SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

29 May – 23 July 2020

TOPICAL REPORT

HEALTHCARE

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COVID-19 UPDATES

Singapore designs shield to protect COVID-19 healthcare workers

"The DART can lessen the risks of infection associated with procedures such as suctioning, intubation and extubation by providing an extra layer of protection between the healthcare workers and the patient. It also helps to limit environmental contamination, which can be a source of transmission."
Source: Biospectrumasia

HEALTHCARE DIAGNOSTICS

SFU, Providence Health Care develop AI tool for quicker COVID-19 diagnosis

"The tool, currently in the validation phase at St. Paul's Hospital in Vancouver, Canada, enables a clinician to feed a patient's chest x-ray image into a computer, run a bio-image detection analysis and determine a positive pneumonia case that is consistent with COVID-19."
Source: SFU

HEALTH DEVICE

Skin-interfaced microfluidic devices with one-opening chambers and hydrophobic valves for sweat collection and analysis

"Here, we introduce hydrophobic valves at the junction of the chamber and the microfluidic channel as a new chamber design to reduce sweat evaporation. Because the advancing front of the liquid in the hydrophilic microchannel is blocked by the hydrophobic valve, the fluid flows into the chambers, forms the initial meniscus, and completely fills the chambers along the initial meniscus."
Source: Lab on a Chip

FingerTrak: Continuous 3D Hand Pose Tracking by Deep Learning Hand Silhouettes Captured by Miniature Thermal Cameras on Wrist

"In this paper, we present FingerTrak, a minimal-obtrusive wristband that enables continuous 3D finger tracking and hand pose estimation with four miniature thermal cameras mounted closely on a form-fitting wristband. FingerTrak explores the feasibility of continuously reconstructing the entire hand postures (20 finger joints positions) without the needs of seeing all fingers."
Source: Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies

HEALTHCARE REPORTS

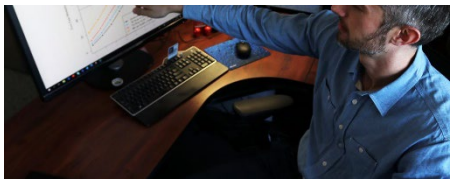
Digital Trends in Healthcare—Global, 2019 to 2023

"This study incorporates the breadth of analysis obtained from healthcare industry analysts and IT/Telecom industry analysts with customer research to provide our clients with a holistic view of future IT investments and impact of these solutions. You will find the latest insights on the state of the industry, the impact of COVID-19, and predictions for digital health solutions. You will also discover customer perspectives on digital transformation trends and investment plans."
Source: Frost and Sullivan

Post-pandemic Global Healthcare Market Outlook, 2020

"Every year, the team of futurists, analysts, and consultants in Frost & Sullivan's Transformational Healthcare Group comes together to render a comprehensive analysis to predict the themes, technologies, and global forces that will define the next 12 to 18 months (future) for the healthcare industry. In light of the lessons learned from the COVID-19 pandemic and the changing economic and business scenario, Frost & Sullivan has re-visited predictions and identified the top growth opportunities for companies to survive the remainder of 2020.
Source: Frost and Sullivan

MEDICAL DATA



Patient data can predict life expectancy for older adults with diabetes

"A new study finds that clinicians can use patient data, such as a history of co-occurring health conditions and medication, to predict the 5- and 10-year life expectancy of older people with diabetes."

Source: VETERANS AFFAIRS RESEARCH COMMUNICATIONS

HEALTHCARE ROBOTICS

KIMM develops remote specimen collection robot

"The robot system is composed of a master device controlled by medical personnel and a slave robot that interacts with patients. The slave robot is equipped with a disposable swab, which retrieves samples from the nose and mouth of a patient, and moves according to the operation of the master device."

Source: NATIONAL RESEARCH COUNCIL OF SCIENCE & TECHNOLOGY

Robotics in healthcare: Trends

"Robotics is increasingly being considered synonymous with progress within multiple industries. Healthcare robotics has been specifically developed to improve patient outcomes. Healthcare robotics varies, as there are multiple ways they can be used in a healthcare setting. The industry is expanding with the adoption of automation across all areas. Surgical robotic systems are a paragon of robotics in the medtech industry. Over the next five years, there will be rapid growth in the robotics market within the healthcare sector."

Source: Medical-Device Network

MEDICAL DEVICES

New wearable devices set to diagnose medical conditions

"UniSA biomedical engineer Professor Benjamin Thierry aims to develop a

Smart Healthcare Device for Cardiac Patientst

"Heart diseases can be considered as the most occurring long-lasting diseases in modern times. In this paper a standalone smart healthcare device is developed and implemented. The device can monitor the heart condition based on the measured electrocardiogram (ECG) signal and send/save updated report for the patient, doctor or health care center (HCC). This collected data is also processed and analyzed inside the device by using multi-layer perceptron to predict any abnormal behavior. In case of any abnormalities, the device will send an alarm to the patient, and also sort of data could be submitted through the cloud to the health care center. In case of an emergency, the system has the capability to send a call/SMS with location information to the emergency department for an action."

Source: IEEE

Wearable Heart Rate and Body Temperature Monitoring Device for Healthcare

"The Development of a wearable sensor that can monitor a heart rate and body temperature based on ESP8266 NodeMCU microcontroller is proposed in this project. To realize the system, two biomedical sensors are used which are MAX30205 and SEN11574 Pulse Rate Sensor. The sensors should be wearable to make it easy to be used by the patient."

Source: Journal of Physics: Conference Series

Smart app for respiratory monitoring device : healthcare

"With the advancement of smartphones and the increasing number of carriers, it is able to house much powerful and efficient applications. These applications have diversified and have been proven to cater to the different needs of users. With that, the proposed project looks at how to leverage common day technology, the smartphone and mobile application, to detect pulmonary edema using a portable medical device. The purpose of this is to ease trips visited to clinics and ensure constant health monitoring."

Source: NTU

Low-Power Wearable Healthcare Sensors

"While smart home technology solutions are enabling people to live in their homes for longer, research has shown that more personalized data are needed to improve services and decisions, and this is where wearable devices are proving their worth.

Global Healthcare Interoperability Market, 2019–2024

"Interoperability has become a critical consideration for all health IT applications. Globally, major healthcare stakeholders acknowledge the need to invest in digital infrastructure capabilities that facilitate cross-continuum patient information exchange and support evidence-based care, at scale."

Source: Frost and Sullivan

Frost Radar™: Artificial Intelligence for Healthcare IT, Global, 2020

"Hospitals that have so far invested in AI-based financial solutions to automate patient access management, reimbursement eligibility matching, and computer-assisted coding are now also preferring clinical-grade AI solutions for imaging analytics, genomics profiling, clinical risk stratification, and precision medicine-based diagnosis."

Source: Frost and Sullivan

Growth Opportunities In Materials For Ppe, 3d Printing, Healthcare, And Smart Construction

"This issue of High-Tech Materials Technology Opportunity Engine (TOE) showcases innovations and growth opportunities of super-conducting materials, smart concrete, modified sugar molecules, materials for 3D printing, and personal protective equipment."

Source: Frost and Sullivan

Frugal Medical Devices Innovations in Emerging Economies Democratizing Healthcare

"The research details the value propositions of the frugal medical devices to the patients, healthcare system, hospitals, clinics, and medical professionals. The opportunities and challenges of frugal innovations are also explored in detail. The RS also covers some of the revolutionary frugal innovations in various segments of medical devices. It also presents the various growth opportunities for the frugally innovating local and global companies. The report also provides strategic recommendations to the local and global firms to capitalize the opportunities and build a sustainable market in these countries. In addition to the above, this research service also offers insights on the intellectual property landscape and the key patents in the last five years."

Source: Frost and Sullivan

range of solid-state sensing and wearable technologies capable of diagnosing conditions including preeclampsia, epilepsy, fetal arrhythmias and heart attacks."
Source: UNIVERSITY OF SOUTH AUSTRALIA

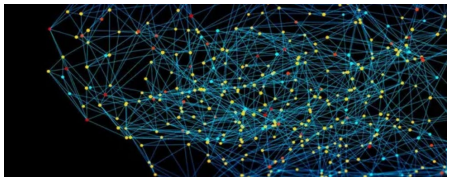
Wearable Diagnostic Devices Help Ease Pressure on Healthcare Systems

"In terms of wearable technology evolution, body area networks have started becoming a larger factor, along with Internet of Things (IoT) integration involving sensors and user-friendly interfaces to provide a feedback loop of various data. Furthermore, and particularly in the medical field, the accuracy of the data provided back to the consumer is of critical importance. Therefore, medical device manufactures have to focus on continuously improving sensor technology as well as the accuracy of data. Nemaura Medical, Inc. (NASDAQ: NMRD), CytoDyn Inc. (OTC: CYDY), Aytu BioScience, Inc. (NASDAQ: AYTU), Johnson & Johnson (NYSE: JNJ), BioNTech SE (NASDAQ: BNTX)"
Source: PRNewswire

Using connected medical devices to slow coronavirus spread in hospitals

"Digital tools can help stream data from tools ranging from ventilators to monitors, says Kevin Phillips, VP of product management at Capsule."
Source: HealthcareITNews

AI in HEALTHCARE

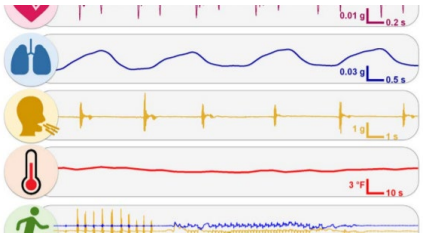


Artificial intelligence: unleashing its power in healthcare

"The use of artificial intelligence (AI) – including machine learning (ML) and deep learning techniques (DL) - is poised to become a transformational force in healthcare. Patients, healthcare service providers, hospitals, medical equipment makers, pharmaceutical companies, professionals, and various stakeholders in the ecosystem all stand to benefit from ML driven tools. From anatomical geometric measurements, to cancer detection, to radiology, surgery, drug discovery and genomics, the possibilities are endless. In these scenarios, ML can lead to increased operational efficiencies, extremely positive outcomes and significant cost reduction."

Sensors can be placed on and around the body, in clothing, in shoes, in jewelry, and in many other accessories to measure movement, physiology, environment, and even mood/emotion. Such technology will become more common, and indeed vital, in long-term health monitoring. Perhaps the real potential of such devices is not just to monitor, but to have interactive communication with cloud services to offer personalized and ongoing real-time healthcare advice, enabling people to manage their health and to reduce hospital admissions. Therefore, the challenge of the next generation of wearable healthcare devices is to offer a wide range of sensing, computing, communication, and human–computer interactions, all within a tiny device with limited resources and electrical power."
Source: Electronics

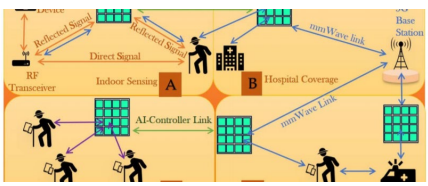
COVID-19



Continuous on-body sensing for the COVID-19 pandemic: Gaps and opportunities

"This past spring, the Rogers group and researchers at Shirley Ryan AbilityLab introduced a novel wearable device and set of data algorithms specifically tailored to catch early signs and symptoms associated with COVID-19 and to monitor patients as the illness progresses. About the size of a postage stamp, the soft, flexible, wireless device sits just below the suprasternal notch, the visible dip at the base of the throat -- an ideal location for monitoring respiratory health."
Source: Science Advances

HEALTHCARE INNOVATIONS



Revolutionizing Future Healthcare using Wireless on the Walls (WoW)

"These intelligent surfaces mounted and/or coated on walls aka - Intelligent Walls are planar and active surfaces, which will be a key element

Source: Healthcare

HEALTHCARE TECHNOLOGIES

VR/AR in Healthcare: Technology Trends

"VR/AR technologies have been traditionally associated with the entertainment industry, with virtual and immersive environments used for gamers, product designers, and architects. However, increasing healthcare expenditure and the need for cutting-edge technologies to aid the development of novel therapies and diagnostics have fuelled the need for this technology in the healthcare industry."
Source: Verdict

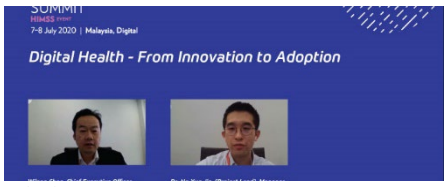
How IoT is Transforming the Healthcare Industry

"In healthcare, the IoT is used for interconnected healthcare devices like monitoring systems, sensor machines, and detectors that can capture real-time health information. The detectors store the information on a centralized cloud/server to be later analyzed for better healthcare service."
Source: Embedded Computing Design

Blockchain in Healthcare: Macroeconomic Themes

"Blockchain technology will play a role in a wide range of sectors in healthcare, including sharing healthcare data, tracing supply chains, and optimising the payment process. By using blockchain technology, synchronised public data can be securely stored, ensuring that each party is sharing the same real world data. A blockchain-based network holds an immutable record of transactions that can be used to track the products in supply chain, but do so in a confidential way that safeguards sensitive information."
Source: Verdict

DIGITAL HEALTH



Digital health - From innovation to adoption

"Sunway Medical Centre was one of the earliest companies who adopted teleconsultation during Malaysia's MCO period, which allowed patients

in beyond 5G and 6G communication. These intelligent walls equipped with machine learning algorithm and computation power would have the ability to manipulate EM waves and act as gateways in the heterogeneous network environment. The article presents the application and vision of intelligent walls for next-generation healthcare in the era of beyond 5G.."
Source: Nature Communications

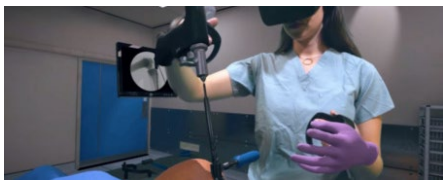
Design and technological development of a therapeutic device for physical rehabilitation in the hospital setting

"The objective of this study was to design a therapeutic device with its respective management guide, for comprehensive physical rehabilitation that adapts both to the conditions of the hospital infrastructure and to the clinical situation of the hospitalized patient, whose condition is deteriorated due to their condition of health and the consequences of a prolonged hospitalization. In turn, this device seeks to promote the performance of therapeutic activities aimed at preventing and improving aerobic capacity, mobility."
Source: Uninorte Health Magazine

In Vivo Photoacoustic Sentinel Lymph Node Imaging Using Clinically-Approved Carbon Nanoparticles

"The researchers injected carbon nanoparticles (CNPs) into the forepaws of living rats to stain SLN. Subsequently, photoacoustic and ultrasound dual-modality imaging were performed simultaneously in real-time at the axillary area of the rats to trace the SLN and guide the biopsy."
Source: IEEE Transactions on Biomedical Engineering

AI in HEALTHCARE



The rise of artificial intelligence in healthcare applications

"AI is ready to support healthcare personnel with a variety of tasks from administrative workflow to clinical documentation and patient outreach as well as specialized support such as in image analysis, medical device automation, and patient monitoring. In this chapter, some of the major applications of AI in healthcare will be discussed covering both the applications that

to continue to consult doctors from home."
Source: HealthcareITnews

are directly associated with healthcare and those in the healthcare value chain such as drug development and ambient assisted living."
Source: Artificial Intelligence in Healthcare

Medicine of the Future: the Power of Artificial Intelligence (AI) and Big Data in Healthcare

"The article presents digitalization in the healthcare sector in North America and Europe in order to derive inferences on opportunities to establish a leadership in digitalized, tailored healthcare solutions for individual well-being and public care."
Source: SSRN

The Future of Artificial Intelligence in International Healthcare: An Index

"This article provides a snapshot of the current state-of-the-art of AI, algorithms, big data-derived inferences and robotics in healthcare. Examining medical responses to COVID-19 on a global scale makes international differences in the approaches to combat global pandemics with technological solutions apparent."
Source: SSRN

Transforming healthcare with data and Artificial Intelligence (AI)

"AI can transform healthcare at every touchpoint, but clinicians and researchers need to first address their data infrastructure to meet computing needs in research and treatment."
Source: APBN

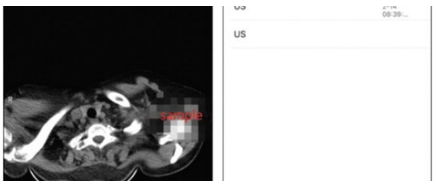
Commercial Adoption of AI in the Healthcare Sector: An Exploratory Analysis of S&P500 Companies

"We employ a dataset including news mentions and executive communications of all S&P500 Health Care Index companies to explore these differences. Pharmaceutical and medicine manufacturing companies had the earliest AI-linked news presence, yet they appeared to be among the slowest commercial implementers of AI. Ambulatory health care services and hospitals, as well as insurance carriers, received media coverage later, but were the quickest to take AI into commercial use"
Source: Digital Personalized Health and Medicine

What we talk about when we talk about trust: Theory of trust for AI in Healthcare

"In this article, we call for a conceptual framework of trust in health-related AI based not just on expert opinion but first and foremost on sound empirical research and conceptual rigor. Only with a well-grounded and comprehensive understanding of the trust construct, we will be able to inform AI design and acceptance in medicine in a meaningful way."
Source: Intelligence-Based Medicine

MEDICAL RESEARCH



Functionality and acceptability of a novel non-invasive neonatal heart rate monitoring device: a qualitative study of healthcare professionals

"The study aimed to inform the prototype design process by exploring the required features and usability of this novel device among healthcare professionals. Methods: Face-to-face,semi-structured interviews were conducted with healthcare professionals involved in the immediate care of babies at birth: paediatricians, midwives and neonatal nurses. Interviews were audio-recorded and subsequently transcribed verbatim."
Source: Surrey Research Insight

User experiences of virtual reality technologies for healthcare in learning: an integrative review

"The aim of this integrative review was to analyse the usage of different virtual reality (VR) technologies in learning and user experiences (UXs) of these technologies in healthcare practice and education. The integrative review was conducted in spring 2019 by searching eight international databases. The searches retrieved n = 26 original articles that were quality checked and included for the review."
Source: Behaviour & Information Technology

The Telemedicine And Ict As Tool To Improve The Local Healthcare

"the present work intends to give an overview of the new opportunities offered by telemedicine and various medical devices used to the care and assistance of patients among those suffering from diabetes. In particular, some information is presented on the spread of this pathology in the province of Foggia

and on the estimates of the costs incurred by the local health system."
Source: New Trends in Sustainable Business and Consumption

Healthcare Innovative Projects Co-promotion Between Higher Education Institution and a Private Organization of Social Solidarity

"Three projects are presented that results from the articulation between Coimbra Institute of Engineering (ISEC) and the IPSS-CASPAE, which have contributed to a positive social impact and the production of scientific knowledge. These projects aim to improve the quality of life of its users, encourage active ageing and collaborate with health professionals in the area of rehabilitation and neurodegenerative diseases, specially Parkinson Disease."
Source: IEEE
