

Emerging Mixed Reality Applications for Combating COVID-19 Pandemic

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Abstract

The COVID-19 pandemic has introduced an unprecedented impact on global healthcare, economics, and general human well-being, industries, educations. Handling various tasks is become very challenging due to social distancing and limited traveling possibilities. Mixed reality (MR) technology can be helpful during this COVID-19 situations. MR can give assistance remotely and provide instructions to the less experienced workers by ensuring everyone's safety. In this paper, we discussed about the significant impacts of COVID-19 on various sectors and also provided different possible solutions using MR technology that can assist to mitigate impacts of COVID-19.

I. Introduction

Mixed reality (MR) integrate the virtual world with real world where real and digital object can co-exist and interact in real time. During this pandemic situation, MR tools can help us to transform our immediate surroundings into learning, work and entertainment spaces. In this COVID-19 pandemic, many people have to stay at home that can impact on team operations. This situation can create a huge skill gap in the industrial sectors. A few numbers of staff can be present on site due to illness, self-isolation and financial restrictions impedes an organization's ability to continue operations as before. It is difficult to upskill new staff or train existing staff as lack of hands-on training. Mixed reality tools can play an effective role in mitigating these obstacles and, at the same time enhanced the ways of working.

In [1], analyze the potential of augmented reality as an innovative learning medium in the industrial sector. Different teaching and learning objectives can be achieved through the use of AR technology in training. In [2], an augmented reality enabled cloud based remote maintenance system for robotics industry is shown. In this system expert can provide instruction remotely to the end user. In [3], illustrate the importance of augmented reality technology in education and training. In [4], demonstrate the validity and educational effect of virtual reality and augmented reality applications in medical education. In [5], showed an augmented reality based remote live support application for industrial sector that can save user time and reduce cost by utilizing various tasks.

II. Mixed reality Applications

In this section, we discuss about different mixed reality applications that can mitigate COVID -19.

A. Mixed reality (MR) remote assistance

MR-enhanced remote assistance application provides a live video-sharing experience between two or more people. This approach is completely different from traditional video conferencing. Computer vision technology can be used to track

the movements of the device's camera across the scene. Expert can draw annotations on to the elements in the video and this annotation remain in the same place on the real object. On the other side of the video, user can see the annotation in the same place in the physical world. This technique can be very useful in this pandemic situation as limited number of employee can work in the site. They can easily get help from expert remotely with the help of mixed reality.



Figure 1: MR Remote assist [6].

B. Mixed reality worker Guidance

In this COVID-19 situation, it is not possible to provide face to face guidance to the staff. In some situation remote expert is not required but a step by step guidance is still preferred. By MR based worker guidance application can upskill the new staff. This type of applications provide instructions for workers to properly follow processes and help them get the work done. Worker also can make live video call any time to the expert using this application. When the work is done, the progress report with image and recording will be sent to the remote expert so that they can know the work status.



Figure 2: Augmented reality worker guidance [7].

C. MR enable no-touch product interaction via virtual interfaces

MR have the ability to superimpose a digital augmented user interface on physical environment. User can control different equipment of any system by using this user interface. User can interact with this interface by using hand gestures or verbal commands without touching any physical surface. This approach can reducing the amount of touching required by physical objects that may be used by numerous people. This approach is very helpful in this COVID-19 situation. MR based no touch product interaction technique can be use in industries as well as medical sector. Medical professionals can carry out their duties during the current pandemic. This type of applications can helps to reduce the amount of physical contact between doctor and patient. Doctor can interact with medical content such as x-rays, scans or test results using hand gestures and voice command by using a mixed reality headset.



Figure 3: MR no-touch virtual interfaces [8].
D. MR based equipment training

Mixed reality technology can also be used for training industrial workers or medical professionals by providing highly efficient and interactive training methods that can streamline the process of learning new equipment and other necessary procedures. In COVID-19 situation, all-time experienced stuff can be available due to illness or self-isolation. In that situation, replacements need to be trained as quickly as possible. Less experienced worker can be quickly trained about different equipment using MR based training system.

IV. Conclusion

COVID-19 has significant impact on education, medical, industry, and many other sectors. Unavailability of expert worker can hampered the productivity of a company. Team operations cannot be done in this pandemic situation and also hands-on training program cannot be executed due to lack of skilled worker. By using mixed reality technology, we can mitigate this issues. MR based applications can be very useful not only in industrial sections but also in medical and educational sectors. Though MR application is still at its infancy, more support from experts are required to make it mature.

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