



2nd SYMPOSIUM OF APPLIED RESEARCH

Book of Abstracts

Barcelos, 26th May 2017



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Event Program

Programa do Evento

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14:30

Registo

15:00

Sessão de Abertura

Sessão1

Moderador: *Estela Vilhena*

15.10

(AP1) *Collaborative Navigation for Flying Robots*

Tiago Silva - MEEC

15.15

(AP2) *MyEyes - Automatic Combination System of Clothing Parts to Blind People*

Daniel Rocha - MEEC

15:20

(AP3) *Plan to create safe flight areas for drones*

Fátima Barroso - MSIGQAS

15:25

(AP4) *A Case Study of the Adoption of Cloud Computing Technologies by the Portuguese Enterprises*

José Araújo- MEI

15:30

(AP5) *Detection and analysis of activities in AAL*

João Palma - MEEC

15:35

(AP6) *Desenvolvimento de uma Plataforma Computacional de aquisição de dados para Central Fotovoltaica*

Carlos Silva - MEEC

15:40

(AP7) *Guaranteeing safety in the fight against food waste: a case study in an IPSS*

Verónica Mariano – MSIGQAS

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Sessão 2

Moderador: *Mariana Carvalho*

- 15:45 **(AP8) *Systematic conversion of the behavior defined by the functional blocks, from IEC 61 131-3, for finite periodic automata***
Tiago Miranda - MEEC
- 15:50 **(AP9) *WingSuit Flying Electromechanical Simulator***
José Oliveira - MEEC
- 15:55 **(AP10) *Passenger Detection and Pose Estimation***
Nelson Rodrigues - MEEC
- 16:00 **(AP11) *Handbook of Procedures for the Academic Management of IPCA***
Isabel Miranda - MSIGQAS
- 16:05 **(AP12) *Apartamento Inclusivo***
Luís Portela – MEEC
- 16:10 **(AP13) *Distributed Command Systems Controllers Modeling, using Finite Automata Timed***
Vitor da Cunha - MEEC
- 16:15 **(AP14) *Embedded CV***
Simão Ferreira – MEEC

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Sessão 3

Moderador: *Vitor Carvalho*

- 16:20 **(AP15) *Humanization as a quality factor in health services***
Helena Morgado - MSIGQAS
- 16:25 **(AP16) *Robotized Puncture***
Rafael Queirós - MEEC
- 16:30 **(AP17) *Development of Serious Game to Fight Childhood Obesity***
Fátima Gonçalves - MEI
- 16:35 **(AP18) *Interactive Application for learning Portuguese Sign Language***
Marcus Torres - MEEC
- 16:40 **(AP19) *Evaluation of BPM Tools***
Marco Sousa - MEI
- 16:45 **(AP20) *Stress Ocular***
Fábio Vieira - MEEC
- 16:50 **(AP21) *Implementation of an Integrated Management System - Obstacles and Motivations***
Manuela Vilas Boas – MSIGQAS

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Sessão 4

Moderador: *Luís Ferreira*

- 16:55 **(AP22) *The importance of BRC Food, IFS Food, FSSC 22000 and ISO 22000 in the food industry***
Luís Sá - MSIGQAS
- 17:00 **(AP23) *Django APP to register events and obtain statistics about them***
André Barreira – MEI
- 17:05 **(AP24) *Development of a solution for the interlocking of tires in the vulcanization channels***
Bruno Batista – MEEC
- 17:10 **(AP25) *Interactive Platform for Children with Attention Deficit***
Elisa Enes - MEI
- 17:15 **(AP26) *Game Mechanics Influenced by Biometric Sensors***
João Petersen - MEDJD
- 17:20 **(AP27) *Building a web tool for the implementation of a business process: Urban planning processes***
Justino Neiva – MEI
- 17:25 **(AP28) *Monitorização contínua do stress em indivíduos – Aplicação móvel***
Luís Simões – MEI
- 17:30 Sessão de posters & Coffee-Break**
- 18:00 *Sunset* EST**
- 19:00 Entrega de prémios**



Implementation of an Integrated Management System - Obstacles and Motivations

Manuela Vilas Boas; Martinha Pereira; Estela Vilhena

BACKGROUND:

The implementation of an integrated management system is currently an important requirement for companies that want to survive in a global market.

A management system requires a great effort, involving both human and financial resources. However, despite the efforts involved, organizations recognize, that the management systems are essential to mark a position in market and guarantee their sustainability.

OBJECTIVES:

- Implement an Integrated Management System of Quality, Environment and Safety in a Metalworking Industry.
- Determinate the main difficulties and advantages associated to the implementation of the integrated management system.

METHODOLOGY:

This project includes a case study and the application of a surveys by questionnaire, developed according the following steps:

- Search and analysis of scientific articles and other bibliographical references;
- Identify legal requirements, applied to metalworking industry;
- Case Study: Implement an Integrated Management System, in a metalworking industry;
- Analyses the difficulties and advantages on the implementation of an integrated management system through a workers and administration questionnaire;
- The population will be composed by employees and company management;
- Statistical analysis methodologies will be used to analyze the data according to the objectives of the study.

RESULTS AND CONCLUSIONS:

- With this project, it will be possible demonstrate the main resistances and difficulties felt by the workers and administration, in the implementation of an integrated management system.
- This project intends, also, demonstrate that despite the difficulties identified by the workers, they recognize several advantages and improvements that the integrated management system brings to productive process and work methodologies.

Keywords: Quality, Environment, Health and Safety, Management System, Advantages, Diffilcuties.



The importance of BRC Food, IFS Food, FSSC 22000 and ISO 22000 in the food industry

Luís Sá; Martinha Pereira; Estela Vilhena

BACKGROUND: Food safety is related with the presence of dangers which can occur in any stage of the food chain. This implies the need of a control which is ensured by the combined set of means of all the relevant parts.

It became aware an emergent necessity to improve food safety, which led to the requirements creation, specifications and normative references to protect the consumers. The industry adapted and shaped itself with these new assumptions and as a result food safety has a bigger part not only in food production but in any other stage of the food distribution chain.

OBJECTIVES: The main purpose of this work is study the importance of BRC Food, IFS Food, ISO 22000 and FSSC 22000 references in the food industry, following the below objectives:

- Develop and create a validation tool for the Food Safety normative references under study;
- Understand the impact of the implementation of these same normative references;
- Recognize Food Safety indicators (to be able to create a national map).

METHODOLOGY: To get to the proposed objectives, this thesis will focus on three main aspects:

1. Study and approach to the normative references ISO 22000, FSSC 22000, IFS Food and BRC Food with the purpose of developing a validation tool.
2. Analyze the impact of the implementation of the normative references in study on the organizations.
3. Define and implement a method that will allow the definition and measurement of the food safety indicators. The purpose is that this study might be applied to the national reality, reflecting the national food safety “barometer”.

RESULTS AND CONCLUSIONS: It is intended to evaluate the integration impact of the normative references on the organizations which will facilitate the operational process reducing their weight in the organizations, and giving a bigger safety margin and trust, as it will get an effective consolidation of the concepts and requirements.

It will bring a new insight regarding Food Safety on our organizations, contributing to improve their global indicators and the understanding of the certification's importance in its evolution

Keywords: Food Safety Management systems; BRC Food; IFS Food; ISO 22000; FSSC 22000;



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The impact of Nanomaterials on Safety and Health of Workers in a Textile Industry

Marco Gomes, Delfina Ramos, Luís Almeida

BACKGROUND: Nanotechnology will be one of the main technological drivers in the construction and innovation of a European Union based on an intelligent, sustainable and growth economy. The field of nanotechnology has been making rapid progress and the use of nanomaterials is increasingly common.

OBJECTIVES: The main objectives to develop in this study is the application of nanotechnology and nanomaterials in the textile sector and their Risk assessment.

METHODOLOGY: The proposed methodology for this project will be "Control Banding", which describes a specific approach based on the control based on the level of exposure of workers to nanomaterials, according to ISO / TS 12901-2: 2014 - Nanotechnologies - Occupational risk management applied to engineered Nanomaterials - Part 2: Use of the control banding approach.

RESULTS AND CONCLUSIONS: It is intended to compare the results obtained with the normative limit values, since in Portugal there is a legal vacuum. This study intends to evaluate the level of exposure of workers to nanomaterials, as well as to propose a measure of control. It is also intended to sensitize employers and workers to occupational risk management

Keywords: : Nanotechnologies; Nanomaterials; Control Banding; Textile Sector.



Humanization as a quality factor in health services

Helena Morgado, Mariana Carvalho, Estela Vilhena

BACKGROUND: Hospitals are implementing quality management systems to achieve high-quality patient care. Some studies revealed that patient-centered care receives less attention than other dimensions of quality. While the health care quality consists in "doing the right thing to the right person at the right time at the lowest cost", the humanization focuses on the whole human being and recognizes the professionals' subjectivity.

OBJECTIVES: This study aims to verify if the hospital humanized care increases the patients' satisfaction index and to assess its impact on the health care quality. It's expected to identify the most significant humanization factors and the measures that can and should be taken to increase the adoption of humanized care in hospitals.

METHODOLOGY: The target population will be composed by all patients hospitalized in a given period in an accredited hospital located in the North of Portugal. The sample will be obtained through the probabilistic sampling method. The measuring instruments used for data collection will consist of surveys by questionnaire. Based on bibliographic review, two questionnaires (one for patients and one for professionals) will be constructed and submitted to pre-test and validation.

RESULTS AND CONCLUSIONS: According to OCDE, strengthening the patients' role should be a priority, because the satisfaction with the Portuguese health system has historically been low. Therefore, it can be concluded that the importance of this study covers the entire health system, since the humanized health care aims to increase the quality of life and not only the absence of the disease.

Keywords: humanization; health care quality; patient-centered care; patients' satisfaction index; quality management systems

Quality Management in Local Accommodation Establishments: Approach by ISO 9001, ISO 10002 and ISO 10004

Joana Guimarães, Delfina Ramos, Manuela Cunha

BACKGROUND: Portugal is characterized by its huge tourist offer. In 2015, Portugal was 15th in the ranking as the most competitive tourist destination in the world (World Economic Forum, 2015). In 2015, local accommodation received 2.3 million guests, which resulted in 5.3 million overnight stays. The average stay was 2.27 nights and the occupancy rate was 32.2% (INE, 2016). Adoption a quality management system is a strategic decision for organizations that can help improve its overall performances and provide a solid foundation for sustainable development initiatives “(NP EN ISO 9001, 2015).

OBJECTIVES: Determine customers needs and expectations, measure and monitor customer satisfaction, through the approach to ISO 9001: 2015 and ISO 10004: 2012 standards. How to deal with a customer who complains? Guiding principles for structuring a complaint handling process, through the approach to ISO 10002:2014.

METHODOLOGY: The method will be the survey and analysis of all complaints in the year 2016 and through monitoring and measuring customer satisfaction in local accommodation through the questionnaires available on the web platforms such as: Booking, Airbnb, HomeAway and Tripadvisor.

RESULTS AND CONCLUSIONS: Analyze the results of the study through the level of customer satisfaction related to the quality of the service, these criteria are important for the guests in the choice of accommodation and destination, as well as all the complaints during 2016 and compare it with National statistics, and adopt control and improvement measures to minimize future complaints.

Keywords:

Tourism

Quality Management

Customer Satisfaction

Private Accommodation



Plan to create safe flight areas for drones

Fátima Barroso, Mariana Carvalho, João Vilaça

BACKGROUND: It is currently possible to use drones in various commercial, industrial and ludic activities. The growth of the aircraft industry is expected to lead to a widespread increase in the use of drones as well as an increase in the variety of purposes of their use. So it is necessary to safeguard and risk operations and implement measures to mitigate this risk.

OBJECTIVES: The main objective of this project is to identify and define ways to implement safe zones and routes to pilot and use drones, in accordance with Portuguese Regulation 1093/2016 of November 24, 2016, other legislation and directives related to the unmanned aeronautical theme.

METHODOLOGY: A theoretical framework will be developed on the basis of bibliographical research taking into account existing national and european legislation. After the bibliographic review, a case study will be carried out in Polytechnic Institute of Cávado and Ave (IPCA), a higher education institution with a research focus in automation and robotics.

RESULTS AND CONCLUSIONS:

At the end of this project, it is intended to create and implement procedures for the use of drones in a secure way, not only in the study institution but also in other entities. This safe operation involves the correct assessment and risk management associated with the operation and implementation of associated risk mitigation measures.

Keywords: *Drone, RPAS(Remotely Piloted Aircraft System), UAV(Unmanned Aerial Vehicle), safe flights, safety.*



Guaranteeing safety in the fight against food waste: a case study in an IPSS

Veronica Mariano, Martinha Pereira, Mariana Carvalho

BACKGROUND: Food waste has become a very current issue in recent years. According to recent data, about half of the food produced in the world is wasted. This, over the years, will generate serious impacts on society, the environment and the economy. In light of the fact that we can only make a difference by changing our habits, we decided to work in our own community. Therefore, a revision of the HACCP system (Hazard Analysis and Critical Control Points) of the association GASC (Christian Social Action Group) will be carried out, in order to guarantee the best food safety practices. This organization manufactures and distributes meals to the vulnerable and collects food at some grocery stores. With the same vision of combating food waste, the project aims to prepare operational and administrative procedures to welcome the *Re-Food* movement to Barcelos.

OBJECTIVES: The overall objective of this project is to ensure food safety in the food waste prevention practices implemented by GASC and Re-food.

This general objective will be achieved through the following specific aims:

- 1) Review of the HACCP methodology of the GASC association;
- 2) Definition of administrative and operational food safety procedures to implement the Re-food project in Barcelos.

METHODOLOGY: The methodology used in this project will be a case study in an IPSS (Private Institution of Social Solidarity).

RESULTS AND CONCLUSIONS: With this study, we expect to effectively implement the HACCP system at GASC and ensure the best food safety practices to receive the Re-food project in the city of Barcelos, as tools to combat food waste.

Keywords: food waste, food safety, HACCP, IPSS , Re-food



Abstract

Handbook of Procedures for the Academic Management of IPCA

Isabel Miranda, Patricia Gomes, Martinha Pereira

BACKGROUND:

The management of Higher Education Institutions (HEI) is becoming more demanding, as a consequence of the necessity to accompany the evolution of the contemporary world.

The implementation of quality management systems comes as an imperious topic for all the organizations that wish to express a differentiating attitude in a global market context. The challenges that HEI face, demand a strong positioning, with ground-breaking and competitive strategies that materialize themselves in performances oriented for excellency.

Thus, this project aims to cooperate with IPCA in reaching its mission, through the adoption of solid and rigorous management models, promoting the continuous improvement in organizational performance, particularly in the definition of a procedure handbook for the academic services.

OBJECTIVES:

The objectives are:

- Create procedures handbook for the academic management, considering the ISO 9001:2015.
- Identify improvements for the academic management;

METHODOLOGY:

The methodology used in this project is based on a case study applied to the IPCA academic services, approaching the following steps: revision of literature; collection of data; creation of the necessary procedures and forms; writing and turning in the project.

The evolution of the project has a dynamic characteristic. As such, there are no fixed steps, but complementary ones which can intersect throughout its writing.

RESULTS AND CONCLUSIONS:

Writing a procedures handbook for the academic management of IPCA has a purpose to allow the organization to continuously provide services which satisfy the needs of its clients as well as the statutory requirements.

Keywords: Quality Management System; ISO 9001:2015; Procedures; Academic Services; Higher Education Institutions.



Desenvolvimento de uma plataforma computacional de aquisição de dados para central fotovoltaica

Carlos Silva, Filipe Pereira

BACKGROUND: Renewable energies emerge as a sustainable solution in the production of electricity, because their production represents a lower cost. In this context the photovoltaic plants emerge, with potential growth and future improvement, that leverage an inexhaustible source and non-pollutant, the Sun.

OBJECTIVES: This work has as main objective the development of a computational application which allows the monitoring, control and real-time data acquisition of photovoltaic plant that will be installed at the premises of the Instituto Politécnico do Cávado e Ave (IPCA).

METHODOLOGY: A data acquisition circuit using the National Instruments (NI) Universal Serial Bus (USB) - 6008 Data Acquisition (DAQ) will be implemented, using USB for connection to the computer. The application will be implemented in LabVIEW graphical programming, by making the development process faster and efficient.

RESULTS AND CONCLUSIONS: The application will serve to support the maintenance of the central where some modules can be removed from service in order to perform maintenance. This application differs from others on the market because it is personalized and targeted to the needs of the IPCA

Keywords: Photovoltaic Energy, Photovoltaic Plant, Computer Application, LabVIEW.



Development of a solution of interlocking tire in the curing area

Bruno Batista, João Vilaça, Roberto Perretta

BACKGROUND: With the steady increase in demand in the industrial world where the place to errors and failures are increasingly reduced, it was then proposed this research project by the Continental Mabor, which provides that it eliminates one of the main factors leading to the delay production and stop machines either upstream or downstream of the vulcanization channels.

OBJECTIVES: Over the years and the constant changes in the industrial park and growth of Continental in the number of curing machines channels turned out to be the most adversely affected by these factors all, so the Continental Mabor propose to an update and improvement of all 13 channels present in the factory.

METHODOLOGY: The methodology will take into account the implementation of some central point.

- A review
- Proposed solutions
- Implementation of the first prototypes
- End all channels

RESULTS AND CONCLUSIONS: With the resolution of this project it is intended that all channels become adapted to all the reality of daily production at this time.

Due to the steady increase in cost that this problem reflects daily in normal production company this cost reflects to the amount of reparations that this problem causes in the quantity of the non-compliant that it leaves each time there is a misfeed tires and also due to accidents that operators and maintenance teams are subject every time you have to solve the situation, it is concluded that this project has a strong reason for being.

Keywords: Improvement, Production, Computer Application, Automation, Beckhoff.



MyEyes - Automatic Combination System of Clothing Parts to Blind People

Daniel Rocha, Vítor Carvalho, Eva Oliveira, Joaquim Gonçalves, Filipe Azevedo

BACKGROUND: The aesthetic follow us in almost all the things that surround us. In the way we dress, in the environment we live in and in more or less subtle ways, guides us. Sometimes for personal reasons, particularly in our self-esteem, in our well-being, but also in practical terms as aesthetics also helps us to be more functional. It is in the search of these features that comes the motivation for this project to instill these feelings and characteristics in a blind with total loss of eyesight.

OBJECTIVES: Thus, we intend to develop a support system for the blind in a web platform to provide greater independence and consequent welfare in aid to the combination of garments. The purpose is to develop a REST (Representational State Transfer) architecture system composed of an API (Application Programming Interface) and a front-end application. The user's device must have NFC (Near Field Communication) technology so that the front-end application obtains the NFC sensor data.

METHODOLOGY: The way of identifying the various pieces of clothing focuses on the use of NFC technology. The NFC is an open wireless technology that allows the exchange of information between devices within a short distance; we will use tags in the pieces of clothing in a minimally invasive way for their identification.

Moreover, we will consider an Arduino platform chosen together with a module PN532, which allows the tag to be read on the clothing. The Arduino is connected to a PC and allows the interface with the web platform.

In the development of all software it is used Laravel, which is a PHP Framework that uses the MVC (model-view-controller) architecture.

RESULTS AND CONCLUSIONS: This project was submitted to a preliminary validation of blind people, namely, the user interface and the database build. The feedback was very positive where the general opinion was classifying it has interesting and advantageous for blind people.. According to blind people, they considered that technology has evolved a lot, but the aesthetics and the visual image is a part that has to be more explored because its influence of the well-being and confidence.

As future work we intend to implement machine learning in combinations of garments, as well as the insertion of garments automatically using a camera and image processing algorithms in the extraction of characteristics. Moreover, real world tests of the application with blind people will be considered.

Keywords: Blind people; Computer Vision; Clothes; Combination; NFC.



Stress Ocular

Fábio Vieira, Eva Oliveira, Nuno Rodrigues

BACKGROUND: The fatigue is considered as one of the leading causes of human error. Often the symptoms are ignored, as its importance both physical and mental, fundamental to human performance and health. It is very difficult to recognize their own level of fatigue. Spend many hours looking for a computer, can cause serious eye problems.

OBJECTIVES: Development of an application capable of sensing the level of fatigue of the user in real time, in order to improve your performance and eye health, warning them of behaviors less correct, and providing a set of analysis tools.

METHODOLOGY: The system to be developed is aimed at improving the performance and health of the user, verifying your level of fatigue through his eyes. The eye fatigue will be calculated through the implementation of the technique Deep Learning. The process is characterized initially by obtaining the user through processing of images acquired in real time via a webcam. Through the Deep Learning will be possible to acquire information about the current state of the user's eye, i.e., whether they are open or closed. Thus, it is possible to obtain various data that will conclude something about eyestrain. The result will alert the user of possible incorrect behaviors, providing a set of analysis tools and a set of recommendations.

RESULTS AND CONCLUSIONS: This paper describes the development of an application that will allow users of computers to raise your personal performance and to prevent possible consequences of health by means of image processing, thus allowing to check the level of fatigue through the eyes.

Initially were developed algorithms to perform image processing, which consisted in the segmentation of user's eye, for later whether they were open or closed. But after the development of several image processing algorithms, the results were not the best, because the efficiency of same was much affected by external factors, mainly by light. Therefore we chose to study the implementation of Deep Learning, to check if it is possible to obtain better results compared to the eyestrain.

It has already been initiated the development of the interface of the site. Currently being developed throughout the process of training and tests that the Deep Learning requires. In parallel, is also to be studied the server implementation, because this will be integrated across the Deep Learning.

Keywords: Fatigue, Eyepiece, Health, Performance, Computers, Deep Learning.

Automatic Collage System Optimization

João Machado, João Vilaça, Gabriel Rocha

BACKGROUND: Automatic collage systems are a type of system widely used in many industries. This is due to the fact that an automatic system presents more precision and accuracy than a manual system. In 2012, the institution in collaboration has developed an automatic collage system that fulfilled the needs of its client. However, recent changes in the needs of its client has led to the necessity of the development and optimization of a new system.

OBJECTIVES: It is proposed the development and optimization of a new system focused on: (1) better management of the available resources allowing execution of parallel processes, (2) optimization of the current processes, (3) addition of new maintenance processes, (4) addition of a vision system.

METHODOLOGY: The focus of this work is the projection and development of the control module and user interface. Both control module and user interface will be developed using *Microsoft Visual Studio* and *Visual Basic* programming language. The control module has to be able to control and monitor all the machine processes and the user interface should allow the user to control and monitor the machine.

RESULTS AND CONCLUSIONS: As this project is still in an early development stage there are no results or conclusions to present. However, with this optimization is expected: (1) decrease of the machine cycle time and consequent increase of the production capability, (2) increase of the quality and precision of the processes, (3) more fully autonomous processes and (4) increase of the system's flexibility.

Keywords: Automatic Collage System, Plasma Cleaning, Glue Dispensing, UV-Bonding



Detection and analysis of activities in AAL

João Palma, Vítor Carvalho, Demétrio Matos

STATE OF ART: Everyone needs a regular monitoring and continuous of their health, in specially, people with disabilities. However, for relatives this might be a hard task as it requires long time, dedication and resources. At the moment, it doesn't exist yet an application that is capable of detecting and analysing activities in AAL and send notifications when there is a potential crisis. There are only applications that detect the activities, based on sound and movements produced the user.

OBJECTIVES:

- Detect activities on daily using the sensors of a mobile device.
- Store data ensuring a user privacy.
- Detect activity patterns and special criteria to be used.

METHODOLOGY: This project will study the use of mobile devices for detecting and analyzing activities in AAL. The first stage will consist in discovering which sensors and signals could recognize those activities. After, it will be created an application that will detect and store the activities in real-time. In the final stage, we aim to find the periodicity and location of activities throughout the day, via Machine Learning Algorithms. These steps will allow us to define daily routines and alert anytime there is an abnormality that could create danger.

RESULTS AND CONCLUSIONS: This is still an ongoing project, therefore we are unable to produce any conclusions. However, it is safe to conclude that this is practical and could be the answer to today's demands.

Keywords: monitoring, activities, routines, alert, AAL.



WingSuit Flying Electromechanical Simulator

José Oliveira, João Vilaça

BACKGROUND: Virtual reality is a synthetic playing experience representing a context of virtual or illusory the user simulation. Architecturally a virtual reality system consists of three essential components: one or more screens, a set of sensors that detect movements and stimulate the user (sound and touch), and a responsible computer for controlling the whole experience. The development of these experiences also includes the construction of worlds, contexts or virtual environments modelled computationally.

OBJECTIVES: The objective of this work is the development of an electromechanical simulator, along with virtual reality, in order to provide the sports experience Wingsuit Flying immersive way. The simulator must also provide a generic API able to receive (and possibly send), in real time instructions from software applications of third command, in particular digital virtual reality games.

METHODOLOGY: The user of the simulator find suspended, arrested for several harnesses attached to a movable structure controlled by pneumatic cylinders. This way you can control the rotation and operator bias simulator. For immersion in synthetic experience, you will use the Oculus Rift which will be designed the scenery. All control API that will undergo a virtual reality game receives commands acquires the user's movement simulator and controls pneumatic cylinders due to the melting of the received data.

RESULTS AND CONCLUSIONS: The dissertation project aims to provide simulator users to the extreme sport experience Wingsuit Flying without risk or require learning. The actual experience of this sport requires intensive learning, equipment and is considered an extremely dangerous sport.

Keywords: Virtual Reality, Wingsuit Flying, Electromechanical, Software



Apartamento Inclusivo

Luís Portela, Vítor Carvalho, Demétrio Matos

BACKGROUND: Despite the increase in the average life expectancy, this increase is affected by the increase of diseases and disabilities that have an effect in the people's well being. Thus in the absence of a system capable of giving a focused and individualized response to this type of problem, there is a need to create a system that is moldable to each type of limitation, and at the same time, is capable of giving the necessary answer.

OBJECTIVES: Implementation of a system that will facilitate the domestic tasks of daily life of people with limitations, making them more autonomous; individualized response centered on those limitations; system depending on the type of person concerned, adopt an inexpensive system.

METHODOLOGY: Implement a system that allows access to the entrance door: by approaching a card in the RFID reader; through a Bluetooth system, by the approach of the user to the door; and also, through a system that identifies the face of the user; implement a light control system through an openHAB platform. Control of lights by voice, implemented through a smartwatch.

RESULTS AND CONCLUSION: After the bibliographic analysis, it can be concluded that there are still many aspects that can be developed. However, it is hoped that it will be possible to contribute to the growth of this area. In addition, it can also be concluded that this project is viable and will be limited to a low-cost system.

KEYWORDS: Smart home, RFID, Bluetooth; Face Detection.



Interactive Application for learning Portuguese Sign Language

Marcus Torres, Vítor Carvalho, Filomena Soares

BACKGROUND: In Portugal, children belonging to the sign language communities have difficulties in communication and learning processes and there is no auxiliary learning application that responds to this problem in an interactive, dynamic and fun way.

OBJECTIVES: Development of an interactive and didactic serious game to learn Portuguese Sign Language (PSL). The main focus are deaf children integrated in the first cycle of basic education in PSL.

METHODOLOGY: The game promotes automatic interaction with the player / child through the Leap Motion sensor and controller where the main feature is the capture and recognition of hand and finger gestures performed by the child and the game returns the appropriate feedback through the graphic interface.

As the main focus are children, their appeal and stimulation towards the game is very important. Also, the content is based on the initial concepts of learning the first cycle of basic education of PSL, namely the alphabet, numbers from 0 to 9 and colors.

In this sense, it's developed a virtual game where the player/child must overcome challenges considering the learned PSL concepts. These challenges go through the representation of an image and its success is the good execution of the respective gesture (example: a number or a letter).

RESULTS AND CONCLUSIONS: Its purpose is to assist deaf children in learning PSL in a fun and interactive way in which it will contribute to the increase in communication, learning, mobility, autonomy and social interaction.

Keywords: Leap Motion, Portuguese Sign Language (PSL), Serious Game, Deaf Children, Sign recognition



Passenger Detection and Pose Estimation

Nelson Rodrigues, José Brito

BACKGROUND: Autonomous vehicles are increasingly being introduced in our daily lives, and with them the need to monitor all passengers. It is the aim of this project to create a monitoring solution using Time of Flight (ToF) cameras, obtaining a depth image of the interior of the vehicle. ToF cameras have a great advantage over RGB-D, their immunity to the presence of light. Applying the right algorithms to this depth image, it should be possible to determine the position and pose of each passenger of the vehicle.

OBJECTIVES: The aim of this project is to detect the presence of humans and estimate their respective body posture, namely the spatial location of the articulations of the skeleton in three-dimensional space, from images captured with ToF cameras located inside the vehicle.

METHODOLOGY: In order to develop this thesis, it is necessary to study the most efficient algorithms for this detection. In the field of artificial intelligence there are algorithms capable of detecting many types of objects very effectively, from RGB images and ToF images. Some traditional algorithms use classic machine learning methods. Most of the latest algorithms are developed using techniques based on deep learning.

1. Identification of classical methods for people detection and estimation of pose and its implementation;
2. Identification of methods based on deep learning for people detection and estimation of pose and its implementation;
3. Selecting an appropriate dataset with ToF images and human pose information;
4. Selection of a deep learning framework;
5. Development of a deep neural network, to train the dataset;
6. Testing and validation of algorithms, using images taken with the ToF camera;
7. Comparative analysis of the performance of the algorithms in terms of their efficiency and effectiveness.

RESULTS AND CONCLUSIONS: To determine the effectiveness of the algorithm is intended to compare one or more solutions made in basic machine learning and one or more solutions based on deep learning.

Keywords: computer vision, image processing, artificial intelligence, autonomous driving, human pose



Robotized Puncture

Rafael Queirós, João Vilaça

BACKGROUND: Nephrolithiasis is one of the most common urological disease, primarily in industrialized countries affecting more men than women and with a 50% recurrence rate. One of the surgical steps of nephrolithomy is percutaneous puncture, in which a surgical needle is inserted from the periphery of the skin until the goblet kidney where is the stone. Because of the high precision and dexterity needed, this task becomes a complex job even for the most experienced surgeons, there is therefore a huge probability of occurring errors and damage to vital organs through a inaccurate puncture.

OBJECTIVES: With the objective of facilitate the work of surgeons this project proposes the adaptation and control of a robotic arm so that it can be controlled through a haptic device. It is then expected to: Reduce dependence on surgeon; Reduction of complications during and after the surgery; Make the step of puncture more quickly;

METHODOLOGY: The Surgery, more specifically the puncture, will be performed by a robot with a needle controlled by the surgeon through a haptic device. The surgeon will have available visual information to know the position of the needle, and thanks to the haptic device and the robot's sensors will be able to feel the forces exerted on it.

To achieve this goals is proposed to use a KUKA robot with 7 degrees of freedom that will be adapted with a surgical needle with an electromagnetic sensor at its tip. Will be used the Aurora Electromagnetic tracker system as sensors, which provides 6 degrees of freedom using an electromagnetic field. As for the haptic device, will be used the Omega7 from Force Dimension that provides 7 degrees of freedom including the gripper.

To control the robot will be created an interface in C++ using the SDK from the Force Dimension that will communicate with the PLC of the Robot by TCP/IP.

RESULTS AND CONCLUSIONS: The procedure is to be tested in vivo more specifically living pigs. There will be multiple objectives in those tests, like finding the best puncture strategy, different velocity, and how much helpful is robotized puncture is in this kind of surgery.

Keywords: Nephrolithiasis , puncture, robot, haptic device, Computer.



Embedded CV

Simão Ferreira, José Brito

BACKGROUND: The objective of this project is to develop a computer vision system, implemented with an embedded system based on an ARM processor (Raspberry Pi), which has limited processing power. The algorithm and the code to implement should be as optimized as possible for the ARM processor. The code to optimize is part of the OpenCV library, and this is the focus of the project.

OBJECTIVES:

- Implement a set of computer vision algorithms for real-time object detection
- Evaluate accuracy and speed performance
- OpenCV library optimization for the Raspberry Pi processor
- Improve processing using alternative algorithm implementations

METHODOLOGY:

- Development of an app for object detection with latest version of OpenCV
 - Perform tests and get results
 - This app will be the reference
- Develop OpenCV library improvements
 - Focus in the "HOGDescriptor" class
 - Implementation of some operations in Assembly
 - Compare results with reference
- Implement possible alternative improvements
 - Processor Overclocking
 - Use SdCard Class10
 - Parallel processing (Multithread and multi processes)
 - Compare results with reference

RESULTS AND CONCLUSIONS: The expected results are to get the maximum possible frame rate optimization of the OpenCV library, as well as maintaining the detection accuracy of the biggest number of objects. This would enable the use of computer vision technology, using low-cost embedded systems. There are systems that use FPGAs, but the cost of an FPGA is much higher than the cost of a Raspberry Pi.

Keywords: Computer vision, Object detection, Embedded system, Optimization



Systematic conversion of the behavior defined by the functional blocks, from IEC 61 131-3, for finite periodic automata

Tiago Miranda, Vítor Carvalho, José Machado

BACKGROUND: Existe uma necessidade que é fruto da existência de lacunas na verificação e validação dos blocos funcionais, que são unidades fundamentais de um PLC (Programmable Logic Controller), de acordo com a norma IEC 61 131-3. Sem os blocos funcionais, uma série de sistemas não pode ser estudados, pois não é possível modelar o código implementado nos seus controladores.

OBJECTIVES: O objetivo do trabalho passa por encontrar formas de estudar a interação entre as diferentes partes intervenientes num sistema mecatrónico e os seus programas. Antes de realizar e implementar os modelos dos blocos funcionais da norma IEC 61 131-3, é necessário estudar os seus comportamentos e compreender como estes respondem, e selecionar os que correspondem a comportamentos necessários, sendo portanto este o primeiro objetivo.

METHODOLOGY: sistema a desenvolver visa a majoração de técnicas de verificação e análise de autómatos temporizados finitos. Existe a necessidade de verificar que todos os sistemas mecatrónicos sejam fiáveis e seguros para quem os opera, é importante que estes sejam testados e monitorizados de modo a conhecer todos os seus comportamentos. De momento existem varias entidades multidisciplinares que estudam o comportamento de softwares e análise dos sistemas de controlo, pois subsiste a necessidade na indústria de garantir que não existem erros nas especificações de comando, nos sistemas mecatrónicos. Isto deve-se ao aumento exponencial do poder de processamento dos microcontroladores, permitindo assim que os sistemas utilizados sejam mais complexos, tornando o processo de desenvolvimento e verificação cada vez mais um desafio. Neste trabalho é proposto realizar um conjunto de modelos, para verificação comportamental de blocos funcionais da norma IEC 61 131-3 tendo em conta a Simulação e a verificação formal da especificação de comando de um sistema mecatrónico. A modelação destes blocos funcionais é feita utilizando TA (Timed Automata) e o software de simulação e verificação (UPPAAL), que permite simular e realizar model checking sobre modelos em TA.

RESULTS AND CONCLUSIONS: Neste trabalho é proposto realizar um conjunto de modelos, para verificação comportamental de blocos funcionais da norma IEC 61 131-3 tendo em conta a Simulação e a verificação formal da especificação de comando de um sistema mecatrónico. A modelação destes blocos funcionais é feita utilizando TA (Timed Automata) e o software de simulação e verificação (UPPAAL), que permite simular e realizar model checking sobre modelos em TA.

Keywords: Autómatos finitos, blocos funcionais, verificação, Program Organization Units, norma IEC 61 131-3, UPPAAL.



Collaborative Navigation for Flying Robots

Tiago Silva, João Vilaça, Nuno Dias

BACKGROUND: In recent years, there has been an increasing interest in the development of autonomous vehicles. An autonomous flying robot must be able to take off, carry out a mission and land when a mission ends without any human interaction. The use of multiple robots within the same system allows a new range of missions possibilities, that are not possible using a single robot.

OBJECTIVES: This project aims to use multiple UAVs (Parrot AR.Drone 2.0) guided by computer vision algorithms to perform cooperative tasks in interaction with the surrounding environment. The main contributions of this dissertation will be the creation of real-time image processing algorithms to obtain spatial coordinates, implementation of a control feedback mechanism to be able to control the position of the robot(s) and a method to navigate and synchronize the movements of the UAVs inside buildings, where GPS technology is not accurate.

METHODOLOGY: In order to complete this dissertation, each quadcopter must be configured to communicate with the PC through a wireless access point. The official Software Development Kit (SDK) of AR.Drone 2.0 has to be modified to be able to control all communications between the robots and the PC. The image processing algorithms, programmed in C# with the EmguCV libraries, will be used to create a stand-alone system guided by computer vision. The spatial positioning system is based on a rug filled with squares divided in 4 segments with different color combinations to determine the position of each robot in three-dimensional space, in order to create flight trajectories and avoid collisions with other quadcopters during the accomplishment of the cooperative tasks.

RESULTS AND CONCLUSIONS: The results of this dissertation, proves that it is possible to create a fairly accurate and robust spatial system using real-time image processing algorithms on a relative cheap UAV (around 250€) available for purchase to everyone on the market. All the image processing algorithms and control mechanics can be implemented to other quadcopter models, as long as they are equipped with an camera.

Keywords: UAV, Computer Vision, Cooperative Flight, Real-Time Image Processing, Autonomous Robot



Distributed Command Systems Controllers Modeling, using Finite Automata Timed

Vítor da Cunha, Vítor Carvalho, José Machado

BACKGROUND: Currently, automated systems are controlled by industrial control networks, and centralized control systems almost do not exist in industrial companies. In order to make the distributed control systems more robust, is intended to use formalisms and tools that allow us to simulate their behavior, to study possible delays in sending messages and other problems associated with the existence of industrial communication networks.

OBJECTIVES: Study the behavior and the most common problems of industrial communication networks. Select a communication protocol in order to make a case study and try to create a systematic method for the same, applied to software UPPAAL that returns a heuristic solution for the characteristics presented.

METHODOLOGY: Research on the behavior of industrial networks and the various protocols used today, a survey of the most common problems for examined protocols, which ones have resolution and those who have no resolution. The basis of the present work plan is a mathematical formalism that are finite timed automata. Based on the conducted study, a protocol for the study should be chosen and developed an algorithm that allows a network to be modeled and adapt it to a proposed scenario.

RESULTS AND CONCLUSIONS: This will be a step towards achieving a comprehensive network adaptation algorithm. Ideally it would be desirable to allow the industry heterogeneity in the selection and acquisition of industrial automatons in order to avoid proprietary solutions that only communicate with each other, allowing greater flexibility, lower costs and better adaptation to local equipment, infrastructure and existing machinery.

Keywords: Industrial networks, distributed control systems, timed finite automata, behavior, UPPAAL.



Building a web tool for the implementation of a business process: Urban planning processes

Justino Neiva, Nuno Lopes, Cândido Mariz

The BPMN notation is a powerful language for the modeling of business models. This modeling assists in the visualization and specification of the business rules of the organizations, assisting the managers in making decisions that aim for the improvement of the workflows.

This project proposal aims to study the impact and sustainability of the development of a business process using a web based tool for deploying a Business Process Management System. The tool will use the BPMN notation to model and execute the business process. The use case to be presented concerns the legal regulation in force for the correct web submission of the many variants that constitute an urbanistic licensing process.

More specifically, it is intended to determine how the development of applications based on this type of modeling when implemented in an information system improve the business processes of an organization that lacks this solution. This project will be carried out based on a specific need of an organization, regarding the optimization of the process of submission of urban planning process.

Keywords: bpmn, bpm, business rules, Public Administration, workflow.

Monitorização contínua do stress em indivíduos – Aplicação móvel

Luís Daniel dos Santos Correia Simões

BACKGROUND: Como objetivo principal deste estudo, importa perceber de que forma se pode monitorizar continuamente o stress em pessoas, utilizando para o efeito as tecnologias da informação. Na experiência realizada, foi desenvolvido um protótipo de uma aplicação móvel que sincroniza os dados provenientes de smartbands ligadas diretamente aos indivíduos com smartphones, para monitorizar continuamente o estado físico da pessoa bem como analisa-los, por forma a perceber se a pessoa está em risco de entrar em stress crónico. Será estudada a importância do fornecimento de feedback do estado físico atual do indivíduo bem como a importância deste facultar indicações ajustadas ao indivíduo, em relação às suas necessidades de saúde. Serão analisadas algumas tecnologias normalmente usadas para elaborar um sistema desta grandeza, ajudando assim a definir qual o ecossistema ideal para dar sentido a este protótipo. Existe ainda a intenção de fazer com que os resultados desta proposta prática sejam fornecidos aos profissionais de saúde mais indicados, por forma a assegurarem a qualidade dos mesmos.

OBJECTIVES: Melhorar os sistemas de saúde bem com melhorar a qualidade de vida das pessoas; reduzir as taxas de absentismo e rotação laboral; aumentar a produtividade e performance ao nível das pessoas e das organizações; diminuir o risco de acidentes causados pela natureza humana; reduzir custos públicos (sistemas de saúde nacionais e serviços médico-hospitalares); desenvolver uma *App mobile* com interfaces amigáveis para recolher dados, notificar utilizadores acerca do nível de stress e indicar boas práticas para melhorar a sua saúde; criar um novo modelo para medir os índices de stress de pessoas (substituindo inquéritos por dados biométricos).

METHODOLOGY: Primeira fase: recolher dados de pessoas (150 através de inquéritos e análise ao cortisol dos mesmos; 30 através de dados biométricos mais preenchimento de inquérito) e profissionais de saúde (30); Segunda fase: encontrar classificadores através das 150 pessoas que participaram nos inquéritos da primeira fase. Determinar os dados biométricos relevantes com as 30 pessoas que participaram na primeira fase e utilizaram sensores para a recolha dos dados. Terceira fase: recolher dados de 20 pessoas para validar o modelo. Paralelamente à segunda e terceira fases: recolher e avaliar a opinião dos utilizadores acerca das interações e da amigabilidade da *App*. Ajustar os *layouts* de acordo com os resultados obtidos das avaliações dos utilizadores.

RESULTS AND CONCLUSIONS: Foi realizado um protótipo de uma aplicação móvel que cumpre com os objetivos do projeto de consultar as evidências dos dados biométricos que são recolhidos bem como notificações em caso de deteção de anomalias nas recolhas. O dispositivo utilizado para a monitorização contínua mostrou-se fiável, pois quando comparado com um dispositivo de medição clínico os valores eram similares. A usabilidade da aplicação foi bem aceite junto dos utilizadores finais durante os testes que foram com eles realizados. A segurança e privacidade dos dados foi assegurado, pois garantiu-se a anonimidade dos intervenientes.

Keywords: stress, monitorização contínua, sistemas de informação para a saúde, avaliação, tecnologias móveis

Stress Monitoring System for Individuals – Mobile App

Luís Daniel dos Santos Correia Simões

BACKGROUND: The main goal of this research is to understand how Information Technology could help on purpose to monitor continuously stress factors in individuals. It was created a prototype for a mobile application that synchronizes data provided by smartbands plugged in individuals with their smartphones. Tracking their physical condition in order to calculate if the individual is at risk of entering in a state of chronic stress. It will be studied the importance on providing feedback regarding physical condition from the person in real-time and also the importance of giving appropriate advices to the person about how they can work on their habits in order to improve their health cares. It is important researching about technologies and frameworks commonly used to create a system like the one in this proposal. This will help to define the ideal ecosystem for this prototype. There is the intention to provide the results retrieved from this study to the appropriate medical professionals, in order to ensure their quality.

OBJECTIVES: Enhance health care system and quality of life for individuals. Lower absenteeism rates and also lower laboral rotations. Increase productivity and performance on individual and organizational level. Decrease accident risk caused by human error. Develop a new APP with friendly interface to collect data, notify the users about their stress level and indicate good practices. Create a new model to measure the individual stress (replace surveys with biometric data).

METHODOLOGY: Phase one: collect data from individuals (150 through survey and cortisol analysis; 30 with biometric data and survey) and health care professionals (30); Phase two: find classifiers with the 150 individuals that participated on the phase one survey. Determinate the relevant biometric data with the 30 individuals that participated on the phase one. Phase three: collect data from 20 individuals to validate the model. Parallel to phases two and three: collect and evaluate the users opinion regarding the user interface and user experience with the APP. Adjust the interface accordingly to the results from the users evaluation.

RESULTS AND CONCLUSIONS: The prototype of the mobile app created, accomplished, successfully, the purposes to prove that continuous monitoring of end-user biometric data consultation and notification effect on end-users when some anomaly data is fetch from the device. The device used on this project as shown that is reliable for its usage when comparing it to a clinical device for the same biometric data measurement. The user experience feedback given by the end-users, on using the prototype, prove to be widely accepted and complies with the requirements. The privacy policy and personal data security was guaranteed by users data anonymity.

Keywords: stress, continuous monitoring, health information system, assessment, mobile technologies



Sistema de comunicação por voz, baseado em Voip, para a integração de comunicações móveis entre dois ou mais países
Voice communication system based on VoIP to the integration of mobile communications between two or more countries

João Branco, Nuno Lopes

BACKGROUND: Atualmente existem vários sistemas de comunicações por voz, que podem ser realizadas através de diversas tecnologias, como por exemplo via PSTN (Public switched telephone network), GSM/UMTS (Universal Mobile Telecommunication System) e VOIP (Voice over Internet Protocol). Pretende-se enquadrar este projeto numa pesquisa sobre conhecimentos em comunicações de redes, com o intuito de perceber como podemos usar este tipo de tecnologias e outros equipamentos associados a estes, para construir uma solução que permita estabelecer comunicações internacionais com baixos custos.

OBJECTIVES: Com a realização deste projeto foram traçados vários objetivos, sendo que o principal é implementar um sistema de comunicação de voz baseado em VOIP para a integração de comunicações móveis entre dois ou mais países num empresa (cliente), onde os objetivos secundários são o estudo do mercado para obtenção das várias soluções existentes, redução de custos, manter a qualidade da chamada, dispensar a necessidade de abrir aplicações (facilidade de uso) e uma solução para as chamadas quando os clientes se encontrarem em outros países (em Roaming).

METHODOLOGY: Em termos de metodologia, será focado o desenvolvimento de um sistema no âmbito de uma dissertação de um projeto, ou seja, pretende-se implementar a solução desenvolvida no cliente. Inicialmente será elaborado o levantamento de requisitos que serão fundamentais na escolha da solução. De seguida deverá ser adquirido todos os equipamentos e documentação/informação necessária para as configurações do sistema de comunicação de voz. No final deverá ser implementada no cliente.

RESULTS AND CONCLUSIONS: A solução desenvolvida compreende duas aplicações móveis, uma para o sistema IOS e outra para Android e também o recurso a uma central telefónica. Pretende-se então a implementação desta solução na empresa (cliente) de modo a que esta possa poupar a nível das despesas das comunicações internacionais.

Keywords: Voip, GSM/UMTS, Comunicações Móveis



A Case Study of the Adoption of Cloud Computing Technologies by the Portuguese Enterprises

José Martinho Martins Araujo

BACKGROUND: Cloud computing could be defined as the delivery of on-demand computing resources—everything from applications to datacenters—over the Internet on a pay-for-use basis.

A recently survey conducted by Gartner Research indicated that about two-thirds of the average corporate IT staffing budget goes towards routine support and maintenance activities. Cloud computing can reduce infrastructure costs and energy savings as well reduced upgrades and maintenance costs.

OBJECTIVES: Determine if the Portuguese Enterprises are adopting Cloud Computing Technologies and what are the determinants that lead to that adoption; Determine the Portuguese industry sectors and types of enterprises that are currently adopting Cloud Computing Technologies; Create a guide for all Enterprises to use, that explains, step-by-step, how should they change from monolithic systems to Cloud Systems and what are the advantages of that change.

METHODOLOGY: A study of the State of the Art and a Survey Study and subsequent qualitative and quantitative analysis

RESULTS AND CONCLUSIONS: To gain a greater insight into the Cloud Computing Tools and Technologies used by Portuguese Enterprises, and the determinants that lead a company to invest in them; Understand why some Enterprises are avoiding the Cloud Computing solutions and Educate them on the advantages of the Cloud Systems and eliminate the stigma that still exists on this topic; Contribute to fill the gap of knowledge about the adoption of Cloud Computing services by the industry.

Keywords: Cloud, Computing, Determinants, Enterprises, Adoption.



1ST SYMPOSIUM
OF APPLIED
RESEARCH

Videojogo sério para a Geoeducação no Território Arouca GeoPark

Serious Videogame for the geoeducation in the Territory Arouca Geopark

Júlio Coelho, Vitor Carvalho, Tiago Martins

BACKGROUND:

A utilização de videjogos sérios possui ainda uma pequena história mas a sua utilização tem um grande foco no ensino e na saúde. Na saúde tem como objetivo a reeducação de certos hábitos, como hábitos de higiene oral ou saúde alimentar. No ensino estes videjogos tem como objetivo proporcionar um ambiente mais estimulante e divertido para potenciar a aprendizagem de quem esta a jogar.

OBJECTIVES:

O principal objetivo deste projeto é o desenvolvimento do videjogo e da base de dados associada, para auxilio das visitas guiadas no território Arouca Geopark. O videjogo deverá ser capaz de eficientemente testar e consolidar os conhecimentos adquiridos na visita realizada, assim como ajudar a esclarecer. A base de dados servirá para recolher todos os dados dos visitantes, para futuramente ajudar a melhorar os serviços do Arouca Geopark.

METHODOLOGY:

Inicialmente iremos realizar o levantamento de dados necessários ao projeto seguida de um levantamento das tecnologias para o desenvolvimento do projeto. Seguir-se-á então para a prototipagem, onde serão realizados protótipos de usabilidade, assim como protótipos aos desafios para o videjogo de onde será escolhido o melhor protótipo para desenvolvimento. Quando terminar o aperfeiçoamento do protótipo, realizaremos a modelação da base de dados e a sua implementação. Após tudo se encontrar funcional, serão realizados testes e correção de erros que sejam encontrados.

RESULTS AND CONCLUSIONS:

Os resultados esperados são um videjogo que consiga efetivamente melhorar os conhecimentos adquiridos pelos visitantes do parque, assim como ajudar a resolver certos problemas existentes nas visitas através dos dados recolhidos, ajudando assim a melhorar a qualidade das visitas.

Keywords: Videojogo sério, Arouca, Geopark

Visual Segmentation Component - YClient

Sara Faria, Joaquim Gonçalves, Rui Couto

BACKGROUND: YClient provides the retail sector with a simple tool that is focused on the user, allowing for an efficient development and management of marketing and communication campaigns with clients in real time. However, customers cannot segment clients for tailored communications, as such is a difficult process and involves mathematical logic. This project aims at building a visual component to solve that defect.

OBJECTIVES: The aim of the project is to produce a visual representation of data and to easily build a query along with it. For this purpose, an interactive and easy to understand interface will be created. By using this interface, it will be possible to produce a new client segmentation with queries created by the customer. A new component can simplify mathematical logic, which is usually a big problem for the customer. Another requirement is to create filters to enable clients' segmentation and to see the number of clients covered by each filter. In the end, tests will be made and the product will be implemented in the market; afterwards, the new component will be improved with the customers' feedback.

METHODOLOGY: The action research method is the one which will be used to develop the project, along with usability questionnaires and user interviews. The action research method is a cycle study about action.

RESULTS AND CONCLUSIONS: At the end of the project's visual segmentation component, this will be inserted into the YClient Software so that the customers can customize their communications. This project enables customers to increase the return on investments made through marketing and sales.

Keywords: Segmentation clients, Visual data, Visual query, YClient, Communication



Business intelligence for smart management (BI4SM)

João José Neves Faria

BACKGROUND: Currently we live in a very competitive world where enterprises must deal with very rapid business changes. Every day, managers are faced with important decisions that require immediate responses. To support these decisions, managers need tools that allow them to easily access to useful and up-to-date information.

Nowadays, there are a vast number of software tools that can be used to provide business intelligence solutions. However, these solutions require software licences and/or information technology services that make them very expensive and inaccessible to small enterprises.

Even very small enterprises and independent professionals use software to manage their business data. Most countries have introduced accounting and tax laws that imposed the adoption of standards for electronic exchange of accounting data from organizations to tax authorities. In Portugal, every invoice and accounting software exports data in the Standard Audit Files for Tax Purposes (SAF-T) format.

OBJECTIVES: Using the SAFT files as the data source, this project aims to develop a business performance assessment system, easily configurable and accessible to any small enterprise. The system will provide tables, data graphics and Key Performance Indicators (KPI), presented in easily accessible and customized dashboards. This solution can be deployed at very low costs and targeted to most small or very small enterprises.

METHODOLOGY: The "Design Science Research" methodology is characterized by accuracy, ease of implementation and efficiency. This methodology was adopted because its generic activities are perfectly suited to the software development process.

RESULTS AND CONCLUSIONS: A set of financial and management KPI will be elicited from scientific literature, requiring to be aligned with the available data from SAF-T files. It will be developed a prototype of a Web platform to demonstrate this concept.

Keywords: Business intelligence, Business management, Small and Medium Enterprise



Hub de Integração de Sistemas de Informação

Hugo Ricardo Marques Lourenço

BACKGROUND: Over the last few years we are experiencing a technology revolution, new devices, new technology, cloud and a new paradigm arrive to challenge software houses. They need to be fast changing, customization and offer a large number of integrations to make customer work easier.

Enterprise Application Integration start more than 30 years ago, with single systems and simple connections, however, evolved to really complex systems as cloud usage increase. With this change, new opportunities emerging, but at the same time, big challenges, as the diversity of systems, diversity of API with different ways of communication turns the work difficult to the companies that create those integrators.

OBJECTIVES: Create a middleware API between information systems, that allows one single bidirectional language to communicate with these systems, providing a single point of connection. This solution will also be performed to provide an application market place and will offer a reduce cost.

METHODOLOGY: The methodology adopted is “Design Science Research”, this methodology is based on concept proposed by artefact principles, is an efficient, accurate and easy to apply. This methodology was selected because it is appropriated to the software development process.

RESULTS AND CONCLUSIONS: It will be developed a web API to communicate with at least two systems and perfectly integrated with them, where it will be possible communications by http requests. It will be also developed a single app prototype to demonstrate the concept.

Keywords: Information System, Interaction, EAI, EIP, API, ERP, Cloud, Integration Patterns



Integração de Sistemas

Elsa Barros, Joaquim Gonçalves, Pedro Oliveira

BACKGROUND: A dinâmica de processos implica, em qualquer organização, a integração das aplicações que os suportam. Atualmente o sector do retalho não se abstém desta mesma realidade. Por um lado necessita de um ERP que sustente a sua atividade e suporte os dados envolvidos, por outro é um fator competitivo fundamental a utilização de uma aplicação Web capaz de promover o seu volume de vendas.

Da necessidade de coerência da informação envolvida entre o ERP e a aplicação nasce o conceito “Integração”.

OBJECTIVES: O desenvolvimento deste projeto idealiza uma aplicação que promova a sincronização de informação em tempo real entre duas aplicações: o PrestaShop (Loja On-line) e qualquer sistema de gestão empresarial (ERP), com o objetivo de centralizar toda a informação numa aplicação única.

METHODOLOGY: Considerando a natureza científica envolvente, a metodologia adotada para o desenvolvimento do projeto incorpora um ciclo iterativo de duas fases, a construção e a validação. O paradigma utilizado denomina-se *Design Science Research(DSR)* e tem como principal objetivo identificar e compreender um problema a partir do desenvolvimento e implementação de protótipos/artefactos (Hevner et al., 2004).

Vários artefactos de diferentes tipos compõe os resultados do projeto, validados em cada iteração do ciclo de desenvolvimento.

RESULTS AND CONCLUSIONS: O desenvolvimento do projeto foi impulsionado pela empresa “CHY Retail, Lda” pela necessidade de prover a empresa de uma aplicação que promova a partilha de informação, em tempo real, entre aplicações distintas.

Keywords:

ERP - Enterprise Resource Planning

EAI - Enterprise Application Integration

DSR – Design Search Research



Round Trip *Without Sleep*

Abdulay Abreu, Joaquim Gonçalves, Nuno Oliveira

BACKGROUND: In current times the technology focused on the health and well-being of the human being, has been making considerable progress. Mobile devices and "wearable" among other equipment with multiple sensors, are being used more frequently. The increased quality and accuracy of these devices increases their reliability and credibility, allowing them to be used in more sensitive contexts, particularly in the health area.

There is already a wide range of applications of such devices in clinical practice, for example, photoplethysmography is used clinically to measure blood oxygen saturation or heart rate or electrodermography to measure the galvanic response of the skin. However, the devices that do so are not intended for constant use required for continuous monitoring. With the appearance of a set of devices that have photoplethysmography and electrical conductivity sensors, the possibility of continuous monitoring of biometric signals is opened.

OBJECTIVES: The goal is the development of a mobile or wearable device application that, based on a set of values related to heart rate and variation of heart rate, body temperature, galvanic response of the skin, allows to detect signs of sleep during driving and Activate this or other device associated with the driver that awakens you and alert you to the need for rest. It is intended that the application can be used by any type of driver, but mainly in professional drivers. Machine learning techniques will be adopted for the classification of the driver and the definition of his basal state, and for the prediction of sleep.

METHODOLOGY: In the first phase the devices will be distributed by a set of drivers, who have agreed to collaborate on the project, and will be monitored continuously. The device must collect the biometric data and send it to an associated mobile device.

These data will be analyzed in order to understand the biometric measures that allow to evaluate the sleep. With this information and with the data that continues to be collected we will use prediction and classification algorithms to analyze patterns of behavior associated with sleep and, from these predict future sleep state. Naturally, if there are not two people alike, learning algorithms should be created that fit each user.

RESULTS AND CONCLUSIONS:

- **Keywords:** Continuous monitoring, Customization, Active feedback, Waking pattern, "Machine Learning".



Development of Serious Game to Fight Childhood Obesity

Fátima Gonçalves, Vítor Carvalho, Demétrio Matos

BACKGROUND:

According to WHO, childhood obesity, classified as the epidemic of the 21st century, is reaching alarming values all over the world.

Mobile technologies, specially smartphones and tablets, are an important part of a children's life. Many studies believe that these technologies can be used in a healthy way, helping children to grow, so caregivers allow its use hoping to help in their kid's development. With educational games kids learn better and faster, because they feel motivated.

OBJECTIVES:

The aim of this project is to develop a system composed by a mobile application, that helps fighting childhood obesity, by monitoring and controlling kids. It should have a user-friendly layout, and to lead kids, in the age group of 6 to 9, to increase their movement. It's intended to develop a structure of control that allows caregivers to see app scores and follow their commitment. This information determines if the app is helpful to fight childhood obesity and help them become more active.

METHODOLOGY:

At first, a detailed problem analysis will be performed, followed by a mobile app interface definition. After this, the app will be developed and tests done to improve the proposed solution. Then, a selected group of kids will play with the game and the results will be used to validate this project.

RESULTS AND CONCLUSIONS:

It's expected that the developed game can help fight this epidemic, and allow kids to improve their food habits and obtain a healthy lifestyle, specifically in the targeted group.

Keywords: Obesity, childhood, serious game, mobile

Django APP to register events and obtain statistics about them

André Filipe Barreira, Luís Ferreira, Leopoldo Silva

BACKGROUND: The companies of nowadays having the capacity to get knowledge from existing data represents one of the most important business critical factor.

Having the capacity to timely get knowledge from existing data represents one of the most important business critical factor for nowadays companies. The statistic of traffic data represents a clear example of it.

This project will be carried out with the partnership of Queo, which is a company based in Porto.

Queo proposes a use of modern technological resources tha minimizes the economic impact on the developed solutions. The skills are oriented to use agile techniques and open source technologies, allowing the creation of robust and flexible solutions.

OBJECTIVES: The development of the django application to register and manage events represents a platform to obtain data and statistics about them, as well as:

- Apply recognized Business Intelligence methods without intending to use advanced methods (such as OLAP cubes).
- The application must be developed according to methods that allow its encapsulation in order to make it a reusable module in several Queo products, such as newsletters, SMS systems or subscriptions systems.

METHODOLOGY: Taking into account that the project will be carried out in partnership with the company Queo, the methodologies will be applied according to the methodologies that the company implements.

Bibliographic research on concepts of Business Intelligence and Data Science

Use open source technologies, allowing to create robust solutions and flexible solutions.

Performing quality and usability tests to validate the developed features.

RESULTS AND CONCLUSIONS: It is intended with the development of the application, the application of it in multiples contexts and applications, in order to help getting critical information for those who have statistics developed.

Keywords: Business Intelligence, Python, Django, Statistics, Open Source



Exploratory study of Machine Learning Tools on Big Data platforms

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BACKGROUND: There are today techniques and tools for analyzing Big Data. These tools leverage the large processing capabilities available, and can deliver accurate results by allowing machines to learn with the data processed. Using algorithms, machines can create knowledge and aid in Data Driven Decisions. Nowadays, people and organizations can identify profitable opportunities and/or avoid risks based on the machine aid provided.

OBJECTIVES: The objective is to study the Machine Learning tools for Big Data platforms. The study will be based on the analysis of tools and will be made by characterizing the functionalities, advantages, disadvantages and possibilities of implementing of them in Big Data platforms.

METHODOLOGY: To explore the Machine Learning tools for Big Data platforms. The methodology adopted will be based on literature review, identification and selection of featured tools, evaluation of selected tools, and the redaction of the dissertation.

RESULTS AND CONCLUSIONS: The results extracted from the technical aspects of tools/platform will be complemented by the application of a possible use case. This dissertation aim to be a document that will serve as reference for an introduction of the Machine Learning tools in Big Data platforms.

Keywords: Machine Learning, Big Data, Distributed Computing, MapReduce, Hadoop, Spark.



Evaluation of BPM Tools

Marco Samuel Cruz de Sousa

BACKGROUND: In recent decades, the processes became an asset in day-to-day organizations. With specific tools the organizations can have an adequate and efficient business process management (BPM). However, there are some issues inherent to the use of this type of tool, such as the diversity of BPM tools. One problem related to the diversity of BPM tools is to discover too late that the tool chosen is inappropriate for their organizational goal.

OBJECTIVES: Due the diversity of BPM tools, the appropriate selection of a tool by an organization becomes increasingly difficult. In this sense, the main objective is to propose a classification based on a set of technological criteria, of the BPM tools studied, in relation to each phase of the BPM lifecycle.

METHODOLOGY: To obtain a greater knowledge about the BPM tools, an evaluation study will be carried out on four BPM tools. In this context, the methodology to adopt will be as follows:

- A survey of BPM tools and technological criteria;
- Identification of a case study (business process in retail);
- Evaluation of BPM tools for the case study;
- Analysis of the results obtained;

RESULTS AND CONCLUSIONS: Currently, the BPM tools represents an opportunity for organizations, in this way, the results of this evaluation will help the organization in the decision-making when to acquire a BPM tool.

Keywords: Business Process, Business Process Management, BPM tools



Study about the teaching of programming at schools

Sandra Lima da Cruz Dias

Introduction: The ICT are becoming more and more necessary in the process of teaching and learning; through its use one can go into the learning process of programming of language. It becomes possible to program in a simpler and intuitive way. It gave birth to the project called “Initiating programming methods” which concerns the secondary grades from the beginning and which improved software and robots up to the above levels.

Objectives: The aim of this project involves a study among computer programming with students of different levels and schools.

In which concerns the learning of computer programming the study will give emphases if the process can easily be adopted by lower level students, if they could learn it earlier, or if they could achieve a certain higher level through robots.

Methodology: In this study, the following instruments shall be used to gather information: participant observation and registration; questionnaires forms and interviews and questionnaires forms and interviews analysis.

Results and Conclusions

The computer programming teaching, at present times, is important to create future programmers, as well as develop studies about the making of materials or methods which could contribute to its teaching at schools.

This survey will focus on the impact of interactive programming conserving lower level students; it will be based in students of different levels and diverse schools.

Keywords: Cloud, Computer Programming, Students, Enterprises, Robots.



Game Mechanics Influenced by Biometric Sensors

João Petersen, Vitor Carvalho, Eva Oliveira

BACKGROUND: Biometric sensors are mainly used in Medicine, they can track heartbeat, respiration, temperature, muscular contractions, skin conductance levels, among many others biometric measures. Some are used in smartphones for unlocking the device and some for robotics in the bionic department, but they are rarely seen in usage with games. There are already some proof of concept games that use these sensors like, for example Dekker and Champion's "Half-life 2" modified level, where they are used to modify the avatar's movement speed, activate hearing ability between other game mechanics, but integrating these sensors in virtual reality games to simulate real-life still hasn't been tested.

OBJECTIVES: Research the use of unimodal/multimodal biometric sensors to influence conventional digital game mechanics. Data on phobic patients during exposure therapy to their phobia.

METHODOLOGY: As a first-year master student, there are still some decisions to make regarding this research project but by now there some well-defined phases. The first phase is the research on the current studies, projects and researches currently under development on the subject. The second phase will be the development of the sensors communication in a the game "Phobos", a serious game to treat blood phobia and where the biofeedback will give the therapist, some insights about the emotional state of the player. This development will be used for proof of concept, as biometric sensors will be integrated in a virtual reality context to enhance the experience and gather further results. The third phase will be for testing where phobic patients while playing the game and using the implemented technology so we can gather the results we seek for analysis.

RESULTS AND CONCLUSIONS: For now, we still don't have any results and conclusions but with the upcoming months we aim to have Biometric logs of the phobic patient, and results on how the sensors can influence the game mechanics without removing the fun factor and playability of digital games, introducing a new method to how games can be developed and played.

Keywords: Digital Games; Biometric Sensors, Game Mechanics, Multimodal