

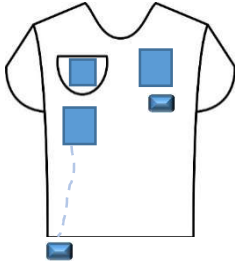
PROPUESTA DE TFM

Curso 2020-21

Directores	Carlos Medrano
Título	<p>Aprendizaje no supervisado de posturas sentadas usando mallas sensibles a la presión</p> <p>Unsupervised learning of sitting postures using pressure sensitive mats</p>
Breve descripción	<p>The main goal of this project is to analyze the performance of unsupervised learning (clustering) to discover typical postures adopted while sitting in an office chair. The data will come from a Pressure Sensitive Mat (PSM) developed in EduQTech.</p> <p>The steps of this project are the following:</p> <ol style="list-style-type: none"> 1. State of the art. Literature review to analyze related paper and make a summary of typical sitting posture analyzed and algorithms for classification. 2. Research design. Postures to be analyzed, data acquisition and processing, performance evaluation. 3. Data collection. Depending on the restrictions due to COVID-19 and the place of residence of the student, data can be collected by the members of the EduQTech group or by the student using the PSM developed in EduQTech. Both hardware and software for data acquisition (DAQ) would be provided to the student. 4. Data analysis. Contrary to most of the previous papers that use supervised classification, in this case the idea is to use clustering techniques to analyze the data and then compare the results with the known posture. The student can use different algorithms for dimensionality reduction, clustering etc and compare their performance. The student will apply the concepts for data analysis of the subject "Methodology for R+D+i and data processing in Health and wellnes" and basic concepts of DAQ (developed in subject such as "Complementary training in Industrial Technologies" and "Wearable sensors and mHealth"). 5. Writing of Master thesis
Nº alumnos	1

PROPUESTA DE TFM

Curso 2020-21

Directores	Raúl Igual
Título	Diseño y desarrollo de un sensor de frecuencia respiratoria integrado en elementos textiles
Breve descripción	<p>Los sensores vestibles están cada vez más presentes en la sociedad. Un conjunto de sensores vestibles son aquellos que se integran en prendas de ropa cotidianas de manera que pasan inadvertidos, o casi, para un observador externo. En este Trabajo Fin de Máster se propone diseñar y desarrollar un prototipo de sensor de frecuencia respiratoria vestible que se integre eficientemente en una prenda de ropa (camiseta). Para ello se hará uso de una “tela conductora” de bajo coste conocida como “velostat”. El trabajo consistirá en realizar el diseño de este sensor y su integración en la prenda de ropa. El estudiante deberá familiarizarse con la operación y trabajo con esta tela conductora, realizar pruebas de los puntos óptimos de la camiseta donde ubicar el sensor y proponer un diseño integrador. El director proporcionará guía en la implementación electrónica del sensor y proporcionará los materiales para llevar a cabo el proyecto.</p> 
Nº alumnos	1

PROPUESTA DE TFM

Curso 2020-21

Directores	Jesús Lázaro Plaza y Eduardo Gil Herrando
Título	Study on coverage of wearable heart rate monitors
Breve descripción	<p>Wearable devices are developing very fast and have a huge potential impact in terms of healthcare improvement and industrial applications. Many of them offer continuous heart rate monitoring usually based on either pulse photoplethysmographic (PPG, optical sensor) or in electrocardiogram (ECG) signals. However, artifacts occur during daily life due to movement, or to bad contact of the sensor with the skin. These artifacts lead to gaps in the heart rate monitoring, or even to inaccurate measures. The percentage of time that a continuous heart rate monitor can offer accurate measures (coverage) is a very important parameter to take into account when thinking of health monitoring applications.</p> <p>In this thesis, the coverage of several wearable heart rate monitors will be studied. The study will include some commercially available wearable devices (Apple, Polar, etc), and a prototype that is being developed with the collaboration of University of Zaragoza. Some data, including data recorded during daily life, will be acquired simultaneously from different wearable devices and a commercially available Holter monitor, whose estimated heart rate will be used as reference.</p>
Nº alumnos	1

PROPUESTA DE TFM

Curso 2020-21

Directores	Raquel Lacuesta Gilaberte y Jesús Gallardo Casero
Título	Diseño de un videojuego para promover experiencias intergeneracionales (mayores y jóvenes)
Breve descripción	El proyecto se centrará en el diseño de un videojuego o aplicación que potencie la colaboración entre personas mayores y jóvenes para promover y fomentar experiencias, actitudes y sentimientos positivos entre mayores y niños/jóvenes. De esta manera se pretenden potenciar los beneficios físicos, cognitivos y socioemocionales de las actividades conjuntas y de la interacción social.
Nº alumnos	1

Directores	Raquel Lacuesta Gilaberte y Jesús Gallardo Casero
Título	Diseño de una aplicación para el seguimiento del estado anímico en periodos de COVID para mayores
Breve descripción	El proyecto se centrará en el diseño de aplicación que permita hacer un seguimiento de personas mayores con o sin COVID preferentemente en lo relativo a su estado anímico.
Nº alumnos	1

PROPUESTA DE TFM

Curso 2020-21

Directores	Carlos Medrano
Título	<p>Diseño y fabricación de un sistema de adquisición de datos para una malla sensible a la presión.</p> <p>Design and development of a Data Acquisition System for a Pressure Sensitive Mat</p>
Breve descripción	<p>The main goal of this project is to design and develop a Data Acquisition (DAQ) System for a Pressure Sensitive Mat (PSM) manufactured in EduQTech. A Pressure Sensitive Mat is an array of pressure sensors in a flexible support. It can be placed in chairs, on the floor to measure body pressure with applications in ergonomics and stability analysis for instance.</p> <p>The student has to design and develop a system to scan all the sensors and send the information to a PC. The parts of the system are the typical of a DAQ: multiplexing, signal conditioning, DAC, communication, ...</p> <p>The steps of this project are the following:</p> <ol style="list-style-type: none"> 1. The student will be provided with some papers that describe the typical configurations used in this topic as well as the current system used in the PSM manufactured in EduQTech. 2. Decision making: the student should decide which configuration and components should be used. Fast sampling and easy of developing is a key goal of the project. 3. Design of the system. The student should design the system, including a PCB, and do some preliminary test. Experience in developing PCBs is welcome. 4. Implementation. 5. System testing. 6. Writting of Master thesis. <p>Although the last part of the project requires hardware testing, it can be done with a minimum of components that emulates the PSM. The most critical part is the careful design of the system and the component selection. If well done, this part would be enough for a Master thesis. A background on electronics is recommended.</p>
Nº alumnos	1

Directores	Carlos Medrano
Título	<p>Detección de caídas utilizando algoritmos de seguimiento de la posición: aplicación en bases de datos públicas</p> <p>Fall detection using tracking systems: application on public data sets</p>
Breve descripción	<p>Falls are a major public health concern. According to the World Health Organization, about one third of people older than 65 years falls every year. Some times the consequences are severe, bot physically and psychologically.</p> <p>Many fall detection systems are based on the information provided by IMU (Inertial Measurement Units) and Machine Learning algorithms. There are several public data sets available for testing them.</p> <p>The goal of this project is to use the orientation of the IMU as the key element to detect falls. The orientation allows tracking the position of the IMU. Thus, the aim is to extract kinematic information that can be very relevant for classifying the input as fall/not fall.</p> <p>The steps of this project are the following:</p> <ol style="list-style-type: none"> 1. The student will be provided with a basic algorithm in Python to track IMU position and some papers. The student should update the information about the current research on the topic. 2. The student has to apply the algorithm to several public data sets. <ol style="list-style-type: none"> 2.1 The student has to study the data sets organization, select data preprocessing, algorithms to be used (guided by the supervisor) and performance metrics. All the data sets have to be treated in a coherent way. 2.2 The student should compare the results with state-of-the-art algorithms and published papers. 2.3 The student has to extract conclusions about the usefulness of using kinematic data for fall detection and the need for complex Machine Learning algorithms. 2.4 The code developed must be elegant and clear (commented). It should be easy to extend to other data sets. 3. Writting of Master thesis. <p>This project is related to these subjects: “Methodology for R+D+i and data processing in Health and wellnes” and “Wearable Sensors and mHealth”.</p>
Nº alumnos	1