Captain & AI

Can Artificial intelligence (AI) make the co-pilot's role in the flight deck redundant?

Humans are more intolerant when dealing with softwares but more forgiving with humans making errors. AI is not just a software but closer to the human brain without the physical form.

But obvious there will be new methodologies developed to produce the future Captains who haven't flown as copilots. The Multi Crew Pilot license was a step towards producing competent co-pilots with minimum real time aircraft experience. The Captains will also be made after the industry is comfortable with the presence of AI.

AI is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using rules to reach approximate or definite conclusions) and self-correction.

AI can be either weak or strong. Siri and Alexa are examples of weak AI.

Featured in many movies, strong AI acts more like a brain. It does not classify, but uses clustering and association to process data. In short, it means there isn't a set answer to

your keywords. The function will mimic the result, but in this case, we aren't certain of the result. Like talking to a human, you can assume what someone would reply to a question with, but you don't know. For example, a machine might hear "good morning" and start to associate that with the coffee maker turning on. If the computer has the ability, it theoretically could hear "good morning" and decide to turn on the coffee maker. Another example is AI in games. In one example, **an AI program taught itself to play 49 classic Atari games. When the program was instructed to obtain the highest score it could in the game Breakout, it was able to outperform humans in just 2.5 hours.**

IBM research project. Throughout life, many of us develop unhealthy habits that may feel nearly impossible to change. To quit smoking, reduce alcohol consumption, eat a healthier diet, or become more physically active requires effort and the right state of mind. A team of behavioural scientists at University College London (UCL) and researchers at IBM Research-Ireland are looking at ways to help people reach these goals and achieve better health behaviour by using AI.

AI in the flight deck

Humans are prone to making errors but humans also perform extraordinarily under certain unimaginable circumstances. The out of the box abstract thinking, the gut feel and hearing murmurs in a crowd are certain qualities that are keeping then in the game. This is one of the reasons why there are pilots in the flight deck. The role in the flight deck which could face a threat of replacement and being made redundant is the co-pilots role. AI through machine or deep learning can be trained to perform normal and abnormal

functions. Routing procedural actions and work as demanded by the Captain or the situation in hand can be performed with relative ease.

AI can track each and every moment in the flight deck. Good behaviour can be rewarded and bad can be reprimanded. AI is not a slave but plays multiple roles of the PM, friend, company, regulator, engineer, dispatcher etc. Therefore AI is is critical support function.

AI and safety

The role of the Co-pilot as a pilot monitoring(PM) or supporting pilot is very important in terms of safety of the flight. The PM not only performs key procedural actions & functions but also monitors the actions of the Captain or pilot flying (PF). The PM performs critical checklists, gives essential call outs, cross checks the actions of the PF.

The PM is able to detect subtle incapacitation and also when the PF is fixated. If the flight is unstable or performs a long float which affects safety, the PM can detect and give critical callouts thereby helping the PF to make a judicious decision and mitigate the threat.

Human biases and ego

Humans behave differently with other humans as compared to machines. The whole concept of CRM in the SHELL model is about the human interaction with other elements. Bias typically arrives along with real world data; as long as our society exhibits negative biases, we'll see these reflected in the data we collect. The most potent (and probably most unrealistic) way to change this state of affairs is to eliminate bias from the dataset. In other words, we all need to become better people overnight or in some very short period of time.

Fortunately, there's another option. We can build AI that reinforces positive attributes a reality, today, through programmatic product design choices, which puts the burden on a few good (wo)men.

In the cockpit there is a constant struggle between the pilots to prove who is superior and how much authority is wielded by the person in-charge. Human factor is a leading contributor in most of the accidents/incidents.

E.g. in the event of an unstable approach the PF can be held responsible for mismanaging the aircraft energy but at the same time the PM is equally responsible for not being assertive enough to force the PF to err on the side of safety and mitigate the threat faced in the situation. Fear of authority, inexperience or complacency are some of the reasons for the PM not to act according to SOP's.

AI can be trained to detect the PF's physiological state, the retinal & head scan can easily detect fatigue, fixation, incapacitation. The AI can give soft and hard call outs and take over limited controls if the PF breaches safety parameters. It is like the Airbus flight envelope which prevents the PF from exceeding the parameters.

mindFly analysis

We can accelerate good behavior and eliminate many socially unacceptable biases through AI product design choices. It is not about eliminating the role of the co-pilot but ensuring that more safer systems are built. Traffic density can be increased by giving the airlines the option to fly more aircrafts allowing them to employ more pilots.

With AI as a co-pilot, the behaviour of the Captains will also change and the presence of AI

will be a constant reminder to the Captain to act responsible and comply with instructions at all times. It will also allow detect fatigue levels and record real time data of the pilots physiology and events happening inside the cockpit for investigations if there are any.

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