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ICMDT

2023

RAMADA PLAZA HOTEL, JEJU ISLAND, KOREA
MARCH 8 – 11, 2023

**The 9th International Conference on
Manufacturing, Machine Design and Tribology**



**The Korean Society of
Mechanical Engineers**



**The Japan Society of
Mechanical Engineers**

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RAON X



Program at a Glance

	March 8 (Wed)	March 9 (Thu)	March 10 (Fri)	March 11 (Sat)
08:00 ~ 08:30	Arrival & Welcome	Registration		Panel Discussion
08:30 ~ 09:00				
09:00 ~ 09:30		Parallel Session 1 15 min / Person	Poster Session 2	
09:30 ~ 10:15		Coffee Break		
10:15 ~ 10:30		Opening Ceremony	Coffee Break	
10:30 ~ 11:00		Keynote Speech 1 (1, 2) 30 Min / Person	Keynote Speech 2 (3, 4) 30 Min / Person	
11:00 ~ 11:30		Lunch	Lunch (Delegation Meeting)	
11:30 ~ 12:00				
12:00 ~ 12:30		Parallel Session 2 15 min / Person	Parallel Session 4 15 min / Person	
12:30 ~ 13:00				
13:00 ~ 13:30		Coffee Break	Coffee Break	
13:30 ~ 14:00				
14:00 ~ 14:30		Parallel Session 3 15 min / Person	Parallel Session 5 15 min / Person	
14:30 ~ 15:00				
15:00 ~ 15:30				
15:30 ~ 16:00	Registration	Coffee Break	Coffee Break	
16:00 ~ 16:30				
16:30 ~ 17:00	Welcome Reception	Poster Session 1	Closing Ceremony	
17:00 ~ 17:30				
17:30 ~ 18:00				
18:00 ~ 18:30	KSME / JSME Joint Delegation Meeting	Banquet		
18:30 ~ 19:00				
19:00 ~ 19:30				
19:30 ~ 20:00				



Session Program Overview (2/2)

Time	Friday, March 10, 2023				
	Room A	Room B	Room C	Room D	Room E
8:30	Registration				
9:30	Poster Session 2 (Room A)				
10:30	Coffee Break				
11:00	Keynote Speech 3 (Room A)				
11:30	Keynote Speech 4 (Room A)				
12:00	Lunch Break				
13:00	Micro / Nano Processing and Tribology 1 FrA1-1 ~ FrA1-6	Sensors FrB1-1 ~ FrB1-5	Friction and Wear Mechanism FrC1-1 ~ FrC1-6	Other Topics of Interest 1 FrD1-1 ~ FrD1-6	Machine Design / Machine Elements 4 FrE1-1 ~ FrE1-5
14:30	Coffee Break				
15:00	Micro / Nano Processing and Tribology 1 FrA2-1 ~ FrA2-5	CAD / CAM, Integrated Product and Process Design (IPPD) FrB2-1 ~ FrB2-4	Friction and Wear Mechanism, Contact Mechanics, Lubricants FrC2-1 ~ FrC2-4	Other Topics of Interest 2 FrD2-1 ~ FrD2-5	Manufacturing Systems, Printing Technology for Manufacturing FrE2-1 ~ FrE2-4
16:30	Coffee Break				
17:00	Closing Ceremony (Room A)				

FrPS-65	
3D Printing of a Conductive Hydrogel for Continuously Monitoring of Electrophysiological Signals from Engineered Cardiac Tissue	234
Uijung Yong*, Donghwan Kim*, Wonok Kang*, Jihwan Kim*, Sung-Min Park*, Jinah Jang* (*Pohang University of Science and Technology, Korea)	
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Real-time Machine State Monitoring using Sound and Machine Learning	235
Eunseob Kim*, Huitaek Yun**, Martin Byung-Guk Jun* (*Purdue University, USA, **KAIST, Korea)	
FrPS-67	
Algorithm for dynamic analysis of the ankle through EMG signal	236
Inwoo Kim*, Hyunjin Jung*, Won Joong Kim*, Min Soo Lee*, Soo-Hong Lee* (*Yonsei University, Korea)	
FrPS-68	
Geometrical analysis on contact ratio of noncircular gear	237
Hikaru Koyama* (*Kyoto University, Japan)	
FrPS-69	
Construction of dataset for deep learning-based ground sink susceptibility evaluation	238
Jun Hwan Park*, Duhwan Mun* (*Korea University, Korea)	
FrPS-70	
A Reliability Prediction Methods for Improving Reliability of Electronic Components	239
SeungWoo Lee*, Jiyeon Choi* (*Korea Institute of Machinery & Materials, Korea)	
FrPS-71	
Ankle movement prediction using sEMG signal clustering and LSTM Algorithms	240
Minsoo Lee*, Inwoo Kim*, Hyunjin Jung*, Won Joong Kim*, Soohong Lee* (*Yonsei University, Korea)	
FrPS-72	
Prediction simulation of future accidents at LTAP-OD(Left Turn Across Path - Opponent Direction) intersections in Automatic Vehicles equipped with AEB(Autonomous Emergency Braking system)	241
Yunsik Shin*, Jay Il JEONG* (*Kookmin University, Korea)	
FrPS-73	
Hand-guiding gesture-based telemanipulation based on the gesture mode classification and state estimation robust against the body-alignment changes of the operator wearing IMU sensors	242
Haegyeom choi*, Haneul Jeon*, Donghun Noh*, Taeho Kim*, Donghun Lee* (*Soongsil University, Korea)	
FrPS-74	
Upper-extremity's motion-based telemanipulation of a 6-DOF collaborative manipulator with wearable IMU sensors	243
Donghyeon Noh*, Haegyeom Choi*, Haneul Jeon***, Taeho Kim***, Donghun Lee* (*Soongsil University, Korea)	
FrPS-75	
A Method for Implementing Selective Pick and Place of Randomly Placed Workpieces on a Pallet based on a Cooperative Manipulator with an RGB-D Camera	244
Hojin Yoon*, Jingang Lee*, Eunbin Jeong*, Donghun Lee* (*Soongsil University, Korea)	

3D Printing of a Conductive Hydrogel for Continuously Monitoring of Electrophysiological Signals from Engineered Cardiac Tissue

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Abstract

The advances in cardiac tissue engineering have provided opportunities to study drug-induced cardiotoxicity and congenital heart diseases *in vitro*. Monitoring of the electrical activity of engineered cardiac tissues has been considered as a basis of these research since cardiac cells communicate each other through the propagation of electrical signals. However, conventional metallic electrodes are based on a hard, dry, and inorganic substance, which are contrary to the characteristics of soft, wet, and living biological tissues. In recent studies, poly(3,4-ethylenedioxythiophene) polystyrene sulfonate (PEDOT:PSS) has been emerged as a conductive hydrogel and is utilized as implantable electrodes. Here, we developed a conductive wire by 3D printing PEDOT:PSS to map the electrophysiological signals from three-dimensional (3D) engineered cardiac tissues. To electrically insulate the conductive wire from the culture medium, a conductive hydrogel-strut was passivated with a top and bottom silicone sheath. The electrical properties of the developed conductive wire were evaluated, and 3D engineered cardiac tissues were generated by encapsulating induced pluripotent stem cell-derived cardiomyocytes and cardiac fibroblasts into heart-derived decellularized extracellular matrix. Finally, we monitored the field potential of the 3D engineered cardiac tissues by using the hydrogel-based conductive wire. In the future, we expect that the developed hydrogel-based conductive wire can be integrated into 3D engineered cardiac tissues, ultimately can be used for a platform for studying drug-induced cardiotoxicity tests and congenital heart diseases *in vitro*.

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