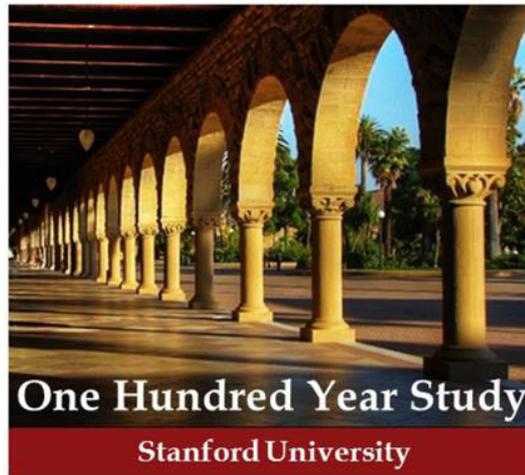# Artificial Intelligence and Life in 2030

ONE HUNDRED YEAR STUDY ON ARTIFICIAL INTELLIGENCE | REPORT OF THE 2015 STUDY PANEL | JUNE 2016

ARTIFICIAL INTELLIGENCE (AI) is a field of study and set of technologies inspired by and reminiscent of things that people do using their brains, bodies, and nervous systems. However, the resulting methods typically operate far differently from humans. While the rate of progress in AI has been lumpy and unpredictable, there have been significant advances since the field's inception sixty years ago. In the twenty-first century, AI has moved from being an area of academic study into a constellation of mainstream technologies, and is now having a substantial impact in our everyday lives. Computer vision and AI planning, for example, drive the video games that are now a bigger entertainment industry than Hollywood. Deep learning, a form of machine learning based on layered representations of variables referred to as neural networks, has made speech-understanding systems practical on our phones and in our kitchens, and its algorithms can be applied widely to disparate applications. Natural language processing and knowledge representation and reasoning have enabled a machine to beat the Jeopardy champion. While impressive, these technologies are highly tailored to particular tasks; rather than a "general purpose" AI, each application requires years of specialized research and careful, unique construction. In similarly targeted applications, we can expect great increases in the future use of AI, including more self-driving cars, health care applications in diagnostics and targeted treatments, and physical assistance for elder care. AI and robotics will also be applied across the globe in industries struggling to attract younger workers, such as agriculture, food processing, fulfillment centers, and factories. They will facilitate delivery of online purchases through flying drones, self-driving trucks, or robots that can get up the stairs to the front door.

THIS REPORT IS THE FIRST in a series to be issued at regular intervals as a part of the One Hundred Year Study on Artificial Intelligence (AI100). Starting from a charge given by the AI100 Standing Committee to consider the likely impacts of AI in a typical North American city by the year 2030, the 2015 Study Panel, comprising AI experts and informed outsiders, focused their attention on eight domains they considered most salient: transportation; service robots; healthcare; education; low-resource communities; public safety and security; employment and workplace; and entertainment. In each of these domains, the report both reflects on progress in the past fifteen years and anticipates developments in the coming fifteen years. Though drawing from a common source of research, each domain reflects different AI influences and challenges, such as the difficulty of creating safe and reliable hardware (transportation and service robots), the difficulty of smoothly interfacing with human experts (healthcare and education), the challenge of gaining public trust (low-resource communities and public safety and security), the challenge of overcoming fears of marginalizing humans (employment and workplace), and the risk of diminishing interpersonal interactions (entertainment). The report begins with a reflection on what constitutes Artificial Intelligence, and ends with a summary of current "hot" areas of research and recommendations concerning AI-related policy.

CONTRARY TO THE MORE fantastic predictions for AI in the popular press, we need not worry about AI being an imminent threat to humankind. There is no significant development of machines with self-sustaining long term goals and intent. Instead, we will see more useful applications of AI, with potentially profound positive impacts on our society and economy between now and 2030, the period which constitutes the scope of this report. At the same time, many of these developments will spur disruptions in how human labor is augmented or replaced by AI, creating new challenges for the economy and society. Design and policy decisions made in the near term are likely to have long-lasting influences on the nature and directions of such developments, making it important for AI researchers, designers, social scientists, and policymakers to balance the imperative to innovate with mechanisms to ensure that AI's economic and social benefits are broadly shared across society. If we approach these technologies primarily with fear and suspicion, missteps will result that slow AI's development or drive it underground, impeding important work to ensure its safety and reliability. On the other hand, if we approach AI with a more open mind, the technologies emerging from the field could profoundly transform society for the better in the coming decades.