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Erasmus+ Programme
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DigiHealth-Asia

“Capacity Building for Digital Health Monitoring and Care Systems in Asia”

Newsletter 3

September 04, 2023

The aim of the newsletter is to disseminate the project information and developments based on the communications and networking of partner universities of Europe and Asia.



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Overview of the project

Capacity Building for Digital Health Monitoring and Care Systems in Asia (DigiHealth-Asia) is designed to be implemented within a three-year project under EAC-A02-2019-Capacity Building in the field of Capacity Building for Higher Education (CBHE). The focus is to develop and implement digital health courses in three different partner higher education institutions (HEIs) in Pakistan, Thailand, and Mongolia. This multi-country curriculum development project will develop short-cycle (vocational) and Master level digital healthcare courses. Quality Plan is developed in scope of the WP-5 (Management) of the project in compliance with the project description and meeting all the applicable rules and guidelines. Main objectives of the project are:

1. To build capacity in partner HEIs with an aim to develop expertise that would modernize healthcare systems by using digital technologies for health care in assisted living.
2. To develop an education and training programs aiming to enhance skills of healthcare practitioners in use of digital and ICT based patient monitoring and assistive technologies.
3. To create a sustainable network of healthcare practitioners, researchers, academic teaching staff, researchers, and industry professionals, focusing on the development of digital technologies for health care.

Plenary Meeting 3 in Pakistan

The third plenary meeting of the ERASMUS+ DigiHealth Asia project was hosted by the Pakistan partners from March 06-07, 2023, at NUST (National University of

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Science and Technology) in Islamabad, and on March 08-09, 2023 at CUST (Capital University of Science and Technology) in Islamabad. The primary purpose of the meeting was to review the progress made by each partner in implementing the project and to discuss the research aspects in the project. Additionally, the participants discussed and suggested ideas for the next steps, with the aim of successfully completing project work packages and guaranteeing the exemplary implementation of innovative teaching and learning methodologies.

During the meeting, the participants were provided with an overview of the project plan and the progress made in implementing each work package. They also discussed the schedule for the next plenary meeting and other project-related gatherings, taking into account the project's timeline and objectives. The partners collectively agreed upon a meeting schedule that outlined specific purposes for each session, aiming to monitor the project's progress effectively and ensure its overall success.

A team of experts and professionals from European universities took charge of coordinating and supporting the integration of Artificial Intelligence, Embedded Systems, and the Internet of Things into practical applications. They achieved this by designing a specialized graduate training curriculum at the master's level and executing pilot cases in several Asian partner countries, namely Thailand, Pakistan, and Mongolia.

During the meeting, the partners shared their progress related to the overall architecture, implementation status, research aspects, and next steps for Pilot Cases 1-3. The meeting also involved productive sessions of brainstorming for each pilot case and their respective research responsibilities. Within these groups, participants collaborated to find solutions to challenging issues that arose during the project and discussed plans for the upcoming implementation phases.

The 3rd Meeting at the National University of Sciences and Technology (NUST) between 06-07 March 2023



The 3rd project meeting was held in Pakistan from 6th March to 10th March 2023 at the National University of Sciences and Technology (NUST) and Capital University of Science and Technology (CUST) in Islamabad. NUST hosted the event from 6th -7th March 2023 in SEECS. The meeting was conducted in a hybrid mode where partners from Belgium, France, and Mongolia joined online and partners from UK and Thailand attended the meeting physically at NUST. During this meeting, all consortium partners focused on the project equipment purchase, pilot case implementation progress, discuss the project dissemination aspect and its impact, and the development of the course outlines relevant to healthcare.

NUST-SEECS has signed an MOA with Islamabad Diagnostic Center (IDC) in 2022 in the context of this project. A member of IDC (Dr. Umer Saeed) also

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attended the project meeting and provided his feedback on the project and mentioned the support that will be extended by IDC



for data collection and its labeling by a medical expert. He also expressed his interest to explore the possibilities of establishing a joint lab with SEECs to exploit other healthcare research prospects.

The UK and Thailand partners visited SEECs IoT Lab and showed great interest in the project demos and offered research collaborations in terms of Ph.D. scholarships in smart healthcare and expressed interest in joining hands for a joint research venture for smart agriculture and livestock-related projects further leading to a commercialized product.

NUST Meeting in a photo glance

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The 3rd Meeting at the Capital University of Sciences and Technology (CUST) between 08-09 March 2023

The second phase of the 3rd project meeting was held at Capital University of Science and Technology, Pakistan from 8th March to 9th March 2023. The meeting was conducted in a hybrid mode where partners from Belgium, France, and Mongolia joined online and partners from UK and Thailand attended the meeting physically at CUST. During this meeting, all consortium partners who are physically present has meeting with university officials. MFU and CMU represents the progress of Mobility disorder use case and they also shared the equipment purchase status.



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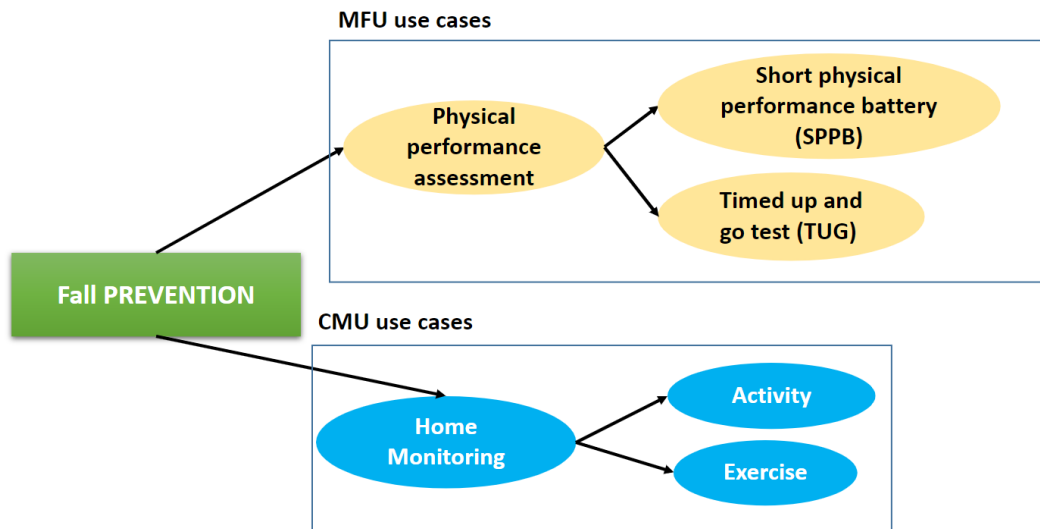
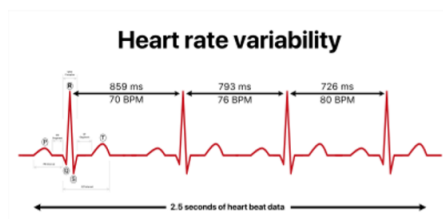


Figure 1: Mobility disorder (Fall prevention)

MFU and CMU give the presentation on the Machine learning requirements and challenges of their use cases. MFU presents that they are using Lilygo watches, a cost-effective device to detect anomalies in heart rate. While CMU presents that in



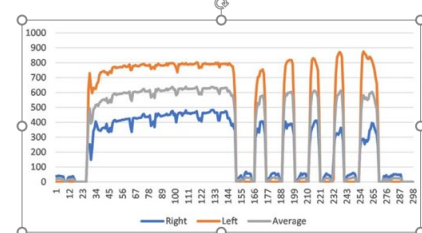
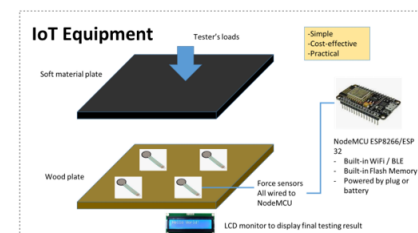
CMU



Capture heart rates using Lilygo watch and detect anomalies =>

Gybot Platform

MFU



Measure left/right standing pressures and calculate imbalance scores =>

Google Cloud

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monitoring the elderly people, they will measure the left/right pressure. Both presented a comprehensive plan with specific dates for data collection, machine learning model training, and model deployment.

Figure 2:ML requirements for CMU and MFU cases

MFU also shared the status of their equipment purchase and on collected dataset, they perform some visualization. They are working on the classification of class imbalance performance.

The CUST had also invited the Associate Professor Dr. Muhammad Asad from Rawalpindi institute of cardiology. Dr. Muhammad Asad gives a talk about the process how doctor check an ECG manually and it involves interpreting the various waves, intervals, and segments on the ECG strip or printout. Participants asked different questions about the features of ECG which is important for the classification of ECG. He also expressed his interests in signing the MOU with CUST regarding the training data collection which is needed for machine learning.

The day 4 of the plenary meeting 3 at Capital University of Science and Technology started with the workshop titled “Wireless Body area networks and smart IoT systems for Pervasive Healthcare” by UNN. The workshop started with the overview of WBAN. Architecture and Applications of WBAN were described. The workshop moved on to the topics of Sensor types and technologies and finally communication protocols of WBAN were elaborated.

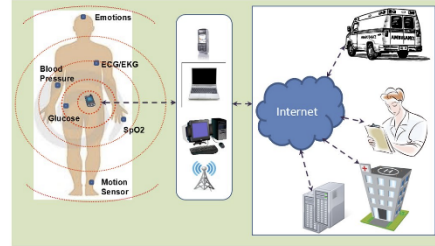
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Wireless Body Area Networks: Communication Protocols and Sensor Technologies

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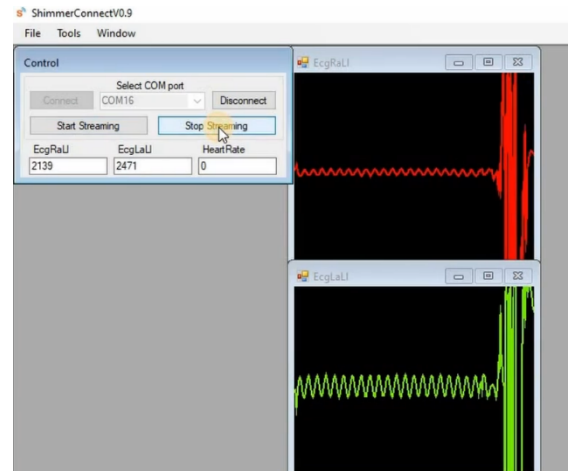
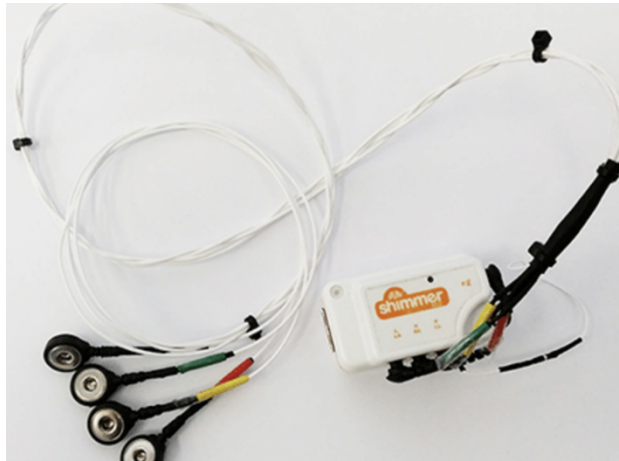
<https://digihealth-asia.eu/>



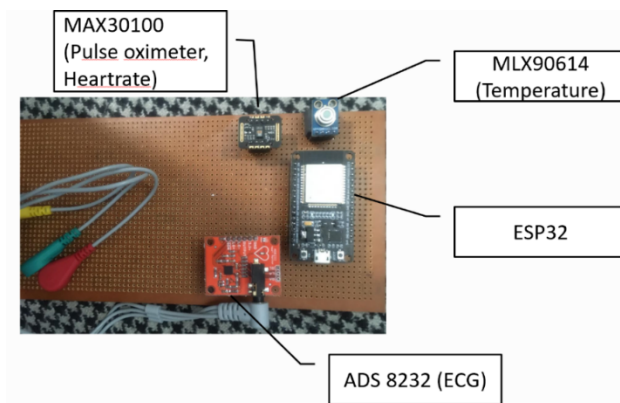
Moving on, a workshop by UoH titled “Embedded Systems for body area networks” was held. The workshop covered topics related to Embedded systems and its applications in Body Area Networks. The workshop concluded with the discussion of research areas for Body Area Networks and two different use cases were presented towards the end of the workshop.

After the conclusion of the workshops, demonstration of the ECG equipment was presented to the attendants of the meeting. Two separate demonstrations were made. First demonstration was made of Shimmer device. The demo consisted of how the shimmer device is used to collect the values of ECG from a patient and how a CSV file is being generated.

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The second demo was presented of a prototype using ESP microcontroller and sensors. Multiple sensors had been interfaced to a microcontroller and the patients vitals including ECG, Heartrate and temperature were being monitored using the prototype.



Data In (From USB-Enhanced-SERIAL CH9102 (COM3))						
Data coming from the current data source will appear below as it is received.						
Current Data						
TIME	CH1	CH2	CH3	CH4	CH5	CH6
22:09:40.47						
Historical Data						
TIME	CH1	CH2	CH3	CH4	CH5	CH6
22:07:22.47	Heart rate:	59	ECG :	744.43 mV		
22:07:25.47	Heart rate:	57	ECG :	319.04 mV		
22:07:34.47	Heart rate:	62	ECG :	251.56 mV		
22:07:37.47	Heart rate:	60	ECG :	576.86 mV		
22:07:40.47	Heart rate:	75	ECG :	238.48 mV		
22:07:52.47	Heart rate:	58	ECG :	679.98 mV		
22:07:55.47	Heart rate:	56	ECG :	293.46 mV		
22:08:01.47	Heart rate:	57	ECG :	702.54 mV		
22:08:10.47	Heart rate:	57	ECG :	467.29 mV		
22:08:16.47	Heart rate:	57	ECG :	705.76 mV		

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CUST Meeting in a photo glance



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