1. Record Nr. UNINA9910747099103321

Titolo	Human-Machine Interface : Making Healthcare Digital / / edited by Rishabha Malviya [and three others]
Pubbl/distr/stampa	Hoboken, NJ : , : John Wiley & Sons, Inc. and Scrivener Publishing LLC, , [2024] ©2024
ISBN	1-394-20034-X 1-394-20033-1
Edizione	[First edition.]
Descrizione fisica	1 online resource (519 pages)
Disciplina	621.39
Soggetti	Computer vision Human-computer interaction
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Dedication Page -- Contents -- Foreword -- Preface -- Acknowledgement -- Part I: Advanced Patient Care with HMI -- Chapter 1 Introduction to Human-Machine Interface -- 1.1 Introduction -- 1.2 Types of HMI -- 1.2.1 The Pushbutton Replacer -- 1.2.2 The Data Handler -- 1.2.3 The Overseer -- 1.3 Transformation of HMI -- 1.4 Importance and COVID Relevance With HMI -- 1.5 Applications -- 1.5.1 Biological Applications -- 1.5.1.1 HMI Signal Detection and Procurement Method -- 1.5.1.2 Healthcare and Rehabilitation -- 1.5.1.3 Magnetoencephalography -- 1.5.1.4 Flexible Hybrid Electronics (FHE) -- 1.5.1.5 Robotic-Assisted Surgeries -- 1.5.1.6 Flexible Microstructural Pressure Sensors -- 1.5.1.7 Biomedical Applications -- 1.5.1.8 CB-HMI -- 1.5.1.9 HMI in Medical Devices -- 1.5.2 Industrial Applications -- 1.5.2.1 Metal Industries -- 1.5.2.2 Video Game Industry -- 1.5.2.3 Aerospace and Defense -- 1.5.2.4 Water Purification Plant HMI Based on Multi-Agent Systems (MAS) -- 1.5.2.5 Virtual and Haptic Interfaces -- 1.5.2.6 Space Crafts -- 1.5.2.7 Car Wash System -- 1.5.2.8 Pharmaceutical Processing and Industries -- 1.6 Challenges -- 1.7 Conclusion and Future Prospects -- References -- Chapter 2 Improving Healthcare Practice by Using HMI Interface -- 2.1 Background of Human-Machine Interaction -- 2.2

Introduction -- 2.2.1 Healthcare Practice -- 2.2.2 Human-Machine Interface System in Healthcare -- 2.3 Evolution of HMI Design -- 2.3.1 HMI Design 1.0 -- 2.3.2 HMI Design 2.0 -- 2.3.3 HMI Design 3.0 -- 2.3.4 HMI Design 4.0 -- 2.4 Anatomy of Human Brain -- 2.5 Signal Associated With Brain -- 2.5.1 Evoked Signals -- 2.5.2 Spontaneous Signals -- 2.5.3 Hybrid Signals -- 2.6 HMI Signal Processing and Acquisition Methods -- 2.7 Human-Machine Interface-Based Healthcare System -- 2.7.1 Healthcare Practice System. 2.7.1.1 Healthcare Practice -- 2.7.1.2 Current State of Healthcare Provision -- 2.7.1.3 Concerns With Domestic Healthcare -- 2.7.2 Medical Education System -- 2.7.2.1 Traditional and Modern Way of Providing Medical Education -- 2.8 Working Model of HMI -- 2.9 Challenges and Limitations of HMI Design -- 2.10 Role of HMI in Healthcare Practice -- 2.10.1 Simple to Clean -- 2.10.2 High Chemical Tolerance -- 2.10.3 Transportable and Light -- 2.10.4 Enhancing Communication -- 2.11 Application of HMI Technology in Medical Fields -- 2.11.1 Medical and Rehabilitative Engineering Using HMI -- 2.11.2 Controls for Robotic Surgery and Human Prosthetics -- 2.11.3 Sensory Replacement Mechanism -- 2.11.4 Wheelchairs and Moving Robots Along With Neurological Interface -- 2.11.5 Cognitive Improvement -- 2.12 Conclusion and Future Perspective -- References -- Chapter 3 Human-Machine Interface and Patient Safety -- 3.1 Introduction -- 3.2 Detecting Anesthesia-Related Drug Administration Errors and Predicting Their Impact -- 3.2.1 Methodological Difficulties in Studying Rare, Dangerous Phenomena -- 3.2.2 Consequences of Errors -- 3.2.3 Lessons From Other Industries -- 3.2.4 The Double-Human Interface -- 3.2.5 The Culture of Denial and Effort -- 3.2.6 Poor Labeling -- 3.3 Systematic Approaches to Improve Patient Safety During Anesthesia -- 3.3.1 Design Principles -- 3.3.2 Evidence of Safety Gains -- 3.3.3 Consistent Color-Coding -- 3.3.4 The Codonics Label System -- 3.4 The Triumph of Software -- 3.4.1 Software in Hospitals -- 3.4.2 Software in Anesthesia -- 3.4.3 The Alarm Problem -- 3.5 Environments that Audit Themselves -- 3.6 New Risks and Dangers -- 3.7 Conclusion -- References -- Chapter 4 Human-Machine Interface Improving Quality of Patient Care -- 4.1 Introduction -- 4.2 An Advanced Framework for Human-Machine Interaction. 4.2.1 A Simulated Workplace Safety and Health Program -- 4.3 Human-Computer Interaction (HCI) -- 4.4 Multimodal Processing -- 4.5 Integrated Multimodality at a Lower Order (Stimulus Orientation) -- 4.6 Higher-Order Multimodal Integration (Perceptual Binding) -- 4.7 Gains in Performance From Multisensory Stimulation -- 4.8 Amplitude Envelope and Alarm Design -- 4.9 Recent Trends in Alarm Tone Design for Medical Devices -- 4.10 Percussive Tone Integration in Multimodal User Interfaces -- 4.11 Software in Hospitals -- 4.12 Brain-Machine Interface (BCI) Outfit -- 4.13 BCI Sensors and Techniques -- 4.13.1 EEG -- 4.13.2 ECoG -- 4.13.3 ECG -- 4.13.4 EMG -- 4.13.5 MEG -- 4.13.6 FMRI -- 4.14 New Generation Advanced Human-Machine Interface -- 4.15 Conclusion -- References -- Chapter 5 Smart Patient Engagement through Robotics -- 5.1 Introduction -- 5.1.1 Robotics in Healthcare -- 5.1.2 Patient Engagement Tasks (Front End) -- 5.1.2.1 Robotics in Nursing, Patient Handling, and Support -- 5.1.2.2 Robotics in Patient Reception -- 5.1.2.3 Robotics in Ambulance Services -- 5.1.2.4 Robotics in Serving (Food and Medicine) -- 5.1.2.5 Robotics in Surgery and Surgical Assistance -- 5.1.2.6 Robotics in Cleaning, Moping, Spraying and Disinfecting -- 5.1.2.7 Robotics in Physiotherapy, Radiology, Lab Diagnostics and Rehabilitation (Exoskeletons) -- 5.1.2.8 Robotics in Tele-Presence -- 5.1.2.9 Robotics in Hospital Kitchen and Pantry Management -- 5.1.2.10 Robotics in Outdoor Medicine Delivery

-- 5.1.2.11 Robotics in Home Healthcare -- 5.1.3 Documentation and Other Hospital Management Tasks (Back End) -- 5.1.3.1 Robotics in Patient Data Feeding and Storing -- 5.1.3.2 Robotics in Data Mining -- 5.1.3.3 Robotics in Job Allocation to Hospital Staffs -- 5.1.3.4 Robotics in Payroll Management -- 5.1.3.5 Robotics in Medicine and Medical Equipment Logistics.
5.1.3.6 Robotics in Medical Waste Residual Management -- 5.2 Theoretical Framework -- 5.3 Objectives -- 5.4 Research Methodology -- 5.5 Primary and Secondary Data -- 5.6 Factors for Consideration -- 5.6.1 Patient Demographics -- 5.6.2 Hospital/Health Institutes Demographics -- 5.6.3 Patient Perception Factors -- 5.6.4 Hospital's Feasibility Factors and Hospital's Economic Factors for Implementation -- 5.7 Robotics Implementation -- 5.8 Tools for Analysis -- 5.9 Analysis of Patient's Perception -- 5.10 Review of Literature -- 5.11 Hospitals Considered for the Study (Through Indirect Sources) -- 5.12 Analysis and Interpretation -- 5.12.1 Crosstabulation -- 5.12.2 Regression and Model Fit -- 5.12.3 Factor Analysis -- 5.12.4 Regression Analysis -- 5.12.5 Descriptive Statistics -- 5.13 Conclusion -- References -- Annexure -- Chapter 6 Accelerating Development of Medical Devices Using Human-Machine Interface -- 6.1 Introduction -- 6.2 HMI Machineries -- 6.3 Brain-Computer Interface and HMI -- 6.4 HMI for a Mobile Medical Exoskeleton -- 6.5 Human Artificial Limb and Robotic Surgical Treatment by HMI -- 6.6 Cognitive Enhancement by HMI -- 6.7 Soft Electronics for the Skin Using HMI -- 6.8 Safety Considerations -- 6.9 Conclusion -- References -- Chapter 7 The Role of a Human-Machine Interaction (HMI) System on the Medical Devices -- 7.1 Introduction -- 7.2 Machine Learning for HCI Systems -- 7.3 Patient Experience -- 7.4 Cognitive Science -- 7.5 HCI System Based on Image Processing -- 7.5.1 Patient's Facial Expression -- 7.5.2 Gender and Age -- 7.5.3 Emotional Intelligence -- 7.6 Blockchain -- 7.7 Virtual Reality -- 7.8 The Challenges in Designing HCI Systems for Medical Devices -- 7.9 Conclusion -- References -- Chapter 8 Human-Machine Interaction in Leveraging the Concept of Telemedicine -- 8.1 Introduction.
8.2 Innovative Development in HMI Technologies and Its Use in Telemedicine -- 8.2.1 Nanotechnology -- 8.2.2 The Internet of Things (IoT) -- 8.2.3 Internet of Medical Things (IoMT) -- 8.2.3.1 Motion Detection Sensors -- 8.2.3.2 Pressure Sensors -- 8.2.3.3 Temperature Sensors -- 8.2.3.4 Monitoring Cardiovascular Disease -- 8.2.3.5 Glucose Level Monitoring -- 8.2.3.6 Asthma Monitoring -- 8.2.3.7 GPS Smart Soles and Motion Detection Sensors -- 8.2.3.8 Wireless Fetal Monitoring -- 8.2.3.9 Smart Clothing -- 8.2.4 AI -- 8.2.5 Machine Learning Techniques -- 8.2.6 Deep Learning -- 8.2.7 Home Monitoring Devices, Augmented and Virtual -- 8.2.8 Drone Technology -- 8.2.9 Robotics -- 8.2.9.1 Robotics in Healthcare -- 8.2.9.2 History of Robotics -- 8.2.9.3 Tele-Surgery/Remote Surgery -- 8.2.10 5G Technology -- 8.2.11 6G -- 8.2.12 Big Data -- 8.2.13 Cloud Computing -- 8.2.14 Blockchain -- 8.2.14.1 Clinical Trials -- 8.2.14.2 Patient Records -- 8.2.14.3 Drug Tracking -- 8.2.14.4 Device Tracking -- 8.3 Advantages of Utilizing HMI in Healthcare for Telemedicine -- 8.3.1 Emotive Telemedicine -- 8.3.2 Ambient Assisted Living -- 8.3.2.1 Wearable Sensors for AAL -- 8.3.3 Monitoring and Controlling Intelligent Self-Management and Wellbeing -- 8.3.4 Intelligent Reminders for Treatment, Compliance, and Adherence -- 8.3.5 Personalized and Connected Healthcare -- 8.4 Obstacles to the Utilize, Accept, and Implement HMI in Telemedicine -- 8.4.1 Data Inconsistency and Disintegration -- 8.4.2 Standards and Interoperability are Lacking -- 8.4.3 Intermittent or Non-Existent

Network Connectivity -- 8.4.4 Sensor Data Unreliability and Invalidity -- 8.4.5 Privacy, Confidentiality, and Data Consistency -- 8.4.6 Scalability Issues -- 8.4.7 Health Consequences -- 8.4.8 Clinical Challenges -- 8.4.9 Nanosensors and Biosensors Offer Health Risks. 8.4.10 Limited Computing Capability and Inefficient Energy Use.