

# HUMAN-MACHINE INTERFACE

*Making Healthcare Digital*



*Edited By*

**Rishabha Malviya**

**Sonali Sundram**

**Bhupendra Prajapati**

**Sudarshan Kumar Singh**

 Scrivener  
Publishing

**WILEY**

# Human-Machine Interface

## Making Healthcare Digital

Edited by

**Rishabha Malviya**

*Department of Pharmacy, School of Medical and Allied Sciences,  
Galgotias University, Noida, India*

**Sonali Sundram**

*Department of Pharmacy, School of Medical and Allied Sciences,  
Galgotias University, Noida, India*

**Bhupendra Prajapati**

*Department of Pharmaceutics, Shree S.K.Patel College of Pharmaceutical  
Education and Research, Ganpat University, Gujarat, India*

and

**Sudarshan Kumar Singh**

*Department of Pharmaceutical Science, Chiang Mai University,  
Chiang Mai, Thailand*



**WILEY**

# Contents

---

<b>Foreword</b>	<b>xxiii</b>
<b>Preface</b>	<b>xxv</b>
<b>Acknowledgement</b>	<b>xxvii</b>
<b>Part I: Advanced Patient Care with HMI</b>	<b>1</b>
<b>1 Introduction to Human-Machine Interface</b>	<b>3</b>
<i>Shama Mujawar, Aaroahi Deshpande, Aaroahi Gherkar, Samson Eugin Simon and Bhupendra Prajapati</i>	
1.1 Introduction	4
1.2 Types of HMI	6
1.2.1 The Pushbutton Replacer	6
1.2.2 The Data Handler	7
1.2.3 The Overseer	7
1.3 Transformation of HMI	7
1.4 Importance and COVID Relevance With HMI	9
1.5 Applications	11
1.5.1 Biological Applications	12
1.5.1.1 HMI Signal Detection and Procurement Method	12
1.5.1.2 Healthcare and Rehabilitation	12
1.5.1.3 Magnetoencephalography	13
1.5.1.4 Flexible Hybrid Electronics (FHE)	13
1.5.1.5 Robotic-Assisted Surgeries	13
1.5.1.6 Flexible Microstructural Pressure Sensors	14
1.5.1.7 Biomedical Applications	14
1.5.1.8 CB-HMI	15
1.5.1.9 HMI in Medical Devices	15
1.5.2 Industrial Applications	15
1.5.2.1 Metal Industries	16

12.2.5.1	The Outline of the AI-Based Room Ventilator System	324
12.2.6	Design of Next-Generation Mask	324
12.3	Results	325
12.4	Conclusion	325
	Acknowledgment	325
	References	326
<b>13</b>	<b>Role of HMI in the Drug Manufacturing Process</b>	<b>329</b>
	<i>Biswajit Basu, Kevinkumar Garala and Bhupendra G. Prajapati</i>	
13.1	Introduction	330
13.1.1	Dialogue Systems	331
13.2	Types of HMI	333
13.3	Advantages and Disadvantages of HMI	334
13.4	Roles of HMI in the Pharmaceutical Manufacturing Process	339
13.5	Common Applications for Human-Machine Interfaces	343
13.5.1	Automotive Dashboards	343
13.5.2	Monitoring of Machinery and Equipment	344
13.5.3	Digital Displays	344
13.5.4	Building Automation	344
13.5.5	Video and Audio Production	344
13.6	Healthcare System-Based Human-Computer Interaction	345
13.6.1	Healthcare System	345
13.6.2	Teaching of Medicine and Physiology	346
13.7	Performance Test of Healthcare System Based on HCI	349
13.7.1	HCI-Based Medical Teaching System	349
13.8	Human-Machine Interface for Healthcare and Rehabilitation	349
13.8.1	Ambient Intelligence and Ubiquitous Computing Scenario	349
13.8.2	The Advanced Human-Machine Interface Framework	350
13.9	Human-Machine Interface for Research Reactor: Instrumentation and Control System	351
13.10	Future Scope of Human-Machine Interface (HMI)	352
13.11	Conclusion	353
	References	353