoctoral research fellow in the Department of Psychology at George Mason University, examined the opportunities and challenges to strengthen collaboration between the United States and South Korea on the strategically important fields of artificial intelligence and robotics and the role semiconductors play in achieving successful innovation.

The Key Findings from this webinar are below.

Artificial Intelligence, Robotics, and Semiconductors: Opportunities and Challenges

Artificial Intelligence (AI) continues to attract attention due to progress in applications in critical sectors such as healthcare and semiconductors, as well as promising fields like robotics. But to realize AI's revolutionary promise, policymakers must recognize the barriers to be overcome, such as diverging public and commercial interests and complex ethical considerations. On semiconductors, a lack of trust and transparency between the public and private sectors could deter more effective US-South Korea technological partnerships.

In healthcare, AI is rapidly being deployed to develop innovative drugs against viruses that are antimicrobial resistant. With increasing enthusiasm towards autonomous machines, AI is also being used to create "social robots" who can interact and proactively assist humans in a variety of fields, from education to defense. Conversely, AI is increasingly utilized to unlock new and innovative microchip technology that may produce the next breed of more effective and efficient semiconductors.

Noting the vital role of semiconductors in both AI and robotics in the era of strategic competition, the urgency to develop a resilient and secure supply chain for advanced chips has accelerated in US foreign and domestic policy, as evinced by the recent passage of the CHIPS and Science Act (“Creating Helpful Incentives to Produce Semiconductors for America Act”).

Decoupling or the use of export controls to divert supply chains, joint ventures, and licensing away from a country has become an attractive tool for the US to impose delays and costs on China’s attempts to acquire and develop advanced technologies to produce semiconductors. But decoupling should not be applied as a blanket policy given the complexity of the US-China relationship. As such, the US and like-minded partners should instead adopt strategic decoupling, determining chokepoints and leveraging strategic advantages in both the Chinese and Western supply chains.

The proposed Chip 4 alliance acts as a viable platform for the United States, South Korea, Japan, and Taiwan—who jointly control 78% of semiconductor supply—to collaborate on innovations in advanced semiconductors and other emerging technologies and implement the concept of strategic decoupling against China. The US must also resist the temptation to engage in unilateral protectionism for short-term advantage to US firms.

Apart from participating in the fundamental research phase, the private sector appears reluctant to forge long-term multilateral collaboration on semiconductors due to deepening industry competition. The competitive nature of the semiconductor industry—largely driven by the susceptibility of global supply chains to geopolitical shocks such as US-China strategic competition, the ongoing war in Ukraine, and misgivings about state subsidies—may hamper concrete progress in achieving the objectives of the Chip 4 alliance.

Potential AI collaboration, especially between US and South Korean companies, is similarly hindered by profit maximization and competition. While there is appetite in the US and Korean private sectors to develop and produce products for public good, the determining factor still lies in commercial viability. For instance, due to reduced financial incentives, the private sector is less inclined to invest in the research and development of antimicrobial resistant drugs.

On AI and robotics, major ethical questions underpinning the governance of AI also remain unanswered. These concerns span the need to mitigate or eliminate biases from machine learning models to incorporating a level of moral competence in robots. Current machine learning models used for facial and voice recognition have been found to have gender and racial biases—a phenomenon that automatically perpetuates, exacerbates, and even multiplies existing political, economic, cultural, and social inequities. If these biases are applied to fields such as healthcare, prevailing inequalities are only replicated, causing disproportionate harms to underprivileged communities.

As robots continue to demonstrate human-like abilities both in mundane and critical circumstances such as crisis or conflict, the moral and ethical dilemmas that undergird their development and deployment become even more acute. Current proposals for “social robots” to assist soldiers in ethical decision-making in the battlefield and prevent harms to civilians will require more thorough assessment. The US and South Korea should conduct further research on making robots more credible moral actors not only in providing advice to humans but also in performing automated tasks such as those in self-driving cars.

With the rapid growth of data combined with the advancement in computing power and algorithmic training, the defense sector aims to create AI-guided precision munitions and fully autonomous weapons systems. Building on notable civilian research and development breakthroughs fueled by defense initiatives like the Defense Advanced Research Projects Agency (DARPA), government defense officials and policymakers have embraced more public-private partnerships to achieve successful AI and robotics research and applications.

However, such collaboration between government defense agencies and the private sector can be a double-edged sword. Researchers and policymakers must weigh the potential benefits against the risks of innovations in military applications, as seen in public concerns in both countries surrounding the development of “killer robots.”

Next Steps for US-South Korea on AI and Robotics

Amid such challenges, opportunities for cooperation are available for the US and South Korea on AI and robotics. Given the expanding knowledge and awareness of the emerging benefits and harms of AI applications, regulatory approaches grounded in cross-sectoral collaboration present a viable way forward.

Aside from strengthening public-private partnerships on capability and regulatory development, integrating a cross-sectoral and even cross-cultural approach could help the US and South Korea better implement joint research and development projects oriented around improved synergy between industry, academia, and civil society.

On the growing discussions on semiconductors—regardless of the results of the midterm Congressional and 2024 presidential elections in the US—the Biden Administration must continue to send high-level officials to multilateral technological groupings such as the proposed Chip 4 alliance. This should be complemented by increased bilateral research and development partnerships at the institutional or working levels to sustain collaboration and stimulate innovation over the longer-term.

By far the greatest opportunity for collaboration between the US and South Korea is to ensure a level playing field that promotes transparency and cultivates trust. Thus, the Biden and Yoon administration must allow companies to collaborate, compete and innovate, resisting the temptation to protect domestic companies.

This document was prepared by Jake Steiner and Mark Manantan. For more information, please contact Dr. Crystal Pryor (crystal@pacforum.org), Vice President of Pacific Forum. These preliminary findings provide a general summary of the discussion. This is not a consensus document. The views expressed are those of the speakers and do not necessarily reflect the views of all participants. The speakers have approved this summation of their presentation.