

# TOPICAL REPORT

## HEALTHCARE

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### COVID-19 UPDATES



#### World-first tool to improve COVID-19 diagnosis, free & online

"Award-winning Sydney start-up DetectED-X has directed its breast cancer diagnosis tool at the coronavirus, drawing on pandemic cases globally with support from healthcare and industry leaders to ramp up COVID-19 detection."

Source: University of Sydney

#### Personalized device could support multiple COVID-19 patients from a single ventilator

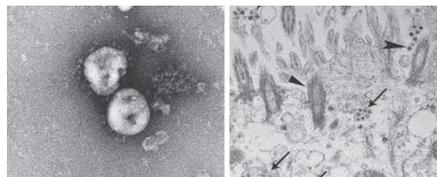
"3D printing fuels U-M efforts to rapidly increase ventilator capacity while providing each patient on vent support with individually tailored gas pressures and pressure monitoring"

Source: EurekAlert!

#### New Online COVID-19 Model Reveals How Lifting or Extending Different Social-Distancing Measures Will Affect States

"A new online tool, COVID-19 Simulator, developed by researchers at Massachusetts General Hospital (MGH) and Georgia Tech can help policy makers see how lifting or extending different social-distancing measures at various times can impact each state in terms of COVID-19 cases, hospitalizations, and deaths.

### COVID-19 RESEARCH



#### Locally Informed Simulation to Predict Hospital Capacity Needs During the COVID-19 Pandemic

"To estimate the timing of surges in clinical demand and the best- and worst-case scenarios of local COVID-19-induced strain on hospital capacity, and thus inform clinical operations and staffing demands and identify when hospital capacity would be saturated."

Source: Annals of Internal Medicine

#### An Interpretable Machine Learning Framework for Accurate Severe vs Non-severe COVID-19 Clinical Type Classification

"In this study, we recruited 214 confirmed COVID-19 patients in non-severe and 148 in severe type, from Wuhan, China. The patients' comorbidity and symptoms (26 features), and blood biochemistry (26 features) upon admission were acquired as two input modalities."

Source: MEDRXIV

### HEALTHCARE REPORTS



#### COVID-19—Implications for the Healthcare Industry, 2020

"A team of futurists, analysts, and consultants from the Global Transformational Health Research Team at Frost & Sullivan have come together to render a comprehensive analysis to predict the future of healthcare with COVID-19 disruption in perspective. This study provides actionable predictions and growth opportunities for major healthcare segments and markets during and after the pandemic."

Source: Frost & Sullivan

#### Healthcare MoneyTree™ report: Q1, 2020

"PwC and CB Insights' Healthcare MoneyTree™ report brings you a quarterly publication based on US venture capital funding for healthcare related industries. Each issue is broken out by five key sections: US healthcare trends, US healthcare industries, US healthcare places, US healthcare movers and shakers, and Global healthcare trends."

Source: PwC

#### Will COVID-19 jumpstart the digital healthcare revolution?

"This study was conducted by Strategy& in collaboration with the Spitzenverband Digitale Gesundheitsversorgung e.V. The results are based on a standardized

### PREDICTIVE ANALYTICS

The tool uses most recent data for each state and infectious disease modeling, as recommended by expert epidemiologists."

Source: Massachusetts General Hospital

## DIGITAL HEALTHCARE



### UC3M spin-off develops a thermographic camera that measures body temperature at a distance

"A spin-off from the LIR-Infrared Lab (Laboratorio de Sensores, Teledetección e Imagen en el Infrarrojo) at Universidad Carlos III de Madrid (UC3M), SENSIA Solutions, has adapted its thermographic camera technology, called HIGIA, in order to manufacture a new high precision system for measuring body temperature that can be used to detect fever in individuals accessing facilities, in the wake of the healthcare emergency brought on by the COVID-19 outbreak."

Source: UC3M

### App calculates risk of delaying cancer care during pandemic

"The University of Michigan's OncCOVID app draws on global cancer and coronavirus data to create an individualized mortality risk assessment for receiving immediate versus delayed cancer treatment."

Source: EurekAlert!

### Diabetes care reaches new heights as drone delivers insulin for patient

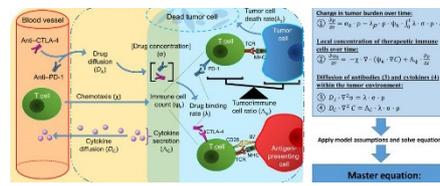
"The international medical team that accomplished the world's first documented drone delivery of insulin for a patient living in a remote community described the project in an ENDO 2020 abstract that will be published in the Journal of the Endocrine Society."

Source: EurekAlert!

## MACHINE LEARNING & AI IN HEALTHCARE



### Artificial intelligence could help predict future diabetes cases



### A CNN-aided method to predict glaucoma progression using DARC (Detection of Apoptosing Retinal Cells)

"Anonymised DARC images were acquired from healthy control (n=40) and glaucoma (n=20) Phase 2 clinical trial subjects (SRCTN10751859) from which 5 observers manually counted spots. The CNN-aided algorithm was trained and validated using manual counts from control subjects, and then tested on glaucoma eyes."

Source: Expert Review of Molecular Diagnostics

### Mathematical prediction of clinical outcomes in advanced cancer patients treated with checkpoint inhibitor immunotherapy

"We present a mechanistic mathematical model of immune checkpoint inhibitor therapy to address the oncological need for early, broadly applicable readouts (biomarkers) of patient response to immunotherapy. The model is built upon the complex biological and physical interactions between the immune system and cancer, and is informed using only standard-of-care CT."

Source: Science Advances

### Healthcare predictive analytics for disease progression: a longitudinal data fusion approach

"Different from the conventional method using only initial or static clinical data to model the disease progression for current time prediction, we design a temporal regularization term to maintain the temporal successivity of data from different time points and simultaneously analyze data from data source level and feature level based on a sparse regularization regression approach."

Source: Science Advances

### Machine Learning Approaches to Determine Feature Importance for Predicting Infant Autopsy Outcome

"In order to aid counselling and understand how to improve the investigation, we explored whether machine learning could be used to derive data driven insights for prediction of infant autopsy outcome."

Source: MedRxiv

survey among digital health entrepreneurs, complemented by selected interviews with digital health experts from the start-up, public health insurance, investor and advisor community. All interviews were conducted based on a standard questionnaire in which the experts were asked about their perspective on the implications of the COVID-19 pandemic on digital healthcare start-ups."

Source: Strategy And

### Advanced Non-contact Patient Monitoring Technologies: A New Paradigm in Healthcare Monitoring

"This research service (RS) presents advanced non-contact technologies for patient monitoring. It thoroughly explains an overview of non-contact patient monitoring technologies, key vital signs for patient monitoring, unmet needs, drivers and challenges, market segmentation, and key developments in this space. Based on the industry research for non-contact patient monitoring technologies, the innovations are segmented based on technology types such as infrared, sound analysis, video analysis, doppler radar, sensor, mobile platform, and ultrasound technologies. The report also enlightens the growth opportunities in the non-contact patient monitoring segment for different indications."

Source: Frost & Sullivan

### 2020 China Life Sciences and Health Care M&A Trends report

"The report, based on deal data, delves into uncertainties and challenges in M&A activities, especially M&A trends in subsectors such as drugs, biotech, medical service institutions and medical device manufacturers. Moreover, it also looks ahead into 2020 by capturing the current trends, observing live business cases and identifying hot areas."

Source: Deloitte

### The future of virtual health

"As virtual health gains momentum, it is becoming a core component in helping consumers improve or maintain their well-being, as well as playing an increasingly important role in the diagnosis and treatment of illness."

Source: Deloitte

"The researchers investigated the use of a type of artificial intelligence called machine learning in diagnosing diabetes. Artificial intelligence (AI) is the development of computer systems able to perform tasks that normally require human intelligence. Machine learning is a type of AI that enables computers to learn without being explicitly programmed. With each exposure to new data, a machine-learning algorithm grows increasingly better at recognizing patterns over time."

Source: EurekAlert!

### Artificial intelligence improves X-ray identification of patients with broken bones

"Artificial intelligence that can "read" electronic radiology reports and flag patients with broken bones who are at risk of osteoporosis outperformed the traditional manual method of health care professionals reading X-ray reports, a new study finds. The results were accepted for presentation at ENDO 2020, the Endocrine Society's annual meeting, and will be published in a special supplemental section of the Journal of the Endocrine Society."

Source: EurekAlert!

## HEALTHCARE DIAGNOSTICS



### City engineering experts to develop diabetes sensor

"The City academics will be developing a hybrid sensor for analyzing VOCs in breath from 1D metal oxide nanostructures functionalized with different catalytic nanoparticles."

Source: University of London

### 3D fusion imaging improves coronary artery disease diagnosis

"Information from the 3D fused image helped correlate specific stenoses, or areas of narrowing in the coronary arteries, and their severity with possible cardiac scar tissue and ischemia—a condition in which parts of the heart muscle don't get enough blood. This could be used to help guide interventional or surgical revascularization procedures like stenting or bypass surgery that improve blood supply to the heart."

Source: EurekAlert!

## MEDICAL DEVICES

## HEALTHCARE DIAGNOSTICS



### Automatic diagnosis of the 12-lead ECG using a deep neural network

"Here we present a DNN model trained in a dataset with more than 2 million labeled exams analyzed by the Telehealth Network of Minas Gerais and collected under the scope of the CODE (Clinical Outcomes in Digital Electrocardiology) study. The DNN outperform cardiology resident medical doctors in recognizing 6 types of abnormalities in 12-lead ECG recordings, with F1 scores above 80% and specificity over 99%."

Source: Nature Communications

### Wireless smart contact lens for diabetic diagnosis and therapy

"Here, we developed smart contact lenses for both continuous glucose monitoring and treatment of diabetic retinopathy. The smart contact lens device, built on a biocompatible polymer, contains ultrathin, flexible electrical circuits and a microcontroller chip for real-time electrochemical biosensing, on-demand controlled drug delivery, wireless power management, and data communication."

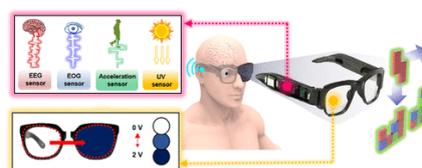
Source: Science Advances

### mHealth spectroscopy of blood hemoglobin with spectral super-resolution

"Here, we report spectral super-resolution (SSR) spectroscopy that virtually transforms the built-in camera (RGB sensor) of a smartphone into a hyperspectral imager for accurate and precise blood Hgb analyses. Statistical learning of SSR enables us to reconstruct detailed spectra from three color RGB data."

Source: Optica

## WEARABLE HEALTHCARE



### 3D Printed, Customizable, and Multifunctional Smart Electronic Eyeglasses for Wearable Healthcare Systems



### Personalised nutrition smart patch to be developed in Australia

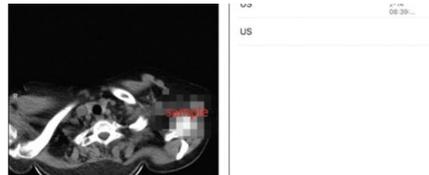
"A wearable smart patch will deliver precision data to help people personalise their diets and reduce their risk of developing lifestyle-related chronic diseases like Type 2 diabetes." Source: RMIT

### and Human-Machine Interfaces

"Here, we describe three-dimensional-printed, personalized, multifunctional electronic eyeglasses (E-glasses), not only to monitor various biological phenomena but also to propose a strategy to coordinate the recorded data for active commands and game operations for human-machine interaction (HMI) applications."

Source: ACS Appl. Mater. Interfaces

### TELEHEALTH



### The Application of Mobile Telehealth System to Facilitate Patient Information Presentation and Case Discussion

"The MTS searches patient information, which is stored in hospital intranet, and uses five modules to display patient information. By a request/response module and a real-time interaction module, we successfully conducted case discussions. In addition, we took measures in three areas to prevent patient information leakage." Source: Telemedicine and e-Health

### HEALTHCARE SYSTEMS



### Internet of things based distributed healthcare systems: a review

"This paper reviews state-of-the-art works in IoT-DHSS, based on which the taxonomy of these systems is proposed considering various aspects such as monitoring methods, communication technologies, computing techniques and low-power protocols. A comparative study of these IoT-DHSSs is made to know the suitability of various healthcare systems. The challenges and open issues associated with existing IoT-DHSSs are also discussed in detail. This paper helps technical people of medical industry, researchers and scientists interested in cloud computing and IoT technologies for medical field."

Source: Journal of Data, Information and Management

