# Thursday, 28TH JULY, 2022

👣 SUMMER BARETALK

- Entry Free!
- From 15:00 to 19:30
- Stammgelände TUM, Room Z995 (due to room restrictions only for students)
- Or via Zoom: https://tum-conf.zoom.us/j/69689210467 (PW: 28072022)

Welcome to a talk hosted by students from the Clinical Application of Computational Medicine (CACOM) course at the TUM. We will see videos with additional Q&A sessions about different applications and fields of use of the actibelt, different topics regarding scoliosis and walking patterns, Covid19-related topics, and about helping people with diabetes.

Come and join us!
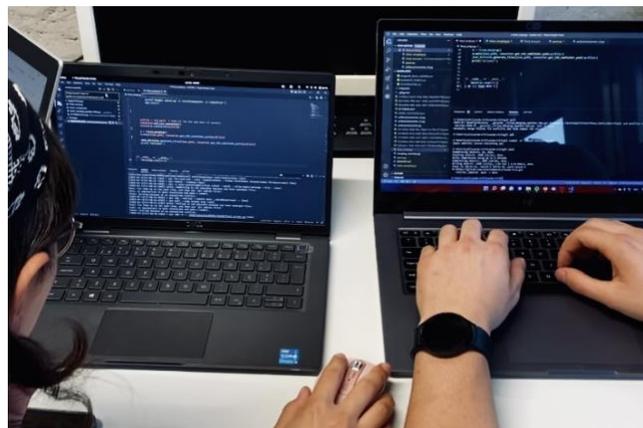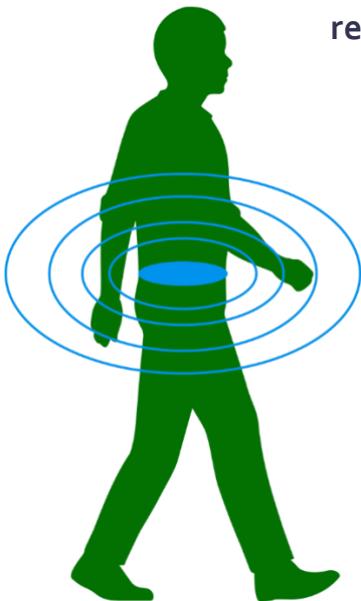
15h00 Welcome/Overview

Prof. Dr. Martin Daumer

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15h10 Detection And Complementary Treatment Of Scoliosis

Jian Tian, Xiaoting Song Changbin Peng, Taiyu Liu Yiming Shuang, Moru Liu Zhuoran Xu, Hongyi Shen, Toni Mager

Through the analysis of data from people with scoliosis, this project has developed a program that allows for image recognition of back photos for comparison. This program can give a rough indication of the degree of scoliosis for the user to self-assess. In addition, we have collected a number of traditional Chinese treatments and Western complementary treatments for the user to use as a reference for self-correction.Diagnosis and complementary treatment of Scoliosis.

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15h30 Simple Motion Data Generation Using New Technologies

Catarina Morais Couto Mota e Pereira, Victoria Hunnenbart, Clara Piris Burgos, Fu Yi, Erika Forss, Luis Vidal Solano, Maximilian Kirchhoff, Pascal Netzer

A high-tech wearable sensor attached to a belt is used to collect a wide range of human movement data such as distance, speed, gait asymmetry that is analysed and assessed afterwards. A broad range of applications are conceivable - for example, on the clinical side, it can be used to monitor the progress of mobility-limiting diseases such as multiple sclerosis. For the analysis and further development of new algorithms high quality data sets (gold standard data) are necessary. Hence in this project, in a first step, additional measurements with various movement profiles are conducted, validated and merged with existing movement sequences to obtain gold standard data. In addition, the web tool for data annotation is tested and verified.

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15h50 How Gait Affects Foot Shape

Wei Zhou Kaicheng Ni Yan Gao Zechen Wang YIming Shan Shuang Wang

Compared to the thousands of years of barefoot running history, modern foot wear has only been developed for a few decades. This raises the question of whether barefoot running is a more natural state for humans. Based on existing research, numerous benefits of barefoot running have been found, but the transition from modern footwear to barefoot running has many risks. In this work, we benchmark the gait of normal barefoot in various planes, test the effect of fullsoul barefoot footwear and high-heeled shoes on the gait of different foot types on different surfaces, and note down the subjective feeling of wearing different footwear. In order to study the gait improvement of different foot types under different foot wearing conditions, and the possibility of transitioning to barefoot running. The expected result of this work is an equally improved gait and a normal-footed gait during the transition from modern foot wear to barefoot.

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16h10 Face Mask Detection And Ancillary Service

Runze Li, Fengrui Gan, Runyao Yu, Xin Zhang, Shuxin Zhang, Yingyi Zhang, Neam Halat, Nour neji

As 3G-rules still apply in several restricted places, and few people are not aware of wearing masks (on purpose or not), this arises the risk of damage of other people's health and further causes the extremly negative influence on the economics. The most efficient way of cutting off the virus spreading chain is natrually wearing a suitable mask. Out of pricy reasons, the online detection might lead to a private information leakage problem. Therefore, developing an offline detection models with real-time tracking ability is critical. Several sensitive/dangerous areas inside factories require the employees to always wear masks for protection reasons (such as dust factories/chemical factories). However, the warning cannot always be raised. Based on the face mask detection results, we could design ancillary services for warning/entrance checking to increase the safety of employees.

16h30 Movements Make The Human

Abdullah Cem Özbay, Omar Atamny, Matous Melecky, Mine Tülü, Anna Dariol, Marcin Mider

It is an observable fact that each of us displays a unique body language and walking style in our day-to-day life. Understanding how our motions differ can be a useful tool in many areas, such as in a clinical trial. For instance, by monitoring the movements of a patient over time, we can observe whether medical therapy is progressing well, and we may also be able to detect new diseases and dysfunctions at an early stage. Our goal in this project is to study and learn specific traits of human motion using data gathered from the usage of actibelt, in an attempt to perform personal identification thanks to these particular movements. With the possibility of identifying a patient just by his data, doctors can now be sure that the movement-monitoring sensors have been worn by the patients themself, and can now develop a personalized treatment for them.

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16h50 Glucohelp

Oussema Kdous, Chaden Ouertani, Ahmed Souissi

Nowadays more than 10 million adults in Germany are suffering from diabetes. Diabetes is a life-threatening condition. In the case of hypo/hyperglycemia, a person's blood glucose can drop/rise to severely low/high levels without showing any symptoms. Without immediate treatment, severe hypo/hyperglycemia may lead to a coma or even death. Our Project goal is to develop a closed-loop alert system in case of severe hypo/hyperglycemia. This application will be addressed principally to young kids and seniors, who live alone without supervision. This application can be used by ordinary people or the government to supervise these patients.

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Coffee break

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17h20 Healthy Walking Detector

Himal Subedi, Weige Wang, Dominik Geiselhart, Shiyao Xu, Dhia Zouaghi, Brigitta Jesica Kartono

A healthy walking posture will bring a cushioning effect to the soles of the feet and back, and prevent damage and deformation of the body. However, many people are not aware of this. Often, we do not notice that more "comfortable" walking posture is "unhealthy", such as: bending, hunchback, neck forward, etc. In the long run, this will bring harm to the lumbar spine. Therefore, we designed this program to detect the "quality" of people's walking by measuring the pressure distribution and acceleration data. We also measure a walk's feature (smoothness, skewness, energy entropy, etc) and then compare the values of these features in a healthy walk vs unhealthy walk. This potentially lets us discover useful features to differ a healthy walk from unhealthy. The goal is to improve people's walk, thus reducing their risk of back pain, muscle aches, and spine problems.

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17h40 A Feasibility Of COVID-19 Detection Based On Cough Audio

Yin Li, Wenzhao Jin, Yicong Li, Yue Xia, Liye Zhang

Although since summer has come, the infection of the Covid has weakened a lot, but the emergence of omicron has led to a new round of mass epidemics around the world since the beginning of this year. It is particularly important to find a detection method of COVID that can not only improve the detection rate, but also be convenient for ordinary people to use.So we want to use the sound detection algorithm to complete the detection of covid-19 and complete an app or web page that can directly interact with people. People upload or record their own cough audio, and the website/App will give the probability of contracting Covid-19, indicating whether further testing is required.

Supported by

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18h00 3D Motion Tracking And Reconstruction From Sparse IMU Sensor Data

Tian Zheng Shunxi Xu Han Liang Zhendong Li Hengrui Li

Human motion capture (MoCap) plays a key role in healthcare and human-robot collaboration. Some researchers combine inertial measurement units (IMUs) and multiple infrared depth-of-field cameras to reconstruct 3D human motion. The expensive price and complexity of using multiple infrared depth-of-field cameras hinder their popularization in various fields. Other researchers have reconstructed the 2D pose of the human body from a single camera, but the results were less accurate. Both methods have significant limitations. Therefore, we design a new 2D pose estimation method by combining the convenience of shooting video with a single camera and the high precision of an IMU device. We first used the video collected by the mobile phone camera to realize Openpose's 2D human pose recognition. The output 2D pose data is then converted into a data format usable in the LSTM model. Furthermore, the 3D data captured by the IMU is projected onto a 2D plane through the analysis of camera positions and parameters. Finally, by analyzing the two sets of reconstruction data, we find the best combination that achieves the least use of IMU data and maintains a high action recognition accuracy. We evaluate the performance of our method on public human pose datasets and our own captured videos. Experiments show that combining these two methods greatly increases the popularity of human pose estimation and analysis, allowing people to achieve high accuracy using as little equipment as possible. Our method can be applied to detect and analyze the degree of rehabilitation of persons with disabilities, and furthermore healthcare application areas.

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18h20 Fetal Heart Rate Simulator

Etay Yacov

We want to address possible inaccuracies in home CTG devices by constructing a mechanism that can simulate the heart rate of a fetus. Creating known CTG patterns to be measured by CTG devices may help evaluate their accuracy.

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18h40 Using Wearables And A Web Platform To Manage Scoliosis Treatment

Ahmed Hajji, Edin Dulic, Gerhard Aigner

Scoliosis is a medical condition in which a person's spine has a sideways curve. This condition is most often found in children in the age 10 to 15. Scoliosis can not be cured, but it is possible to get the illness under control and manage it. Depending on the severity of the curve different therapies are used to manage scoliosis. One method that is often associated with scoliosis is bracing. The patient has to wear a back brace. Depending on the brace type it has to be worn the whole day or night to have a medical benefit. To motivate these young patients to achieve the necessary wearing time a new concept is in the workings. The concept uses wearables to determine if the brace is worn or not and records movement data of the patient. The movement data can be used to determine if a patient exercises regularly. This can be beneficial because regular exercise can help with typical symptoms that scoliosis patients complain about like back pain. All this informations are forwarded to a web platform that uses the information to help a patient manage the illness. Our task in this project is to evaluate this concept in a system test. The evolution includes the optimization of the concept before testing, the testing of the concept in everyday life scenarios and to conclude if this concept works or not.

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19h00 Closure

Prof. Dr. Martin Daumer

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