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DRONES WITH STEREO VISION AND ROBOTIC ARMS FOR ASSISTING ASTRONAUTS: A PATENT LANDSCAPE AND VISUALIZATION ANALYSIS

Abstract

The use of robotic assistance and artificial intelligence in everyday life is so widespread today, that it wouldn't be an exaggeration to say that we've started taking intelligent machines for granted. Be it automatically created photo albums (with accurate location tags) by Android OS, or robot assisted medical surgeries, automated robotic devices are here to stay. In space related applications, NASA's Robonaut2 was successfully launched into space in 2011. However, a lot of recent developments in the technology world have thrown up some interesting options to assist astronauts in space. The research work surrounding Internet of Things (IoT) has succeeded in creating a network of multiple intelligent systems and technologies to achieve some truly remarkable goals.

The aim of this paper is to provide technology architecture to design a drone based robotic assistant for astronauts in space, and provide visualization on the patent landscape of the technologies. The proposed drone assistant consists of a stereo-vision camera to simulate human binocular vision. A real-time output from the stereo-vision camera is made available on wearable augmented reality headset or directly to the astronaut through virtual retinal display. The drone also consists of two robotic arms that are controlled by the astronaut through either of the two mechanisms, namely: (i) robotic arms mimic the hand and finger movements of the astronaut and provide force-feedback to the astronaut's human hands and fingers; or (ii) robotic arms are controlled through the brain activity of the astronaut with force feedback to the astronaut's human hands and fingers.

Just like any multidisciplinary research, the proposed implementation is a result of multiple technologies; drones, robotic manipulators, computer vision, augmented reality, healthcare related instrumentation and implementation, to name a few. Similar to the case of Robonaut2, multiple patents and patent-worthy ideas are a part of this proposed multidisciplinary project. Using IBM's Watson Analytics engine, a detailed patent landscaping is provided for identifying the key players in the areas of research and the direction of their research. The landscaping will also identify the innovative focus of various segments of industries across the globe. The patent visualization also involves detailed graphical representation of the analyzed information along with insights and projections based on patent data.