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Implementation of Artificial Intelligence into Engineering and Business

Artificial Intelligence has been an idea for decades in the tech world but up until a few years ago, the public didn't know the scope of the impact of the implementation of AI into society's infrastructure. Today, new and improved AI tools are being created every day, each with an innovative name that enhances the AI's functions. Numerous AI tools have been open to the public for tasks like writing, image generation, analysis, web browsing, and even ethics. Currently, these AI tools stand alone, in a box that is opened when needed but never taken out or connected to something else. These tools are merely accessed and put away. This paper will outline and detail how the benefits of Artificial Intelligence can be added to fields of engineering and business to make innovation more efficient, cost-effective, and expansive. Since engineering and business at ASEC go hand-in-hand, this paper will introduce AI to the technical engineering side, then to the communicative business side, and finally help ASEC determine how Artificial Intelligence could be implemented into the company. Such topics include how AI can help enhance design processes, optimize performance, and predict patterns in the engineering world. In business, AI can help companies with decision-making, customer service, and operational strategies boosting business to the next level of productivity and deliverability. The vast areas that AI can have in the world will only be possible when understanding how Artificial Intelligence can be implemented into infrastructure at the highest benefits.

The description of engineering spans every discipline such as medicine, biology, chemistry, industry, computer, physics, aerospace, and electrical. Currently, engineering involves manual design and analysis, predictive maintenance, data collection and interpretation, and project management which hasn't changed the field in decades. Many of the same processes engineers do can be done more efficiently by a machine that thinks like an engineer. This is where the idea of implementing Artificial Intelligence into engineering comes from. The idea that AI could replace mundane tasks, like maintenance or manual design, that engineers currently do is a growing sentiment in the tech world. This new strategy leaves human engineers with the time and resources to make drastic innovations without the clutter of inefficiencies. According to Engineering.com, by implementing Artificial Intelligence into the workflow of engineering, these AIs can work alongside human engineers to "enhance and enrich the mechanical design process [...] both in terms of relevant data collections and analytics and also in terms of prioritization", suggesting that if AI is implemented to work parallel with engineers, the workload is reduced leaving more time for innovation.

In the engineering design process, planning is one of the most complicated, time-consuming, and inefficient processes because this stage requires engineers to be essentially perfect and failure would be very costly. In mechanical design, CAD software like AutoCAD, Inventor, SolidWorks, and Fusion360, is the first step in designing an innovative product to solve a complex problem. Often these designs can be extremely intricate and require a lot of time and patience so all the elements of the product fit like a puzzle. If a single piece of the puzzle is too large or small, the puzzle cannot be finished. This goes the same for this step in the engineering design process. Bringing AI into the CAD space is fundamental for the future success of

engineers as people could quickly and efficiently provide quality products that solve problems. Software Development provides insight into why AI should be implemented into CAD software. The company claims that AI can automate repetitive design tasks allowing engineers to focus on the innovative aspects of their projects. With AI's ability to translate rough design concepts into intricate CAD drawings and models, less human labor is needed than in the past, leading to a more efficient design process—as previously brutally outlined. AI-powered CAD systems may examine design limitations to recommend the best solutions, enabling a more creative and user-friendly design process.

It is seen that AI can be well implemented into tools that help engineers solve complex problems, however, AI can be used well beyond the technical side of engineering. AI offers support in project management as it can streamline communications and build a highly effective team that can work without the administrative burden. The Harvard Business Review (HBR) discovered that every year in the United States, approximately 48 trillion dollars are invested in projects, yet only 35% of projects are considered successful. This highlights the sheer amount of resources and time wasted. Through their research, HBR determined that project success rates are so poor because of the low level of maturity of technologies available for managing them. This changes with the implementation of Artificial Intelligence in project management. If AI could improve the success rate by just 25%, it would equate to trillions of value and benefits to organizations, societies, and individuals. AI's specific benefits in managing engineering projects include better prioritization selection and faster project deadlines. Prioritization and selection are a type of prediction that determines which projects will bring the most value to the organization or company. When given certain parameters and data, Artificial Intelligence can narrow down

projects to ones that have no bias toward anyone. For example, an implementation of AI into the selection process will allow for projects to be selected that have a higher chance of success and deliver the highest benefits meaning the projects with the greatest chance of innovation in the engineering world will be selected at a more efficient rate than conventional meetings of selection. A selection committee will no longer be needed when an AI can get through 10 times the number of projects in the same period and provide a list of the top choices for further consideration by the company. Providing AI with the proper parameters and data makes the decision-making process completely objective, removing all human biases from the equation.

However, the AI selection process does have a very large fault that needs to be addressed when implementing these tools into a company where even if the AI doesn't hold any biases, the data it's given might. This is a major problem as biased data will result in biased decisions. One of the most famous incidents of data bias in AI was in Amazon's application process. According to Cardozo Law Review, Amazon was implementing AI into their employee selection process to make combing through applications more efficient. This seemingly sounded like a great idea as more people could hear back from Amazon quicker about their employment except during testing of the AI, engineers found that the algorithm rejected applicants who used the term "women " anywhere in their application. This was a crucial miscalculation by Amazon engineers as they discovered the data that they fed the AI with was based on resumes submitted to Amazon in the past, which were predominantly male. As a result, the AI responded by assuming male candidates were preferred. The biased data of Amazon resumes caused the AI to make fatal errors in the machine learning phases which cannot happen in the real world. This was luckily caught during testing, but sparked a major question surrounding AI, can Artificial Intelligence be able to identify and ignore bias? This question can be applied to how AI is implemented into

project management as its role in processing data and selecting the “best” project could be manipulated by people while supplying the AI with data sets. For example, if a person manipulated data that favored their type of project over someone else, the AI will fundamentally select that person’s project over all others even if other projects were objectively better. This is a problem that needs to be addressed before implementing AI into any workplace as the learning stage of AI needs to be factual or else the Amazon problem emerges again.

The major takeaway of AI being implemented into the engineering world is it needs to be, at some point. Currently, AI is in an adolescent phase where people are beginning to see how impactful AI can be, however, this impact can be both positive and negative. AI can be very much like another coworker at a company that helps to develop, design, create, and innovate the world more efficiently than ever before. However, it can be seen that the dangers of biased data in the machine learning phase of development make it premature to give AI a great deal of power and influence in a company. Currently, it should be used as a tool for people to use, like a pencil, computer, or scissors, until enough development into machine learning occurs to make an AI objectively unbiased in an engineering setting. Society lies in the hands of engineers as great past and future innovations create a technically advanced world that doesn’t risk people’s lives. Artificial Intelligence, in its current state, is not trustworthy enough to be implemented in the engineering world as a sole entity but in a few years that will change.

Business is another important sector in Artificial Intelligence that would provide immediate, dramatic positive effects. The communication of people or groups of people through commerce is extremely important to the development of society as infrastructure is reliant on not

only the physical creation of buildings, networks, or roads but also the communicative side to allocate resources, funds, companies, people, and plans. These processes in business can take up a lot of time which is why there's a new emergence of introducing Artificial Intelligence into the workspace. Artificial Intelligence can improve business operations through enhancing decision-making, improving customer service interactions, and increasing efficiency within the company. One of the primary advantages of AI in business is AI's ability to process large amounts of data faster than any traditional computer which enables it to make more informed decisions as more data is received and analyzed at the same time. For example, according to Investopedia, AI could make huge strides in streamlining a definitive decision-making process through implementing AI in business. They claim that "AI can quickly process large volumes of current and historical data, concluding, capturing insights, and forecasting future trends or behaviors," suggesting that AI can help businesses make better, quicker decisions about numerous aspects like customers, contracts, and strategies for growth. Using massive data sets, AI can effectively and efficiently conclude about certain business strategies that worked successfully or didn't to help a business in the right direction for long-term growth and development as a company. This is a great positive effect of AI in business as the growth and success of the company could be due to Artificial Intelligence's implementation into the workplace. By allowing AI to guide companies through making faster decisions that are more objective, companies could see more successful business development than before.

Another important aspect of business is being able to effectively communicate between the provider and the client. AI will help improve customer interactions and experiences by being able to communicate with clients faster and with more information. Tools like chatbots and

AI-powered assistants are transforming customer service interactions by being able to service many people at once while still being able to help customers. An example of this implementation is newly seen in the medical field where patients can talk to an AI online. AI chatbots can significantly enhance a patient's experience by offering 24/7 patient support, answering common medical questions, and guiding patients to specific medical professionals which ultimately benefits both the patient, who can get immediate help, and the medical staff whose workload can be reduced. These chatbots can handle appointments, initial diagnosis, and intervention solutions to help patients. By streamlining the medical help process and reducing the administrative burden, the hospital can get more patients treatment faster which boosts the business.

However, even with these positive effects of AI in business, the implementation is a double-edged sword as AI can pose substantial risks. AI can greatly improve repetitive tasks in business like administrative tasks and scheduling, it can provide more accurate, objective decision-making, and can make customer interactions with the business more personalized. But, these benefits also come with considerable risks including ethical concerns like algorithmic bias that can lead to biased decision-making. This can be seen with the previous example of Amazon's AI selecting male resumes over females due to the biased data sets that were passed through the AI during the machine learning phase. This is an incredible risk as a biased AI will cripple a business's ability to succeed as it could lead to customer dissatisfaction and ultimately lead them to use a different company. Another issue that is a significant risk with implementing AI is security vulnerabilities since AI systems can be targets of cyber-attacks. According to Eckert Seamans, these security risks need to be evaluated before implementing AI as hacking AI could lead to detrimental effects on the company. Valuable projects, employees' personal information, and funding could all be compromised if an AI is hacked and used to gain access to

confidential information regarding the company. So, Eckert Seamans argues, that it is crucial to maximizing AI's advantages while also mitigating the potential risks by implementing AI into a secure environment, adopting responsible AI practices, and considering the ethnic concerns and implications that AI poses. Overall, Artificial Intelligence is the next step in the new generation of business, however, the implementation of AI needs to be meticulous and well-planned out as AI's implications could dramatically affect a company's success. Conversely, the positive effects of AI in business such as efficient administrative actions, decision-making, and customer support outweigh the risks when the implementation of AI is properly executed.

As demonstrated above, AI has vast uses to increase productivity and company effectiveness in both engineering and business. ASEC is in a unique position where engineering innovation is combined with business interactions to provide the government innovations that will help them complete their duty to the country. ASEC needs to be able to balance customer support and provide quality solutions which the implementation of Artificial Intelligence into this structure can benefit to the highest degree. ASEC's success will increase if the company implements AI into the workflow, which spans from customer support to project management and integrates design software. Artificial Intelligence is still relatively new and developing each day. When implementing AI into the company, there needs to be processes in place to mitigate possible issues that AI could create. Ultimately, Artificial Intelligence is the next step in development as a society, and its impact will be huge when it can be trusted. This trust will come with time and further development in machine learning, but generally, Artificial Intelligence will help propel humanity into the next generation of innovation.

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