

Guest lecture on Biomedical Applications in Rehabilitation Engineering

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| Date of the event | 16-3-2018 |
| Title of the Event | Guest lecture on Biomedical Applications in Rehabilitation Engineering |
| Organized by (Dept Name) | Medical Electronics Engineering |
| Name of department event coordinators | Mr. Sachin Katti, A.P, Medical Electronics |

Descriptive details about the event:

The guest lecture on “Biomedical Applications in Rehabilitation Engineering” was presided by Mrs. Sakshi Agarwal, Scientist, DEBEL, DRDO, Bangalore. The event was attended by the faculty and students of Medical Electronics department.

Her itinerary for the day was as follows:

- Introduction
- What is Medical Device?
- Human Centric robots are people-oriented
- Biomedical Technologies
- Remote Health Monitoring
- Wearable Gait Phase Detection System
- Assistive Devices
- Future Technologies

She opened the session by giving brief introduction to rehabilitation. Next, she spoke about, Remote Health Monitoring Technology, Telemedicine System, Portable Oxygen Cylinder Control System, Wearable Physiological monitoring system, Avalanche Victim Detector (AVD), wearable gait sensing system.

A medical device does not achieve its primary function by means of drugs, but can be assisted in its function by such means

Human Centric robots are people-oriented: Robots designed to be worn/Attached. Designed around the function & shape of the human body. Humans will be able to control the robotic limbs. Assist in walking, running, jumping higher or even lifting objects one would not normally be able to lift.

Exoskeletons are robotic, mechanical frames designed to be worn by a human being.

Rehabilitative Exoskeleton: First rehabilitative exoskeleton concept was developed at Mahijo Pupin Institute at Belgrade in the early 70's. The introduction of the concept of ZMP (Zero Moment Point) during this project has still been used for ascertaining the dynamic stability of humanoids and exoskeletons even today. The literature available worldwide takes Western population for generating Gait database library, but Gait dynamics are highly affected by the body anthropometry.

Wearable Gait Phase Detection System

- The system should be wearable
- The system response time should be very low to achieve instantaneous detection
- The system should not require calibration for its operation
- The system should be independent of the walking style of the subject

Future Technologies:

- Soft wearable robot that uses innovative textiles to provide a more conformal, unobtrusive and compliant means to interface to the human body
- As compared to a traditional exoskeleton, these systems have several advantages:
- Wearer's joints are unconstrained by external rigid structures
- Worn part of the suit is extremely light.
- Minimize the suit's unintentional interference with the body's natural biomechanics and allow for more synergistic interaction with the wearer.

Cognitive Exoskeletons

Cognitive exoskeletons are building tools that improve how humans and their machine teammates. It can be used to analyze cognitive stress and load to assist cognitive performance

- Sense: Heart rate, Oxygen in blood and Brain wave data
- Assess Machine learning algorithms to make sense of the data
- Augment To help user with tailor made augmentation and cognitive assistance



Guest Lecture on 16-03-2018: DRDO Scientist, Sakshi Agarwal explaining the human gait patterns to ML students and faculties in Seminar Hall -4.



Guest Lecture on 16-03-2018: DRDO scientist Ms. Sakshi Agarwal, Interacting with Medical Electronics students regarding the biomedical applications-rehabilitation engineering in seminar hall -4.