

AI and Robotics to the Rescue – Digital Learning Companion

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In the last five years, Artificial Intelligence (AI) has created considerable hype in almost all industries. It has been touted as the transformer of life by the Brookings Institution and will dictate the Future of Work. The repertoire of tools afforded by AI allows people to rethink how we integrate information, analyze data, and use the resulting insights to improve decision-making. In turn, this draws excitement in most people to understand these technologies regardless of their technical background or age.

AI started over 70 years ago, with the conception that machines would one day be able to think like humans. New approaches to AI through the emergence of Machine Learning (ML), and advancements in low-cost cloud computing and storage, and high-speed Internet connectivity, have enabled the quantum progress of AI in the last 25 years. The availability of an avalanche of data generated through Internet-of-Things (IoT) provides the fuel that powers AI to work. It will mean that we may now be on the brink of realizing the dreams of the early pioneers.

Companies who ignore AI will find themselves lagging in many facets of their businesses, and they will be quickly overtaken by startups that embrace AI as the tenet of their existence.

The combination of Artificial Intelligence (AI) and Robotics, commonly known as AI*Botics*, fuses the agility and mobility of robots with AI to make it, naturally, a *smart machine*. The history of robotics stretches from Greek philosopher Aristotle's ideas about automated tools, to Henry Ford's Model T assembly line and beyond. The concept of robots as humanoids started from science fiction, namely that of American author Isaac Asimov. Though we have not seen robots of the like depicted in films such as "*Ex Machina*" and "*I, Robot*," AI*Botics* is continuously evolving.

The outbreak of the coronavirus - CoVID-19 – came at a timely juncture that is about to disrupt many industries. And, the next generation education pedagogy is not spared. The differential between weak AI and strong AI has made the significant impact in the learning environment.

The Digital Learning Companion (DLC) is one of the initiatives to be realized. The DLC is a hybrid of intelligent tutoring engine, an e-learning system, with a dual-way interactive agency and serves as an advisor to a learner. It is both a mentor and a "friend" that guides the learning - making sure the learner is in the optimal condition for education, and even schedules a nap for the learner when it senses, through IoT, that the learning session has become too weary. Monitoring of the acquisition of knowledge is given an equal emphasis to learning behavior. Such a learning companion should embrace a learning plan, an interactive mentor as well as the flexibility in learning.

Beside the traditional teacher and student roles, adopted in a virtual sense, a new agent which plays the role of mentoring the student is crucial.

DLC works along the continuum between strong AI and weak AI. In its effort to know the learner better, the DLC uses weak AI algorithms to analyse the behaviours of the learner through video, audio, and affective data capture by the camera, the microphone, and the special smartwatch worn by the learner. Strong AI techniques are adapted to create learning preferential dynamics and social-emotional capacity.

Weak AI, also known as narrow AI, is one that focuses on accurately performing pre-planned activities. They tackle a pre-determined task or problem. An example is the first generation of a chatbot that works excellently within the prescribed-domain. Still, when being asked upon in other areas, it probably responds with, "Sorry, I do not understand your question," and made attempts to document your queries for someone to curate the answers and re-train the system as part of its upgrading process.

The ultimate aim of Strong AI is to have a system that has a mind of its own. To date, we have created machines that have a certain degree of quasi-consciousness, sentience or perception, and a 'mind' which is adaptive, intelligent, and intentional. Deep learning and back-propagation techniques, coupled with statistical analytics, allows a machine to learn by itself and eventually accumulates the wealth of knowledge in its repertoire to dethrone the champion in Chess. Such a machine will be able to manifest behavior at least as skillful and flexible as that of humans, or purportedly close to.

The learning aid is also equipped with a monitoring tool to discover additional talents which the student could have exhibited beyond the prescribed learning space. Some of the ongoing research has supported the hypothesis that a less capable (digital) learning companion is helpful to a human student because it will nudge the child to excel, and explore his/her true potential.

Inadvertently, technologies such as AI and Robotics can be leveraged to augment the human learning potential. As a matter of fact, the current teacher-student ratio in a classroom can be further optimized with the use of technologies and a hybrid augmentation of physical and cyber space can possibly increase learning potential, perhaps exponentially.

Despite considerable effort to bring education to the masses globally, over 262 million children and youth aged 6 to 17 were still out of school, and more than half of children and adolescents are not meeting minimum proficiency standards in reading and mathematics. The DLC may be an option to provide a personalized learning experience for the students, and giving them the support during out-of-school hours through instant feedback and optimal conditioning of the learner for a better learning outcome.

In tandem with-Industry 4.0, let us embrace Education 4.0 through AI and Robotics.