PalArch's Journal of Archaeology of Egypt / Egyptology

TECHNOLOGICAL INVENTIONS TO FIGHT AGAINST COVID-19: A REVIEW

Pulkit Jain
Department of Mechatronics Engineering
Chandigarh University, Mohali, Punjab, India
Email- pulkitjaindav@gmail.com

Pulkit Jain -- Technological Inventions to fight against COVID-19: A review -- Palarch's Journal Of Archaeology Of Egypt/Egyptology 17(6). ISSN 1567-214x
Keywords: COVID-19, Smart-helmets, NLP, Artificial Intelligence (AI), Virtual Reality (VR)

Abstract: COVID-19 might be devastatingly affecting our enterprises, public activities and individual prepping norms and principles, yet it is likewise inciting an overflowing of innovativeness in different fields. Science and Technology is playing a pivotal role in an effort to tackle this deadly pandemic. The objective of this paper is to carry out a review on the latest technological inventions that have been carried out by researchers, medical as well as top engineering institutions, universities and organizations worldwide to fight against coronavirus. Firstly, six different digital technologies are discussed as how they are helping people in the battle against COVID-19. Then the paper gives a detailed overview of numerous technological inventions like artificial hygienic hand: hands-free door openers, snood-type mask, UV disinfection towers, smart helmets and contact free sanitization cabinets etc. At the end, the conclusion talks give a solid conviction these latest technologies like AI, NLP, Block-Chain, 3D printing, AR/VR will play a pivotal role in helping people to fight against this COVID-19.

I. INTRODUCTION

Since the inception of pandemic Coronavirus Disease 2019 (COVID-19) at Wuhan, China in December 2019, it has influenced more than 200 nations and domains around the globe with over 1 crore cases worldwide and in excess of 5 lakhs deaths as on 28 June 2020 [1]. With this developing emergency, organizations, researchers and analysts over the world are searching for the approaches to address the difficulties of this infection, to alleviate the spread and build up a remedy for this sickness. In this confounding fight, science and innovation is playing a pivotal role as many organizations, companies, researchers, medical and top engineering universities and institutes are coming with up with new technological inventions to fight against this deadly pandemic COVID-19 [2]. Recorded underneath are six different ways developing computerized advancements are helping people in the battle against COVID-19: Some of these models are curated from government, industry and media sources, accessible in the open area:

1. Analysts and researchers are using Natural Language Processing (NLP) to skim through research articles and academic papers to help battle data over-burden [3]. For example, In US, research team developed CORD-19 which is an AI platform developed to makes it simpler for researchers to rapidly discover important investigations that can possibly prompt new bits of knowledge or ways to deal with coronavirus outbreak.

2. Second effective technology namely Block chain technology is being utilized to adequately oversee clinical information, keep a track on supply of infection avoidance materials (disinfectants, sanitizers), and counsel people in general. Over 25 block chain applications have already been launched by China to fight against this pandemic.

3. CHATBOTS- Another very efficient tool which is being used by healthcare professionals especially in Italy, Philippines which can not only help to interact with patients remotely but can be integrated with social platforms like Facebook to remove fake news and rumours related to this deadly pandemic.

4. Virtual/ Augmented reality is another efficient technology which can help many industries and rel-estate business companies to conduct their conferences and expos to help them overcome their losses. For instance this VR technology has already being used by HTC which conducted Vive Ecosystem Conference in March, 2020. Even real-estate companies in Hong Kong and China have started conducting programs to allow their customers to have VR tour of their properties for sale purpose.

5. Drones are also being used in many countries including India, China, South Korea to not only supply test –kits and medication to patients reducing the delivery time but are being used as a spray machine to disinfect public places and on epidemic prevention automobiles, ambulances which are commuting to the containment zones and epidemic prone hotspot areas [4].

6. 3D printing is being utilized to help produce essential clinic and hospital supplies in the midst of COVID-19 outbreak. Reports have come from Italy where a hospital was able to save lives of numerous patients by 3D-printing respirators, valves and masks on reanimation gadgets.

II. TECHNOLOGICAL INVENTIONS OVERVIEW

Many technological inventions have been carries out by researchers, design engineers, medical and top engineering organizations, companies and universities which have been listed as below:

2.1 Artificial Hygiene Hand

Hygiene Hand [5] designed by New York paramedic possesses anti-microbial properties which allow interaction with the world without actual physical interaction. It doesn't give protection to an individual like a face mask instead it performs the important task of preventing germs to reach the human body. An individual comes in direct contact with huge number of surfaces everyday via physical touch and studies also reveal that humans

have the habit of touching their face on an average of 20 times per hour thereby resulting in easy transmission of germs and viruses like COVID-19 to our lungs. Designed from brass (70% Cu and 30% Zn) which is anti-microbial,100% recyclable, sustainable and also corrosion resistant this hygiene hand works like a key-chain which allows to push, pull, and move objects without really contacting them, getting germs far from your hands. This 3D printed gadget as shown in fig.1. accompanies a hook on one end for pressing catches on a lift or entering your PIN number at an ATM and can even work as a stylus pen for tapping touchscreens and for digital signatures. The hook attached also help in operations like sliding, pulling, and turning door handles as well thereby minimising the human contact.

Figure 1. A snapshot depicting different uses of Artificial Hygiene Hand [6]

2.2 Virus Hook

Virus Hook is another game changer device in environments where hand sanitization is a must like hospitals as it's made of Copper and epidemiologists have estimated that coronavirus can live on stainless steel surfaces door handles for at least three days but lifespan on copper made items is comparatively less [7]. It was mainly designed to open the door handles which require turning movement to open as shown in fig.2.

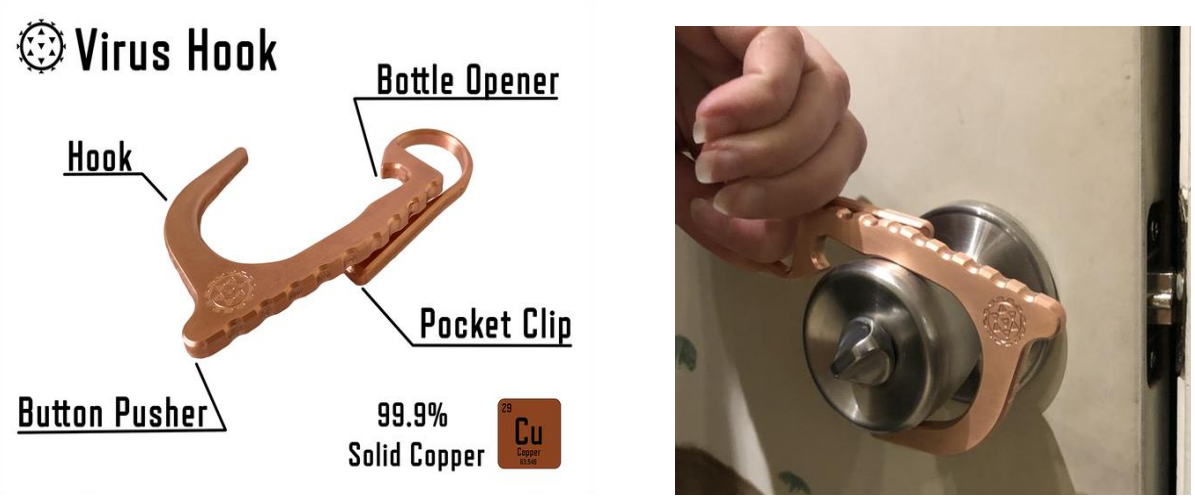

Figure 2. VirusHook: Design and its use in opening round door handles [8]

Another similar hands-free door opener was designed in Whales at Menai Science Park which is basically a door pull opener. Instead of having to get hold of the door with one's hand this device allows to actually open the door with one's forearm as shown in fig.3.

Figure 3. Hands free door opener [8]

2.3 Snood Mask-Antiviral Coating

Patents like flexible and more breathable snood type mask [9] with anti-viral coating is proven to neutralise more than 96% of airborne viruses as shown in fig.4. This shield cuts the risk of cross contamination from saliva droplets, protects the critical virus infection points: noise, mouth and ears and its protein and hygienic fabric coating continues to protect up to three hand washes and makes the shield safe to touch.

Figure 4. Breathable Snood Type Mask with anti-viral coating [9]

2.4 Smart Helmets with IR cameras

A Chinese tech firm has developed smart helmets [10] which are fitted with IR cameras for the police officials for contactless temperature measurement of individuals from a distance of 5 metres. This helmet as shown in fig.5. comes with AR visor, facial recognition feature (to get medical history of the patient), QR code detection camera, supports Wi-Fi, Bluetooth and works on 5G technology to raise the alarm when a person with high temperature is detected and send the data to the nearest hospital. Moreover its response time is very quick as it takes only two minutes to scan a group of 100 people.

Figure 5. Smart helmets with IR cameras and AR visor for remote temperature monitoring of the crowd [10]

2.5 Contactless MIST based Sanitizer Dispenser

It is a contactless sanitizer administering unit [11] which splashes alcohol based hand rub sanitizer and it can be easily installed at entry/exit points in the offices, universities, schools, colleges, hospitals, malls and other public places like railway stations, airports. An ultrasonic sensor is placed inside the unit which senses the human hand at a threshold distance level and then activates the single fluid nozzle to dispense only 5-6mL of sanitizer in mist form for 8-10 seconds with the main aim to avoid wastage. It's available in very compact form and has an LED indicator as well as shown in fig.6.

Figure 6. Contactless MIST based Sanitizer Dispenser [11]

2.6 Sanitization Cabinet Based on UVC technology

UVC technology has been in use for the past 40 years for germicidal disinfection purposes, using the same technology, Automated contactless UVC Sanitization Cabinet [12] has been designed by DRDO's RCI lab, India to sanitize wallets, mobile phones, pass-books, N-95 Masks, iPads, currency notes, laptops, cheque leafs etc. Defense Research Ultra-Violet sanitizer (DRUV) as shown in fig.7. provides 360 degree exposure of UVC to objects placed inside the cabinets and hence can clean multiple objects at the same time. Proximity sensor based switches clubbed with door opening and closing mechanism makes its operation automatic and contactless. After the sanitization process is complete the cabinet enters into sleep mode hence the operator need not wait or stand near the device as it is a timer based device. To protect the operator from exposure to harmful UV rays a safety feature has also been added as the device automatically turns off the UV light if the cabinet is opened accidently before the sanitization process gets completed.

Figure 7. Sanitization Cabinet Based on UVC technology [12]

UV-rays are being used to disinfect public buses in Shanghai. A transport firm in the Chinese Port City installed UV-Lights in a cleaning bay [13]. Health authorities in China say that Coronavirus is sensitive to UV light and heat. The traditional disinfection method, from spray disinfection in a closed environment to wiping things clean takes 30-40 minutes time and alteast two people. But this new disinfection method takes 5-7 minutes for one bus. The major advantages are high efficiency, less time consumption and cuts down on labour and disinfection costs. Moreover it disinfects thoroughly killing more than 99.9 % of viruses and also it doesn't corrode the buses as well.

2.7 UV Light Disinfection Tower

To support COVID-19 fight, an engineering company in Mangaluru, India developed a remote controlled UV light disinfection tower robot as shown in fig.8, which is capable of chemical free disinfection of an entire region whether airports, railway stations and offices etc. very swiftly in a short duration of time and can also clean a surface in just 4-seconds.

Figure 8. A remote controlled UV light disinfection tower robot [14]

III. CONCLUSION

Specialists, Design Engineers, Scientists, healthcare professionals and researchers are examining every conceivable decision for battling the coronavirus pandemic and are designing numerous technological inventions. A summary of some of the major innovations carries out in different parts of the world have been discussed in this paper with the main aim to not only encourage inventors to design more inventions like the ones listed in the paper but also to give motivation to engineers to design these at affordable cost to help each and every citizen in fighting this deadly pandemic.

REFERENCES

[1] https://www.worldometers.info/coronavirus/.Last accessed on 28th June 2020.

[2] Kumar, A., Gupta, P. K., & Srivastava, A. (2020). *A review of modern technologies for tackling COVID-19 pandemic. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 14(4), 569–573.*

[3] Nguyen, Thanh. (2020). Artificial Intelligence in the Battle against Coronavirus (COVID-19): A Survey and Future Research Directions. 10.13140/RG.2.2.36491.23846.

[4] Ruiz Estrada, Mario. (2020). *The Uses of Drones in Case of Massive Epidemics Contagious Diseases Relief Humanitarian Aid: Wuhan-COVID-19 Crisis. SSRN Electronic Journal.* 10.2139/ssrn.3546547.

[5] https://www.ideaconnection.com/new-inventions/hygiene-hand-for-touch-free-interacting-15170.html. Last accessed on 28th June 2020.

[6] https://www.kickstarter.com/projects/34951038/hygiene-hand-antimicrobial-brass-edc-door-opener-and-stylus. Last accessed on 28th June 2020.

[7] Doremalen N.V. et.al., *Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1, New England Journal of Medicine 2020; 382:1564-1567, April 16, 2020.*

[8] https://www.weforum.org/agenda/2020/04/coronavirus-covid19-pandemic-gadgets-innovation-technology/. Last accessed on 28th June 2020.

[9] https://www.theguardian.com/artanddesign/2020/mar/25/10-coronavirus-covid-busting-designs. Last accessed on 28th June 2020.

[10] https://www.scmp.com/video/china/3074719/coronavirus-chinese-police-wear-smart-helmets-check-body-temperature-crowds. Last accessed on 28th June 2020.

[11] https://drdo.gov.in/automatic-hand-sanitizer-dispensing-unit. Last accessed on 28th June 2020.

[12] https://drdo.gov.in/uv-based-disinfection-devices. Last accessed on 28th June 2020.

[13] https://www.sustainable-bus.com/news/bus-disinfection-through-uv-lights-a-way-to-fight-coronavirus-in-shanghai/. Last accessed on 28th June 2020.

[14] https://timesofindia.indiatimes.com/videos/city/bengaluru/covid-19-this-uv-light-disinfection-robot-can-sanitise-entire-room-in-just-4-minutes/videoshow/75718682.cms. Last accessed on 28th June 2020.