2020 International Conference on Assistive and Rehabilitation **Technologies (iCareTech 2020)**

Gaza, Palestine 28 – 29 August 2020



IEEE Catalog Number: CFP20W95-POD **ISBN:**

978-1-7281-9783-8

Copyright © 2020 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

*** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

IEEE Catalog Number:	CFP20W95-POD
ISBN (Print-On-Demand):	978-1-7281-9783-8
ISBN (Online):	978-1-7281-9782-1

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633 E-mail: curran@proceedings.com Web: www.proceedings.com



2020 International Conference on Assistive and Rehabilitation Technologies (iCareTech) **iCareTech 2020**

Table of Contents

Message from the General Chair and Program Chairs ix
About i-CARE Project _xi
Conference Organization xii
Abstracts xvi

Keynotes

Towards a Global Information Network on Assistive Technology .1 Renzo Andrich (The Global Assistive Technology Information Network (EASTIN))
Malaysia Chapter on University Roles to Support the Frontliners during COVID19 Pandemic .5 Zulhasni Abdul Rahim (Malaysia-Japan International Institute of Technology) and Muhammad Saqib Iqbal (Malaysia-Japan International Institute of Technology)
Design of Respiratory Assist Devices: Critical Review of Global Response to COVID-19 Crisis 10
<i>y y y y y y y y y y</i>

Assistive Technology Provision in Low Resource Settings: Challenges and Opportunities .16..... Luc de Witte (University of Sheffield)

Session #1 - Rehabilitation Devices and Exergaming

The Experience behind the REHAROB Project – A New Robotic System for Simultaneous Rehabilitation of Upper and Lower Human Limbs .19...... Daniel Bratanov (University of Ruse) and Pavel Vitliemov (University of Ruse)
Development of 3D Exergame for Upper Limbs Rehabilitation Using Leap Motion Controller and Unity .24...... Mohammad Alnajjar (Al Azhar University – Gaza), Abdalrahman Abutabikh (Al Azhar University – Gaza), Ahmed Issa (Al Azhar University – Gaza),

Mojca Debeljak (University Rehabilitation Institute), and Imre Cikajlo

(University Rehabilitation Institute)

Voice-Operated Exergame with Motion Feedback for After-Stroke Hand Rehabilitation .30...... Hussam Almadhoun (Al Azhar University – Gaza), Khaled S. Issa (Al Azhar University – Gaza), Khalid H. Abushahla (Al Azhar University – Gaza), Ahmed R. Al-Qadi (Al Azhar University – Gaza), and Ahmed Issa (Al Azhar University – Gaza)

Session #2 - Medical Informatics and Data Security

Modification of Select Operation Model for Multilevel Security: Medical Database Systems as an Application .47. *Ahmed Y. Mahmoud (Al-Azhar University-Gaza) and Mohammed M. Abu-Saqer* (*Al-Azhar University-Gaza*)

Session #3 - PARALLEL - Rehabilitation and Physiotherapy Case Studies

The Effect of Prosthetic Foot Type on Spatio-Temporal Parameters of Unilateral Below-Knee Amputees: A Case Study .51
Clinical Case Study: Total Reverse Shoulder Replacement-Major Features of Physiotherapy in Early and Late Postoperative Period .57 Aleksandar Andreev (University of Ruse, Medical Center, Ruse), Tsvetan Sokolov (UMBAL), and Kiril Panayotov (University of Ruse, Medical
Center, Ruse) Vision-based Automatic Detection of Compensatory Postures of After-Stroke Patients during Upper-extremity Robot-assisted Rehabilitation: A Pilot Study in Reaching Movement .62 Yan Fu (Huazhong University of Science and Technology), Xiaoyi Wang (Huazhong University of Science and Technology), Zeqiang Zhu (Huazhong University of Science and Technology), Jie Tan (Huazhong University of Science and Technology), Jie Tan (Huazhong University of Science and Technology), Yan Zhao (Hubei Provincial Hospital of Traditional Chinese Medicine), Yong Ding (Hubei Provincial Hospital of Traditional Chinese Medicine), and Weiya Chen (Huazhong University of Science and Technology)
Tele-Occupational Therapy: Experience with Bulgarian Children during COVID-19 Pandemic .67

Petya Mincheva (University of Ruse) and Ruslana Anastasova (Anglo-American School of Sofia) The Impact of Rehabilitation Programs on the Functional Independence Level of Cerebral Palsy Children: A Descriptive Study .71...... Mahmoud A. Himaid (University College of Applied Sciences), Salh A. Saleh (University College of Applied Sciences), and Naser M. Ghanem (University College of Applied Sciences)

Session #4 - PARALLEL - Automated and Remote Healthcare Systems

Smart Home Automation System Based on Eye Tracking for Quadriplegic Users .76..... Mohammad O.A. Aqel (Al-Azhar University-Gaza), Ahmed Alashqar (Al-Azhar University-Gaza), and Alaa Badra (Al-Azhar University-Gaza)

Supervising Bluetooth Devices with Mesh Wireless Network for Elderly Monitoring .82...... *Kristian Dokic (Polytechnic in Pozega)*

Blood Pressure Monitoring Using Arduino-Android Platform .87..... Ezzaldeen Edwan (Palestine Technical College - Deir El-Balah), Mohammed Abu-Musameh (Palestine Technical College - Deir El-Balah), and Abedelrahman Alsabah (Palestine Technical College - Deir El-Balah)

IoT-Based Healthcare and Monitoring Systems for the Elderly: A Literature Survey Study .92...... Mohammed Elkahlout (Al Azhar University – Gaza), Mohammed M. Abu-Saqer (Al Azhar University – Gaza), Ahmed Fadl Aldaour (Al Azhar University – Gaza), Ahmed Issa (Al Azhar University – Gaza), and Mojca Debeljak (University Rehabilitation Institute)

Session #5 - PARALLEL - Recent Technological Trends in Rehabilitation

Mulsemedia: Review and Perspective on Potentials in Rehabilitation and Disability Technological Developments .97 <i>Abeer A. Elsharif (Al Azhar University – Gaza), Mosbah Mousa (Gaza</i> <i>University), and Ahmed Issa (Al Azhar University – Gaza)</i>
 Wearable Devices for Monitoring Work Related Musculoskeletal and Gait Disorders .103 Sithara P. Sreenilayam (Dublin City University), Yalda Afkham (Dublin City University), Cian Hughes (Dublin City University), Inam Ul Ahad (Dublin City University), Louise Hopper (Dublin City University), Aidan Boran (Dublin City University), and Dermot Brabazon (Dublin City University)
Emerging Technology Trends in Point-of-Care Diagnostics .109 Cian Hughes (Dublin City University), Sithara P. Sreenilayam (Dublin City University), Yalda Afkham (Dublin City University), and Dermot Brabazon (Dublin City University)
3D Printed Casts: A Promising Technology for Improving Orthopaedic Physiotherapy Outcomes .115 Suad J. Ghaben (Al Azhar University - Gaza), Majd N. Al-Hour (Al Azhar University - Gaza), Rozan F. Dabar (Al Azhar University - Gaza), Ayah O. Al-najjar (Al Azhar University - Gaza), Zakaria M. Al Zaq (Al Azhar University - Gaza), and Sarraj F. A. Alsersawi (Al Azhar University - Gaza)

Session #6 - PARALLEL - AI and Image Processing for Medical Applications

Generalization of Deep Neural Network of Hospital Readmission Prediction Models for Diabetes Patients Using Apache Spark Clustering .120 Fatma Al-Rubaei (Islamic University of Gaza) and Mohammed Alhanjouri (The Islamic University of Gaza)
Chest Pathology Detection in X-Ray Scans Using Social Spider Optimization Algorithm with Generalization Deep Learning .126 Haneen AlTalli (Israa University) and Mohammed Alhanjouri (The Islamic University of Gaza)
Brain Tumor Classification Using Deep Learning .131. Ahmad Saleh (Al Azhar University – Gaza), Rozana Sukaik (Al Azhar University – Gaza), and Samy S. Abu-Naser (Al Azhar University – Gaza)
Development of Color Following Robot for Interaction with Autistic Children .137

Session #7 - PARALLEL - Assistive and Therapeutic Technologies

Aerobika as an Evidence Based Physiotherapy Procedure for COPD and the Proposition of a Smart OPEP Device .143 Suad J. Ghaben (Al Azhar University - Gaza), Mohammad O. A. Aqel (Al Azhar University - Gaza), Sama'a A. Baroud (Al Azhar University - Gaza), Wesam H. Abo Sabha (Al Azhar University - Gaza), Ranin K. Abu Hammad (Al Azhar University - Gaza), Zakaria M. Al Zaq (Al Azhar University - Gaza), Sarraj F. A. Alsersawi (Al Azhar University - Gaza), Rasha A. Salha (Al Azhar University - Gaza), and Diana H. Al-Masri (Al Azhar University - Gaza)
Design and Simulation of a Repositioning Device to Enhance the Quality of Life of Bedridden Patients 149 Khair Ghunaim (Islamic University of Gaza), Nada Elashi (Islamic University of Gaza), Amany Alser (Islamic University of Gaza), Taleb Alrayyes (Islamic University of Gaza), and Mohammad Abuhaiba (Islamic University of Gaza)
Development of a Semi-Automated Electromechanical Chair for Physically Challenged Muslim Prayers .154 Mohammad O.A. Aqel (Al-Azhar University-Gaza), Mohammed Aabed (Al-Azhar University-Gaza), and Mohammed Abu-Serriya (Al-Azhar University-Gaza)

Author Index 161

Mohammad O.A. Aqel (Al-Azhar University-Gaza), Ali AlHalabi (Al-Azhar University-Gaza), and Anas Jabre (Al-Azhar University-Gaza)