INTERNATIONAL WORKSHOP ON 'EMERGING TECHNOLOGIES AND CHALLENGES FOR EXOSKELETON

PROGRAM

DAY 1: Venue: Aloft Hotel, Whitefield, Bengaluru		
Time	**Activity**	**Speaker**
08:00 - 09:00	**Registration**	
09:00 - 10:20	**Inauguration**	
	Lighting of the Lamp and Invocation	
09:05 – 09:15	Welcome Address & Theme of Workshop	Dr TM Kotresh Sc 'H', OS & Director, DEBEL
09:15 – 09:30	Key note address by Chief Guest	Dr Samir V Kamat, Secretary, DDR&D and Chairman DRDO
09:30 – 09:40	Inaugural Address	Dr Upendra Kumar Singh, DS & DGLS DRDO
09:40 – 09:50	Inaugural Address	To be Updated (MoD)
09:50 – 10:00	Inaugural Address	Prof. Robert Riener, President-ICORR, Sensory-Motor Systems, ETH, Zurich
10:00– 10:10	Inaugural Address	Prof Arun Jayaram, Executive Director, Technology & Innovation Hub (tiHUB), Chicago, IL, USA
10:10 – 10:20	Vote of Thanks	Dr Alka Chatterjee, Sc 'G', DEBEL
10:20 – 11:30	Group Photo, Interaction with Academia, Startup & Industry Partners, High Tea	
Session 1: Musculoskeletal Modelling & Simulation **(Session Chair - Dr Upendra Kumar Singh, DS & DG-LS, Co-chair : Prof Vineet Vashista, IIT GN)**		
11:30 – 12:00	Lecture 1: Combat & Logistics Exoskeleton	To be updated
12:00 – 12:30	Lecture 2: Rehabilitation Robotics - Dynamics and Control	Prof Sunil Agarwal, Columbia Univ, USA (Online Mode)
12:30 – 13:00	Lecture 3: Biomechanical Perspective for Exoskeleton	Prof. Sujatha Srinivasan, IIT Madras, India
13:00 – 14:00	**Lunch**	
Session 2: Soft sensing, AI Prediction & Mechanisms **(Session Chair - Prof. Robert Riener, President-ICORR, Co-chair: Prof. Mathew Magimai Doss)**		
14:00-14:30	Lecture 4: AI-Learning and optimal control algorithms	Prof Sylvain Calinon, Scientist, IDIAP, Martigny, Switzerland
14:30-15:00	Lecture 5: Digital Twins for Advanced Back Support Exoskeletons for the Industry	Prof.IR. M.I. Refai,University of Twente, Netherlands
15:00-15:30	Lecture 6: Human joints & Cable-driven biomechanisms	Prof. Vineet Vashista, IIT Gandhinagar
15:30 -16:00	Lecture 7: Myo-Neural Sensing & Control Interface	Dr. Neelesh Kumar, Scientist, CSIO-CSIR, Chandigarh, India
16:00-16:30	**Tea**	
Session 3: Plenary Speakers - Advancements in Exoskeletons – Global status **(Session Chair – Prof Arun Jayaram, Co-chair : Prof. Ahmed Chemori)**		
16:30-17:00	Lecture 8: Comprehensive Review on Exoskeleton Balance Control System Prof. Herman van der Kooij, University of Twente, Netherlands (Recorded Video)	
17:00-17:30	Lecture 9 : Need of Exoskeleton in India, Clinical Perspectives To be updated	
17:30-18:00	Lecture 10: Musculoskeletal Modeling & Simulation - Case Studies Dr Divyaksh, Anybody Modeling Systems, Alborg, Denmark (Online Mode)	
Interaction with Industry & Demo of Exoskeletons (1800 onwards)		

DAY 2: Venue: Bengaluru		
Session 4: Plenary Speakers - Advancements in Exoskeletons – Global status **(Session Chair – Dr Kotresh TM, OS & Director, DEBEL, Co-chair : Dr Venkat Subramanian, NIMHANS)**		
09:00 – 09:30	Lecture 11: DRDO Efforts on Exoskeleton Technologies	Dr TM Kotresh, Director, DEBEL, India
09:30 – 10:00	Lecture 12: Military Combat Operation Injuries and Exoskeleton Requirements, Challenges	To be updated
10:00 – 10:30	Lecture 13: Rehabilitation Exoskeleton Status, requirement, Challenges	Prof Arun Jayaram, Executive Director, Technology & Innovation Hub (tiHUB), Chicago, IL, USA
10:30 – 11:00	Lecture 14: Therapeutic Exoskeleton - Status, requirement, Challenges	Prof. Robert Riener, President-ICORR, Sensory-Motor Systems, ETH, Zurich
11:00 – 11:30	**Tea**	
Session 5: Bio Mimic Actuators and Control Strategies **(Session Chair – Vijay Bhaskar, Svaya Robotics, Co-chair: Subendu Bhasin, IIT Delhi)**		
11:30 – 12:00	Lecture 15: Control Strategies- Status, Challenges & Requirements	Prof. Ahmed Chemori, University of Montpellier, France
12:00– 12:20	Lecture 16: Actuator & Human in Loop Control Strategies	Vikash Kumar, Scientist, DEBEL, India
12:20– 12:40	Lecture 17: Bioinspired Actuators and Control for Exoskeleton- Artificial Muscles	Dr Aman Arora, CSIR, Durgapur, India
12:40 – 13:00	Lecture 18: Neurophysiological mechanisms underlying movement intention and kinematics	Dr Suryaprakash, AIIMS, New Delhi, India
13:00– 14:00	**Lunch Break**	
Session 6: Human Machine Interface (HMI) **(Session Chair – Dr R Indushekar, Scientist, DEBEL, Co-chair : Dr K Mohanavelu, Scientist, DEBEL)**		
14:00– 14:30	Lecture 19: Towards Speech-based exoskeletons	Prof. Mathew Magimai Doss, Scientist, IDIAP, Martigny, Switzerland
14:30 – 15:00	Lecture 20: Bridging Clinicians, Researchers and Patients: Lab to Market	To be Updated
15:00 – 15:20	Lecture 21: Futuristic Exoskeleton	T Raghuram, Scientist, DEBEL, India
15:20 – 15:45	**Tea**	
Brainstorming session on Roadmap for Rehabilitative, Industrial and Augmentative Exo		
15:45 – 17:30	1. Status, Issues & Requirements in Exoskeleton Technology. 2. Challenges wrt rehabilitation, industrial and Augmentative Exoskeleton. 3. Roadmap for the technological development of Exoskeleton. 4. Ecosystem with academia, Industry and clinician 5. Exoskeleton Society of India	Chair: Dr UK Singh DS & DGLS, DRDO Co-Chair: Dr TM Kotresh, OS& Director DEBEL Participants: Armed Forces, Industry, Hospital/ Clinicians, Academicians, Research centres
	Vote of Thanks	Dr K Mohanavelu, Scientist, DEBEL