REVIEW ARTICLE

Automatic online monitoring of patients by precision human medicine for fight COVID-19 and other diseases

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ABSTRACT

All patients against COVID-19. At present, the pandemic is causing panic in the world's population, in such a situation, all researchers in the discipline should join efforts to curb said disease, the discovery of pandemic diseases in recent years has become recurrent years for which all researchers must be at the service of humanity, are the case of those dedicated to precision farming, who have experience in the early and remote detection of livestock diseases, and in the application of modern technologies such as mechatronic, artificial intelligence, the internet of things, artificial vision, and others. These disciplines are integrated to form a new branch of medicine; precision human medicine which would be one of the strategies to stop or mitigate the explosive development of this type of pandemic is the application of these new technologies. Therefore, efforts should be increased for bringing this challenging approach of precision human medicine practice. This is only possible when teams from different research disciplines, the use of these technologies is crucial now to fight against current pandemics (COVID-19) and future pandemics that will attack us. The main objective of this work is to highlight that the proliferation of COVID-19 can be avoided using the new technologies and joining all the specialists in these to eliminate it.

Key words: Artificial vision, COVID-19, IoT, mechatronics, precision human medicine

INTRODUCTION

At present, the pandemic of COVID-19 is causing panic in the world's population, in such a situation, all researchers in the discipline should join efforts to curb said disease, the discovery of pandemic diseases in recent years has become recurrent years for which all researchers must be at the service of humanity, are the case of those dedicated to precision farming, who have experience in the early and remote detection of livestock diseases, and in the application of modern technologies such as mechatronic, artificial intelligence, the internet of things, artificial vision, and others. These disciplines are integrated to form a new branch of medicine; precision human medicine which would be one of the strategies to stop or mitigate the explosive development of this type of pandemic is the application of these new technologies. The main objective of this work is to highlight that the proliferation of COVID-19 can be avoided using the new technologies and joining all the specialists in these to eliminate it.

MATERIALS AND METHODS

An intense search was carried out in the databases of scientific journals, libraries, books, and the internet of things.

LITERATURE REVIEW

For example, Santhosh and Sujatha[1] focused on the significance of how internet of things and cloud play

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a key role in health care and also discuss security aspects in IoT devices and efficient health, using Arduino Mega and sensors. Senthamilarasi et al.[2] developed a mobile device-based wireless health-care monitoring system which can provide real-time online information about physiological conditions of a patient mainly consists of sensors, the data acquisition unit, microcontroller (i.e., Arduino), and programmed with a software (i.e., JAVA). The patient's temperature, heartbeat rate, and EEG data are monitored, displayed, and stored by the system and sent to the doctor's mobile containing the application. George et al.[3] proposed a system for so the patient health is continuously monitored using different sensors which is connected to the Arduino board. Moreover, the acquired data are send to the server using Ethernet shield attached to the Arduino board. If any of the parameter values goes beyond the threshold value, an alert is given to the doctor using an Android application installed in the doctor's smartphone.[4] Design and functioning of IOT-based supervising health system of human body, Rajani et al.[5] developed an IOT-based health monitoring system using cloud computing. Sivasankari et al.[6] proposed a WiFi-based wireless sensor network for monitoring purpose. Because, it has both data acquisition and data transmission principle. For continuous monitoring, Atmega328 microcontroller is used. In this case, several sensor units are considered, namely, temperature sensor, heartbeat rate sensor, and human blood pressure sensor. Esfahani and Moshayedi[7] developed an Adriano-based positioning and health-care system to help Alzheimer's patients and their caregivers to track patients and monitor their vital signs remotely. The proposed system consists of an Arduino Mega microcontroller as the main processing unit of the developed system, heartbeat sensor (SEN 11-574), temperature sensor LM35, positioning and communication sensor Sim908, and storage SD card. Likewise, Anonymous[8] makes a comparison between new generation of the e-Health Sensor platform called MySignals with this sensors (patient position sensor [accelerometer], glucometer sensor, body temperature sensor, blood pressure sensor [sphygmomanometer] V2.0, pulse and oxygen in blood sensor [SPO$_2$], airflow sensor [breathing], galvanic skin response sensor [GSR – sweating], electrocardiogram sensor [ECG], electromyography

sensor [EMG]) and e-Health Sensor Platform V2.0 for Arduino and Raspberry Pi. Parihar et al.[9] described the working of a wireless heartbeat and temperature monitoring system based on a microcontroller ATmega328 (Arduino Uno). Bansal and Gandhi[10] proposed the use of nanoelectronics, IoT, and Big Data in Smart Healthcare (ECG monitoring) essentially, the nanomaterial enabled ECG sensors/devices have certainly improved conductivity, electrical properties, and the toxicity of the devices. It has also reduced the cost, it is easily and abundantly available and can be effortlessly integrated with the latest technological devices and concepts such as IoT and Big Data.[11] Review of IoT-based smart health-care system, proposed a system for transmits the patient's health parameters through WiFi to the doctor's website and to an Android app. Lal and Kaushal[12] designed a device which is used for continue monitoring of patients in hospital and introduced a real-time health monitoring system with Arduino and LABVIEW with GSM technology. Abdulkadir and Zhuopeng[13] designed a system for monitoring the patient's body at any time using internet connectivity. The function of this system is to measuring some biological parameter of the patient's body such as temperature, heartbeat, and blood pressure, using sensors and the sensors will sense the body temperature, heartbeat, and blood pressure of the patient and send the values to IOT cloud platform through WiFi Module. Chagüi and Martinez[14] developed the prototype of a remote monitoring system for monitoring blood pressure and blood oxygen saturation of chronic patients suffering from hypertension, asthma, and/or COPD in Colombia, using free software and internet of things technologies. Rabia and Mohamedbeemubeen[15] designed and implemented effective real-time health-care monitoring dashboard for on-spot-accident patients who are injured and went to unconscious state. The proposed system monitors the ECG, EEG, EMG waveforms, temperature, heart beats, etc., and transmits those vital parameters wirelessly through WiFi technology. Vijay and Jadhao[16] discussed the IoT-based remote monitoring of patient.

DISCUSSION AND CONCLUSIONS

Precision human medicine involves the measurements, predictions, and data analyses

of human variables. PHM offers totally new possibilities to collect and analyze data from people in a continuous and fully automatic way. We cannot only replace the doctor "eyes and ears" to each individual human as in the past, but several other variables (infections, physiological variables, stress, etc.) will soon be measurable in practice. The bottleneck to apply this technique is in the availability of reliable sensors and sensing systems, since it has been shown that the required mathematical algorithms can be developed. The application of new technologies offers new possibilities to precision human medicine. Therefore, efforts should be increased for bringing this challenging approach to precision human medicine practice. This is only possible when teams from different research disciplines, such as mechatronics, artificial intelligence, the internet of things, and artificial vision, join their research efforts. Negrete[17,18] proposed the application of mechatronics, artificial vision,[19,20] and internet of things[21] to increase the productivity of food production, the use of these technologies is crucial now to fight against current pandemics (COVID-19) and future pandemics that will attack us. All patients against COVID-19.

REFERENCES

1. Santhosh BA, Sujatha S. Securing and monitoring human health using arduino mega and sensors. Int J Electron Commun Technol 2018;9:9-12.
2. Senthamilarasi C, Rani JJ, Vidhya B, Aritha H. A smart patient health monitoring system using IOT. Int J Pure Appl Math 2018;119:59-70.
3. George MM, Cyriac MN, Mathew S, Antony T. Patient health monitoring system using IOT and android. J Res 2016;2:102-4.
4. Begum SF, Sreevidya K. Design and functioning of IOT based supervising health circumstance of human body. Int J Innov Technol Res 20175:7569-71.
5. Rajani N, Kumar J, Lakshminarayana N. IOT based health monitoring systems using cloud computing. Int J Innov Technol Res 2018;6:7870-2.
6. Sivasankari N, Parameswari M, Anbarasan K, Moses MB. Arduino based human health care monitoring and control system. IOSR J Electr Electron Eng 2016;11:9-18.
7. Esfahani OT, Moshayedi AJ. Design and development of arduino healthcare tracker system for Alzheimer patients. Int J Innov Technol Exp Eng 2015;5:12.
8. Anonymous. e-Health Sensor Platform V2.0 for Arduino and Raspberry Pi [Biometric/Medical Applications]; 2020. Available from: https://www.cooking-hacks.com/documentation/tutorials/ehealth-biometric-sensor-platform-arduino-raspberry-pi-medical.
9. Parihar VR, Tonge AY, Ganorkar PD. Heartbeat and temperature monitoring system for remote patients using Arduino. Int J Adv Eng Res Sci 2017;4:55-8.
10. Bansal M, Gandhi B. IoT ande Big Data in Smart Healthcare (ECG Monitoring). Faridabad, India: 2019 International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (COMITCon); 2019. p. 390-6.
11. Poojitha S, Reddy BI. A comprehensive survey on smart healthcare monitoring of patients using IOT. Int Res J Eng Technol 2018;6:2360.
12. Lal SM, Kaushal JK. Real time health monitoring system using Arduino and LabVIEW with GSM technology. Int J Adv Eng Res Dev 2019;4:1-5.
13. Abdulkadir IA, Zhuopeng W. IOT patient health monitoring system. Int J Eng Res Appl 2018;8:77-80.
14. Chagüi RJ, Martinez FE. Prototipo de Sistema de Monitoreo No Invasivo de Pacientes Crónicos que Padecen Hipertensión, Asma Y/O EPOC. M.Sc. Thesis. Cartagena: Universidad de Cartagena; 2018.
15. Rabia JS, Mohamedbeemubeen N. Real time physiological status monitorinig through telemetry system for on-spot-accident patients using IOT. Int J Trend Sci Res Dev 2019;3:1580-3.
16. Vijay MM, Jadhao KT. Remote patient monitoring for smart care using IOT. Int J Adv Eng Res Dev 2017;1:120-7.
17. Negrete JC. Mechatronics in Mexican agriculture current status and perspectives. SSRG Int J Agric Environ Sci 2015;2:250-300.
18. Negrete JC. Mechatronics and precision livestock farming in Mexican animal production. Anim Rev 2017;4:1-7.
19. Negrete JC. Artificial vision in Mexican agriculture, a new techlogy for increase food security. Manag Econ J 2018a;2:10-5.
20. Negrete JC. Artificial vision in Mexican agriculture for identification of diseases, pests and invasive plants. J Adv Plant Sci 2018b;1:303.
21. Negrete JC. Internet of things in Mexican agriculture; a technology to increase agricultural productivity and reduce rural poverty. Res Anal J 2018c;1:40-52.