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ICT APPLICATIONS BASED ON QR CODES AND RFID IN TEACHING AND RESEARCH LABORATORIES

TECHNOLOGY OFFER

Code

TIC_UAH_02

Application areas

- Information and Communication Technologies

Type of collaboration

- Interested in companies or institutions to conform a consortium for a project proposal to make it the system real

- Manufacturating Agreement

- Services Agreement

Main researches

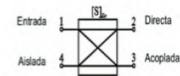Dr. Rocío Sánchez Montero

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ABSTRACT

The query of the equipment manuals, devices and instrumentation used in teaching labo- ratories of RF through the use of passive RFID labels on measuring devices and instruments used in each practice allows the access to document database or video tutorials in which various aspects are developed related with the practice, such as the description of the devices and the steps to follow to the measurement of its para- meters (equipment calibration, wiring and sequence of the commands), allowing the performance and the interpretation of the measures.

The same functionalities can be achieved by replacing the RFID labels for QR codes, whose capture will allow to access to the same database. In this case, a cheapening is achieved since it is not necessary the use of labels or RFDI reader.

The implementation of an App to read the label or the QR code, and redirect the user to the information available on the portable device itself or in an external server through an Internet connection via broadband mobile 4G or Wi-Fi -will provide students and researchers to resolve the doubts rose in the performing of their practi- ces.

The key features of the system are based on the characteristics of the technologies used, being extended to any area of the laboratory practice of any subject. Thus, the use of ICT is favored by students and researchers, facilitating their access to user manuals of the measuring equipment and directing them to the tasks of self-lear- ning.

ADVANTAGES AND INNOVATIONS

- Use of RFID and QR codes in educational environments or research laboratories.

- Simplification of equipment manuals use.

- Possibility of inclusion of video tutorials.

- Strengthening of ICT use in educational environments.

- Fast and efficient access to information by students or the research staff.

- Help for using the instrumentation or the device to characterize.

- Personalized guide for the performance of the activities and measures.

ARP-PATH SHORTEST PATH BRIDGES (FASTPATH ETHERNET TRANSPARENT BRIDGES)

TECHNOLOGY OFFER

Code

TIC_UAH_05

Application areas

- Information and Communication Technologies

Type of collaboration

- Interested in companies or institutions to conform a consortium for a project proposal to make it the system real

- License agreement

- Technical cooperation

- Joint venture agreement

Main researches

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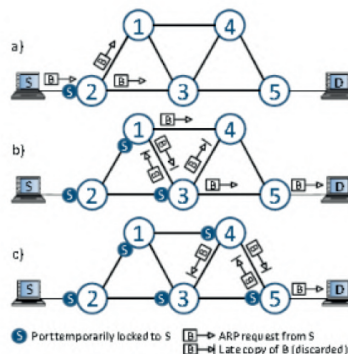
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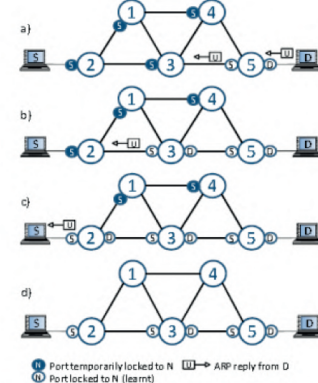
Figure1. FastPath discovery from host S to host D

Figure 2. FastPath confirmation from host D to host S

ABSTRACT

Fastpath (also known as ARP-Path) is a radical departure from this approach. It is a natural evolution of the transparent bridge paradigm to implement near shortest path bridging (or strictly shortest, depending on the loop prevention mechanism). Instead of interchanging topology information, short unicast paths and source rooted multicast trees are built directly in the data plane without any ancillary routing protocol, just by controlled flooding (to bridges or to hosts) of an on demand or periodically broadcasted beacon frame. The fastest unicast path in transmission direction, among the paths permitted by the loop prevention mechanism, gets selected at every bridge. This path is then confirmed as a bidirectional, symmetric path, after reception of the unicast reply frame from the destination host or bridge(s). In this way, unicast paths and/or source rooted spanning trees are set up directly in the data plane.

The proposed FastpathUD protocol prevents loops by enforcing a simple and limited prohibition of some turns of frames at bridges (down-up turns only, around one fifth of the total possible turns), instead of the full link prohibition applied by the spanning tree protocol. Throughput is close to that of shortest path protocols. Alternative mechanisms for loop prevention may be used to attain full shortest paths performance.

The resulting architecture requires zero-configuration, uses standard Ethernet frame format, relies on standard Rapid Spanning Tree Protocol, is fully transparent to hosts with or without frame encapsulation, and compatible with 802.1D bridges in core island mode.

ADVANTAGES AND INNOVATIONS

PFastpathUD is the first proposal using for Layer two Shortest Path Bridging and unicast/multicast source rooted tree construction, without need of an additional (control plane) routing protocol and the simplest one.n switches.

- Provides very simple and performant Ethernet Shortest Path bridging devices Zero configuration. Compatible with IEEE 802.1D standard in core-island mode.

- Ethernet switches are used everywhere, but have severe limitations (blocking of many links by the spanning tree protocol to prevent loops, complex configuration).

- Ethernet Fastpath switches provide high network utilization and performance equal to Shortest Path Bridges (under standardization at 802.1aq), without the need of running complex link state protocols on switches.

PROCEDURE TO REPAIR CLUSTERED ROADS IN FAILURE AND ARP-PATH/ALL-PATH NETWORK BRIDGE

Patent
ES2527550

Code

TIC_UAH_07

Application areas

- Information and Communication Technologies

Type of Collaboration

- Technical cooperation

- Commercial agreement and Technical assistance

- License agreement

Main Researchers

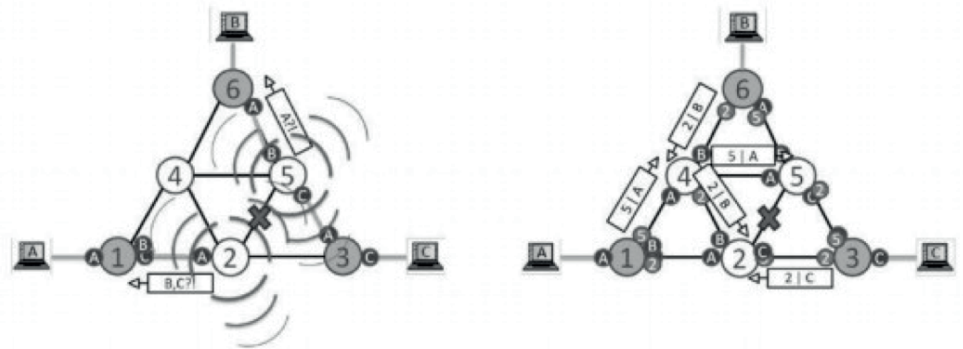Dr. Guillermo Ibáñez Fernández

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ABSTRACT

The main drawback of the path establishment protocols based on the instant scanning of the network, that are called Fast-Path, ARP-Path and generically All-Path, occurs when a link or bridge falls.

If that happens when the link is going to be used it is necessary to individually repair each existing path, which requires to spread a frame across the entire network (and process it especially on the bridges).

One of the ways that requires to be repaired. This is a significant process load for the bridges especially when the number of simultaneous active connections on a link is very high (1 Gbps or 10 Gbps).

The present invention achieves a group repair in the paths in fault. This repair is done in a jointly and proactively way. When the failure in the link is detected, it is sent with the joint repair plot of all (or part of) the terminals directions (hosts) associated with the output port link when it failed.

By mean of a broadcast message to the management of common multicast group to all the All-Path bridges and with an All-Path protocol identifier. The message is forwarded to all bridges in the network and then processed in each of the All-Path bridges. That process is responded issuing an unicast message from each bridge border of the terminal (host) for the direction or directions to repair.

This message is directed with destiny the intermediate bridge that originated the broadcast message and connected to the link in failure. The message goes through each bridge and produces the learning in that bridge the terminal direction destination. Thus repairing the road to destiny.

This unicast message may be a special Unicast Path Reply message or a standard ARP Reply message.

ADVANTAGES AND INNOVATIONS

The main innovative aspect of the patent is the clustered joint repair of all paths used by a link when it fails, which resolves the main limit scalability of the protocol.
It is computationally less expensive because of:

- Dramatically reduce the burden of repair messages broadcast on the network and the processing at intermediate switches.

- Not required to distribute across all network (and process together bridges).

- The repair is performed in a jointly way by destination switch and not individually.

DIFFERENTIAL DETECTION SYSTEM OVER OPTICAL FIBER BASED ON BRILLOUIN STIMULATED SCATTERING

Patent
ES2528327

Code

TIC_UAH_09

Application areas

- Information and Communication Technologies

Type of Collaboration

- Technical cooperation
- Commercial agreement and Technical assistance
- License agreement

Main Researchers

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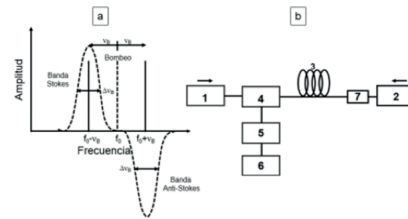otriuah@uah.es

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FIGURA 1

ABSTRACT

As a first aspect of the invention, a distributed sensing system is presented which comprises; light emitting means adapted to emit the probe and pump signals on the optical fiber, discriminating means adapted to separate the two signals corresponding to the amplified band and attenuated band along the optical fiber subject to monitoring, detection Means adapted to obtain the difference between band of amplification and stimulated attenuation band or viceversa and analyzing means, adapted to implement the distributed sensing technique based on Brillouin scattering using the differential measurement of amplification band and the attenuation stimulated band, instead of the measurement of a single band as in conventional systems.

Two preferred options for the discriminating means are:

- A device which discriminates in frequency.
- A device which discriminates in polarization.

Once separated the two signals (amplified band and attenuated band) so that they can be analyzed independently, two preferred detection means methods are:

- A device which discriminates in frequency.
- A device which discriminates in polarization.

As a second aspect of the invention, a distributed sensing method is shown consisting in separating the two signals corresponding to the amplified band and attenuated band along the optical fiber subject to be monitoring. Thus is obtained a signal with higher amplitude than in the case of performing a detection with a single band. With this increase in the amplitude the signal-to-noise ratio of the sensor signal is improved, improving the dynamic range and increasing the length scope and at the same time decreasing the uncertainty of the measurement.

The present invention solves the long-standing problems by means of the system and method of sensing which implements any of the techniques based on Brillouin stimulated scattering (systems BOTDA, BOCDA and BOFDA including their variants) by a differential detection of amplified and attenuated bands.

ADVANTAGES AND INNOVATIONS

- The sensor signal relationship between signals to noise is improved. Dynamic range and scope length increase as well as reduces the measurement uncertainty.

- The common noise presented in the two bands of the probe signal is eliminated.

- In the case of using a balanced detector for detection, the detector saturation characteristics are improved, and can be obtained with much larger amplitudes than in the conventional case of signal detection.

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SYSTEM AND METHOD OF DISTRIBUTED CONTINUOUS CHARACTERIZATION OF AN OPTICAL FIBER MEDIA

Patent
ES2528327ES2561679B2

Code

TIC_UAH_10_P

Application areas

- Information and Communication Technologies
- Industrial Manufacture, Material and Transport technologies
- Energy

Type of Collaboration

- Technical cooperation

- Commercial agreement and Technical assistance

- License agreement

Main Researchers

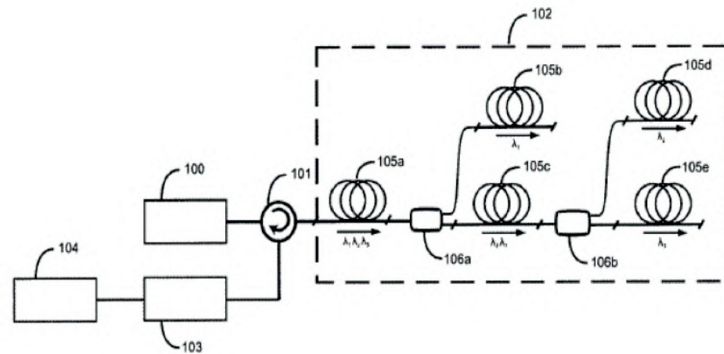Prof. Miguel González Herráez
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ABSTRACT

It is a system and a sensing method which allows the fully distributed characterization of optical fiber media with an arbitrary branching of ramifications using wavelength multiplexing techniques to interrogate and identify the different branches of such optical fiber media. As a first aspect of the invention, is presented a distributed characterization system with at least one branch in which there are two or more segments of optical fibers. As a second aspect of the invention, is presented a distributed characterization method applied to an optic fiber media, with at least one branch comprising at least two optical fiber segments.

In one of its preferential implementations, the method consists on characterize the optical fiber media by an optical reflectometry technique sensible to the phase (φOTDR).

ADVANTAGES AND INNOVATIONS

The system and the method of the present invention allow the characterization of optic fiber medias with an arbitrary topology branches without using measurement equip- ment in each ramification.

The competitive advantages of this invention are as follows: Application in complex networks with arbitrary branches without adding measuring equipment in each of the branches. Characterization fully distributed, providing decisive measures in length, continuous, and not sampled. Adaptation to any fiber optic topology, sensing techniques and distributed metrology.

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DEFINITION AND DESIGN OF EFFICIENT ARCHITECTURES FOR ADVANCED ELECTRONIC SYSTEMS

TECHNOLOGY OFFER

Code

TIC_UAH_11_C

Application areas

- Information and Communication Technologies

- Industrial Manufacture, Material and Transport technologies

- Other Industrial Technologies

Type of collaboration

- Acquisition Agreement

- Commercial Agency Agreement with cooperation

Main researches
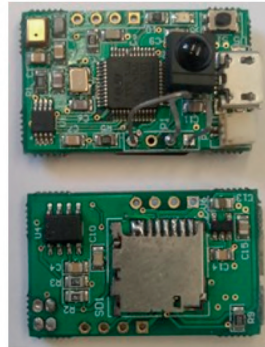
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ABSTRACT

The GEINTRA research group from the Department of Electronics of the University of Alcala presents a wide experience in the definition and design of embedded electronic systems, with high complexity and requirements, for the implementation of efficient architectures in different fields of application: communications, transport, energy, control and power, sensory systems, etc.

This type of solutions, based on SoC (System-on-Chip), FPGA devices (Field-Programmable Gate Array) and/or processors, represent an effective alternative, with competitive advantages when dealing with high operation frequencies, demanding response times, complex experimental tests, safety approvals, etc.

ADVANTAGES AND INNOVATIONS

The GEINTRA group can proceed with the design of advanced architectures (including SoC) for the implementation of digital signal processing, control algorithms and any other application, which are analysed in detail to be able to deal with the definition of the most suitable proposal for its implementation in last generation devices. This type of development and expertise represents an important advance when it comes to developing successful solutions for the electronic product market, available to be incorporated into any application area where an electronic system for high-performance information processing is necessary, with possible mixed hardware/software solutions.

In most cases, the partner sought will be interested in know-how and transversal knowledge from the research group in the design of electronic systems, efficient architectures and SoCs, for its application in any of the fields already addressed in the group, as well as in new areas and domains, of interest to both parties. For this, a collaboration will be established within a specific legal framework, such as a research contract.

GEINTRA seeks to reach technical cooperation agreements with companies in the ICT and industrial sectors in general, but also particularly in areas such as communications, sensory and positioning systems or transportation.

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SIGNAL DEMODULATING DEVICES THROUGH A WAVELET OFDM RECEIVER

Patent
ES 256 148 B2

Code

TIC_UAH_14_P

Application areas

- Communications through the electrical network
- Smart grid
- Internet of things
- 5G

Type of Collaboration

- Technical cooperation
- Commercial agreement
- Technical assistance
- License agreement

Main Researchers
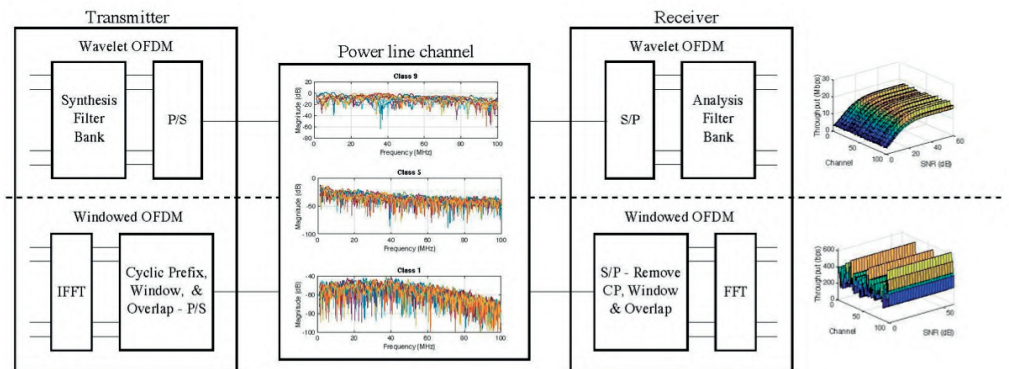
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ABSTRACT

The invention proposes a receiving system for multicarrier signals modulated in the transmitter with wavelet OFDM. This receiver includes a frequency-domain equalizer that corrects the channel effects. The invention also proposes a fast algorithm of implementation, and can be used in all those systems that employ multicarrier modulation based on Wavelet OFDM. Furthermore, the invention presents the following innovative aspects:

- It is compatible with several standards of communications by the electric network.
- It presents greater spectral efficiency than windowed OFDM.
- It increases the robustness of the system, decreasing the probability of error.
- It allows to improve the data rate in very noisy hostile enviroments.

ADVANTAGES AND INNOVATIONS

Smart Grid (SG) and IoT will bring one of the biggest technological changes in the first half of the 21st century. Within the context of SG, IoT-oriented technologies and systems are experiencing outstanding growth (28.5% between 2016 and 2020), with a large number of social and economic sectors demanding / offering new products from / to the market.

This change must be based on communication technologies that provide SG and IoT with capacity, efficiency and reliability in the transmission of information. The communication by the electrical network, or power line communication (PLC), is well positioned to offer this service, since it exhibits advantages as:

- Cost reduction to deploy new infrastructure, since it uses the existing power lines cables, and

- Great capillarity, allowing access to all IoT entities and systems that have power from the electrical network.

Wavelet OFDM is the modulation technique proposed in standards for PLC broadband data transmission in in-home electrical network, on platforms, for Smart Grid, and for IoT devices.

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CATCHAPS/HIPS TO TEST AND IMPROVE THE SECURITY

TECHNOLOGY OFFER

Code

TIC_UAH_15

Application areas

- Information and Communication Technologies

Type of collaboration

- Interested in companies or institutions to conform a consortium for a project proposal to make it the system real

- Manufacturating Agreement

- Services Agreement

Main researches

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ABSTRACT

Extensive knowledge and experience in IT Security, in particular, in the field of the security of CAPTCHA/HIP. It has also performed several successful security analyses of very different CAPTCHAs/HIPs currently in production.

They can assist in:

- Developing a threat model covering their proposal. This would allow our customers to better understand the security ecosystem in which their proposal is working and better conduct Risk Management strategies.
- Assessing the security of their current CAPTCHA proposal or implementation. This would allow the customers to understand if their CAPTCHA/HIP proposal or implementation passes a minimum security level without which it should not be put into production.
- Study of improvements. This service is orientated towards allowing the customers to improve their CAPTCHA/HIP security without affecting much the user interaction. This study might or not reach an improvement, depending on the proposal. After the results of this study, a new security assessment should be run.
- Improvement of Resilience. This service would allow us to cooperate with our customers towards implementing additional measures to increase their CAPTCHA/HIP security under attack. This would possibly include attack detection and mitigation mechanisms.

ADVANTAGES AND INNOVATIONS

Having a secured CAPTCHA implementation can help a company to protect its on-line assets from various types of automated abuse. This can prevent the loss of revenue to the company, and also allow it to confidently offer more on-line services knowing that their automated abuse is difficult.

Innovative aspects:

- Automatic attacks to test the security of the implementation.

- Increase the security against external attacks

TCARE ROBOTIC SOLUTIONS FOR TELECARE

TECHNOLOGY OFFER

Code

TIC_UAH_16

Application areas

- Information and Communication Technologies

Type of collaboration

- Interested in companies or institutions to conform a consortium for a project proposal to make it the system real

- Manufacturating Agreement

- Services Agreement

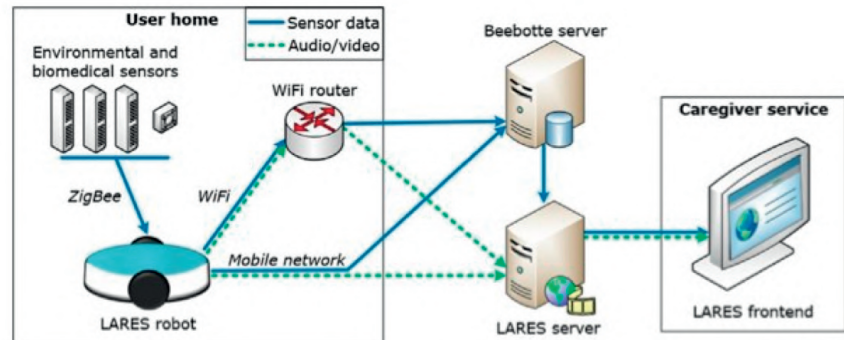### Main researches

Prof. Ma Dolores Rodríguez Moreno

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ABSTRACT

We propose a set of innovative tools for companies of telecare and medical assistance. These tools consist of three parts to achieve three objectives:

- Implement telepresence in patients' homes. With telepresence, caregivers can quickly contact with patients which means a significant reductions in travel expenses.

- Provide real-time alerts on the status of patients.

- Elaborate medical reports on the behavior of patients.

The three parts of the system are:

- An autonomous and telecontrolled robot that implements radio telepresence.

- A network of sensors to monitor the patient unobtrusively thus achieving the acquisition of important variables on the patient..

A web platform that allows caregivers to manage the system. By intelligence artificial, the web platform provides alarms and medical reports. In addition, caregivers can control the telepresence robot therefrom.

ADVANTAGES AND INNOVATIONS

So far, the solutions offered to dependent people consist of an emergency necklace button or an emergency phone button (with or without GPS). Both are active systems where the patient has an important role.
Our system presents a new alarm management for the benefit of patients and caregivers allowing a better market positioning, scalability in health care environments and reducing travel expenses.

- A new level of telecare 3.0 that implements e- health and telepresence databases.
- A robotic solution that implements telepresence
- A web platform as a tool for caregivers
- A passive rol of the patient in using the system
- An effective management of potential patient falls and alarms by monitoring with a sensor network WSN.

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DISTRIBUTED CHARACTERIZATION SYSTEM AND METHOD OF VARIATIONS OF THE REFRACTIVE INDEX OF AN OPTICAL FIBER.

Patent
ES2622354

Code

TIC_UAH_17

Application areas

- Information and Communication Technologies

- Measurements and standards

Type of Collaboration

- Technical cooperation

- Commercial agreement and Technical assistance

- License agreement

Main Researchers

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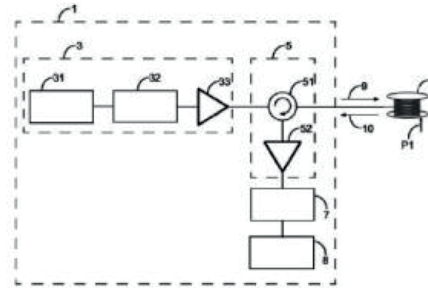Prof. Sonia Martín López

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ABSTRACT

This invention proposes a system and a method for distributed measuring of local variations of refractive index between different states of an optical fiber, for comparison of amplitude profiles of Rayleigh scattering, generated in two different states of the fiber by two light pulses of snapshot frequency, variable in time and invariant between pulses. The system consists in:

- Emission media that generate optical pulses with a same profile of instantaneous frequency, being this frequency variable along a single pulse.
- Receiving media that receive the backscattered optical signals, connected to the same end of the fiber of the emission medias (by an optical circulator)
- Detection media that measure, at least, the amplitude profile of the backscattered optical signals.
- Computing media that calculate the local variations of refractive index, occurring between different states of the optical fiber.

The system further comprises, distributed expansion means that amplify the signal emitted into the optical fiber, allowing the characterization of longer lengths of fiber.
The method consists in:

- Generate and transmit the optical signals described through a fiber under test.
  Receive the backscattered optical signals generated in the fiber at the same end of the fiber tan the transmission
- Measure the amplitude profiles of the backscattered optical signals, using a photodetector whose exit serves as an entrance to a digital mean, such as an oscilloscope.
- The method may include, the measuring of the amplitud and frequency profiles of the pulse optical signal or use some other stored.
  Calculate the local variations of refractive index of the fiber occurred between different states of the fiber.
- Computing media that calculate the local variations of refractive index, occurring between different states of the optical fiber.

With the system, method and computer program of the invention, a measure of the local variations of refractive index of the fiber, with high spatial resolution, high sensitivity and high speed is obtained.

ADVANTAGES AND INNOVATIONS

The invention provides a characterization of high spatial resolution, sensitivity and speed, requiring a single pulse to characterize a state of the optical fiber instead of using frequency sweeps in multiple pulses.
Limited number of elements and therefore reduced cost of the sensor system.

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MODE-LOCKED PULSED LASER USING SATURABLE ABSORBER

Patent
ES2622354

Code
TIC_UAH_19_P

Application areas

- Information and Communication Technologies

- Measurements and standards Environment and risk prevention

- Energy

Type of Collaboration

- Technical cooperation

- Commercial agreement and Technical assistance

- License agreement

Main Researchers

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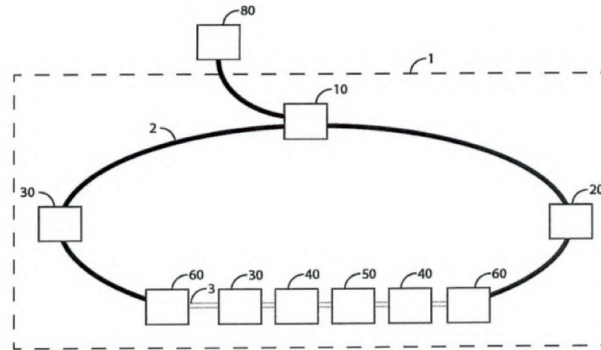Dr. Marco Jiménez Rodríguez

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ABSTRACT

It is a mode-locked pulsed laser whose optical resonator comprises a saturable absorber based on nitrides of group III. The use of this type of materials as saturable absorber allows to achieve a high stability and emission energy without increasing the complexity of the system. A mode-locked pulsed laser based on a resonator with an optical gain medium and a saturable absorber, wherein the saturable absorbent comprises at least a nitride of group III. The nitride of group III is selected from one of the following subgroups, being able to comprise elements of several subgroups in order to configure the wavelength and emission power of the device. Binary compounds: gallium nitride (GaN), aluminum nitride (AlN) or indium nitride (InN). Ternary compounds of gallium nitride and indium nitride, such as InGaN. Ternary compounds of gallium nitride and aluminum nitride, for example AlGaN. Ternary compounds of aluminum nitride and indium nitride such as AlInN.Quaternary compounds of gallium nitride, aluminum nitride and indium nitride, for example AlInGaN.

ADVANTAGES AND INNOVATIONS

This is a completely new use of nitrides of group III, Particularly related to the development of lasers, it introduces as saturable absorbers, materials composed of nitrides of group III, that allow to reach a high stability and emission energy without increasing the complexity of the system. Nothing similar has been found in patent databases or in the scientific literature consulted.

The mode-locked laser provides high peak power, energy per pulse, stability, and oper- ating range. It also allows operation independently of the polarization, simplifying the design and control of the device.

Development with reasonable costs and possibility of distribution in the international market: USA, Europe and Japan.

The group seeks for companies in the ICT, health and industrial sector or any company that manufactures mode-locked laser based on fiber optic, to sign technical cooperation agreements, commercial agreements with technical assistance or patent licensing agreements.

INTERACTIVE PLANT CELL : EDUCATIONAL ROBOTICS PROJECT

Patent
ES1167808U

Code

TIC_UAH_20

Application areas

- Biological Sciences

- Other Industrial Technologies

Type of Collaboration

- Technical cooperation

- Commercial agreement and Technical assistance

- License agreement

- Interested in companies or institutions to conform a consortium for a project proposal to make it the system real.

Main Researchers

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Dr. Ana María Torroba González
Dr. David López Santos

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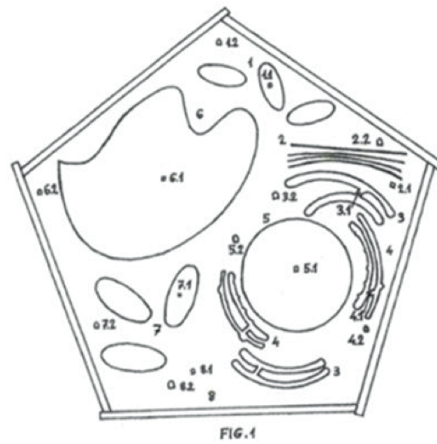otriuah@uah.es

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FIG.1

Figura 1: Muestra la composición de la maqueta didáctica interactiva con las piezas armadas mostrando la estructura de la célula vegetal con sus orgánulos. (1) Mitocondria; (2) Aparato de Golgi; (3) Retículo endoplasmático liso; (4) Retículo endoplasmático rugoso; (5) Núcleo; (6) Vacuola; (7) Cloroplasto.; (8) Estructura pentagonal verde.

ABSTRACT

The present invention proposes the creation of an interactive and buildable didactic mock- up. This model can be used in both primary and secondary education.
The mock-up comprises the base of the cell and on the outside the cell walls. The base of the model comprises hollow spaces corresponding to the organelles of the plant cell they represent, including the mitochondria module, the chloroplast module, the nucleus module, the smooth endoplasmic reticulum module, the reticulum module Rough endoplasmic, the vacuole module and the Golgi apparatus module.

To allow a comfortable use of the model and that is easily manipulate, the pieces that conform it fit in their corresponding holes. In this way the user can separate, press and manipulate the parts that interest him at any time without having to disassemble the complete set. Thanks to its three-dimensional shape, the didactic model facilitates the compression of the structure of the plant cell.

In addition, the present invention provides the physical contact necessary to improve the assimilation of concepts and to understand the structure of a plant cell in a simple and affordable way at the cognitive level of the user.
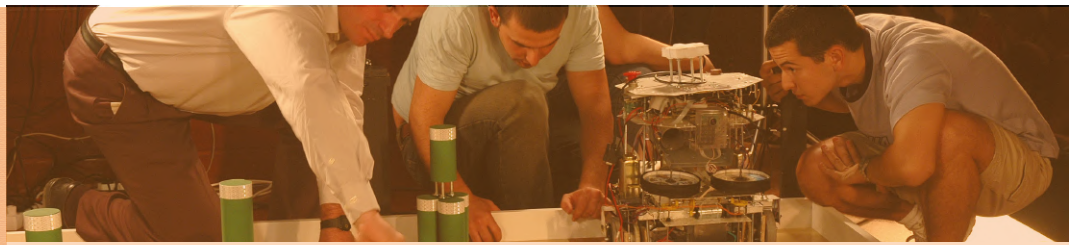
ADVANTAGES AND INNOVATIONS

The combination of the 3D printing of the cell and the interactive robotic parts, becomes a novelty in the market.

- Nothing similar has been found in the scientific literature consulted.
- Nothing similar has been found in a report full search.

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NOVEL SYNCHRONIZATION PROCESS FOR MULTI-CARRIER OR SINGLE-CARRIER COMMUNICATIONS
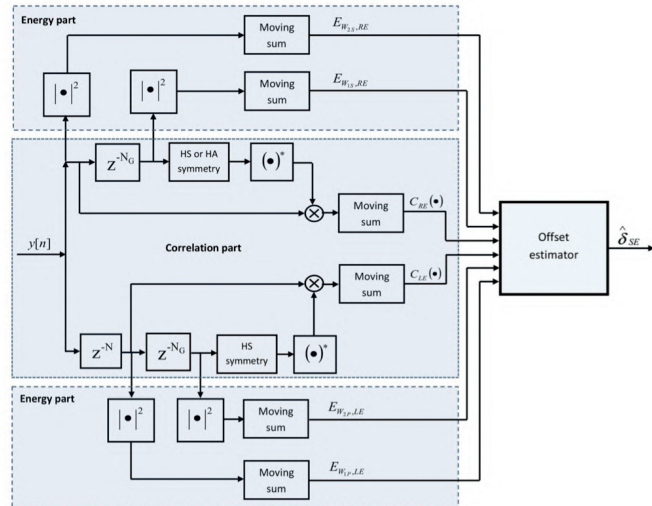
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ABSTRACT

This invention presents a novel synchronization procedure for multicarrier or single carrier systems for narrowband and broadband communications. This procedure allows a precise estimation of the Symbol Timing Offset (STO), and an approximation of the carrier frequency offset. The procedure is based on the inclusion of symmetric extensions in the transmitted symbols for the synchronization, which makes it useful not only for communications systems based on the discrete Fourier transform (OFDM and windowed OFDM), but also for transceivers based on discrete cosine transform (FAST-OFDM).

Among its main applications are communications through single-mode optical fiber, power network, wireless, and in general, all the techniques that use multicarrier and carrier modulation.

ADVANTAGES AND INNOVATIONS

In any multicarrier or single carrier modulation system, symbol timing estimators play an important role in the receiver to find the start of the symbol of the received signal. The invention proposes a method for synchronization in a multi-carrier or single carrier modulation point-to-point or multipoint transmission system, in which the symbols transmitted to the other equipment have symmetrical extension.
The new technique is based on the fact that the correlation between two signals provides a quantitative measure of their similarity.

The proposed technique perform well, especially in low dispersive channels.
It is proven that considering the BER and the probability of the estimate error in the time ofset, a performance gain over conventional techniques is obtained when the length of the redundancy increases.

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SYSTEM OF INTELLIGENT PROBES OF MONITORING APPLIED TO OBJECTS OF DAILY USE, FOR THE DETECTION OF NEURODEGENERATIVE DISEASES OR DEVIATIONS IN THE TYPICAL DEVELOPMENT OF A PERSON

Patent
ES2663417 A1

Code
TIC_UAH_23

Application areas

- Information and Communication Technologies
- Industrial Manufacture, Material and Transport technologies
- Biological Sciences and Health Measurements and standards

Type of Collaboration

- License Agreement
- Commercial Agreement
- Commercial agreement and Technical assistance

Main Researchers

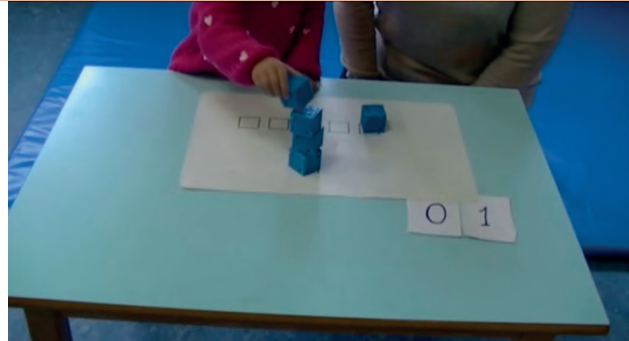Bernardo Alarcos Alcázar
Antonio García Herraiz

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ABSTRACT

The present invention defines a data capture and data analysis system that parameterizes the way of using objects of daily use (cups, spoons or toys) in order to detect possible cognitive or psychomotor difficulties in people, after analyzing the data monitored.

It consists of one or several probes where some sensors and a collector are coupled. The probe consists of a microcontroller, a wireless communication device, a motion sensor and connectors able to integrate sensors (light, force). The collector receives infotmation from the sensors and sends it to a storage system (database), through a network, for later analysis. The analysis system retrieves the information from the storage system to analyze it by applying techniques of data analysis and artificial intelligence, obtaining a diagnosis about the activity of the person analyzed.

Here are some examples of applicability:

- Integration of the probe into a cup to know the movement patterns when using it, with the aim of detecting possible neurodegenerative diseases. For example, to measure the increase of tremors in people with Parkinson's disease or other diseases that have cognitive impairment.
- Integration of the probe inside a ball to analyze the form and intensity that is hit or thrown by a person, through parameters such as maximum acceleration, maximum speed or turns.
- Set of beakers in which a probe is inserted in each one of them that measures the time that a person takes to make a tower of them and the way he/she moves them.

For children under 1-year-old, a probe can be integrated into the rattle to measure movement patterns and the force with which it is gripped.

ADVANTAGES AND INNOVATIONS

- The probe incorporates emitters of light and sound.
- The system can be calibrated so that it can be applied both to the detection of patterns of fine and gross psychomotor movements.
- It performs exact measurements besides the capture of variables of greater use.
- The databases generated by the storage system allow to compare different tests between them and to study the possible changes or evolutions.
- The activities can be managed from a user interface that runs on a smartphone, tablet or computer that communicates wirelessly with the collector.
- The person who manages the activity may add additional information to the interface, such as the identifier of the person performing the activity.
- Information is analyzed using techniques of data analysis and artificial intelligence.

PROCEDURE OF STABLISHMENT, ERASING OF PATHS AND FORWARDING FRAMES FOR TCP TRANSPORT CONECTIONS AND NETWORK BRIDGE

Patent
ES2540595

Code

TIC_UAH_25

Application areas

- Information and Communication Technologies

Type of Collaboration

- Technical cooperation

- Commercial agreement and Technical assistance

- License agreement

Main Researchers

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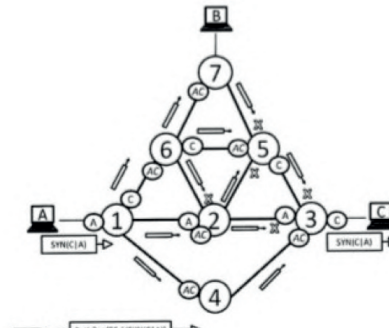
Figura 3: Muestra la búsqueda de un camino TCP-Path tras la recepción de un segmento de transporte TCP con SYN activado (Path Request)

ABSTRACT

The Telematic Services Engineering research group of the University of Alcalá, in collaboration with IMDEA NETWORKS, has developed a mechanism for advanced TCP-Path Ethernet switches that explores a network of transparent bridges to establish a specific path for each new TCP connection established between two terminals. The main applications of this Ethernet switch technology are networks of data centers and com- puter networks in general, audio-video bridges and other types of transparent Ethernet bridges.

The group is looking for companies in the telecommunications sector with the aim of reaching technical collaboration agreements, commercial agreements or patent licenses.

ADVANTAGES AND INNOVATIONS

This invention allows the paths between terminals to be established with TCP connection granularity: one path per connection, improving the distribution of load in the network. Roads are not needed to be calculated, they are obtained by exploration in the network, finding the path less loaded at each moment.

In addition, the path establishment, path clearing and frame forwarding mechanisms described can be implemented in a network bridge that has the corresponding tables to associate the ports to tuples formed by MAC address pairs and origin and destination transport ports. They can also be implemented in bridges with OpenFlow and SDN (Software Defined Networking) capability.

The TCP-Path model can create as many additional paths as transport connections exist at any time.

It presents commercial potential at an international level, focused mainly on the markets of the US, Europe, Australia and Japan with reasonable difficulty and cost of implementation.

ESTABLISHMENT, REPAIR AND DELATING PROCEDURE OF DISJOINT MULTIPLE PATHS, REDIRECTION OF FRAMES AND NETWORK BRIDGE. MULTIPLE DISJOINT PATHS (MDP).

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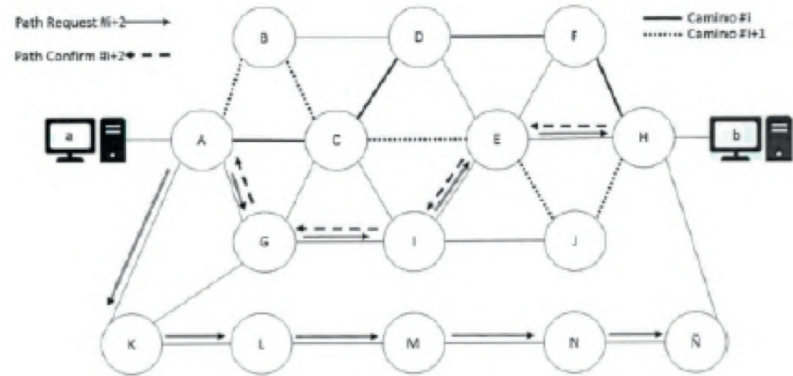otriuah@uah.es

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ABSTRACT

This invention describes mechanisms that sequentially and completely explore a network of transparent bridges to discover and establish multiple bidirectional paths, disjointed in links only or disjointed in nodes and links, between pairs of bridges bordering the network, as well as a network bridge that implements these mechanisms.

The origin frontier bridge sends multicast road establishment packages to the destination bridge, that propagate until reaching the destination bridge, which confirms to the frontier bridge each disjunct road establishment by means of a message from destination to origin, that leaves identified and established the bidirectional path in each bridge.

The roads are automatically deleted when a certain time passes without confirmation, without being used or when sending the border bridge an explicit delete packet of a road or all roads. The number of created paths is parameterizable and both ends communicate to each other the number of output links available, in order to know the maximum number of disjoint paths feasible.

These multiple disjoint paths created by border bridges can be used by an entity or protocol for load sharing, reliability enhancement or other purposes.

The present technology has special application for Ethernet switches for enterprise networks and data centers.

ADVANTAGES AND INNOVATIONS

Unlike Shortest Path Bridging, Multiple Disjoint Paths does not require knowledge of the topology or any calculation against the extremely complex SPB (multiple symmetric minimum paths between nodes, to calculate disjoint routes in the network graph). In MDP, the selected paths are the fastest of the disjoint ones, so they are chosen according to the load, contrary to Shortest Path Bridging, which calculates them without having the real load in mind.

Unlike the protocols derived from AODV and DSR, MDP performs the automatic discarding, without inspection, of the many packages with redundant routes that arrive at the bridges.

The main advantages of this technology are simplicity, scalability and adaptation to real network traffic by selecting the fastest routes, without route calculations.

The protocol can also be used to establish multiple paths between terminals if desired, increasing the state stored in the switches.

COOPERATIVE PROCEDURE SDN-REPAIR NETWORK
FOR FAULTY PATHS AND NETWORK BRIDGE

Application areas

- Information and Communication Technologies

Type of Collaboration

- Technical cooperation
- Commercial agreement and Technical assistance
- License agreement

Main Researchers

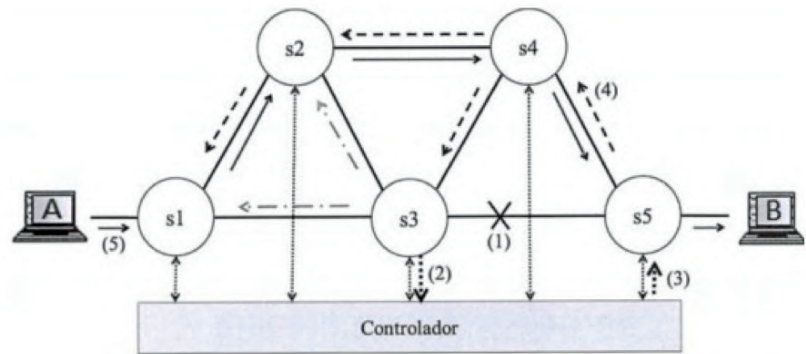Dr. Guillermo Ibáñez Fernández

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ABSTRACT

The present invention describes mechanisms that allow, in a network of transparent bridges with OpenFlow interface and equipped with learning functionality of paths with temporary blocking of the ARP-Path relearning, implementing the repair, in cooperation with the SDN controller, of all the paths in use that go through a certain link when it fails.

In this way, when a link or other cause fails to repair a path to a bridge terminal, it informs the controller by sending an OpenFlow packet of type Packet-In containing the destination address to be repaired.

The controller queries in a table the frontier bridge to which each terminal is connected and sends an OpenFlow Packet-Out packet to the frontier bridge connected to the destination terminal. This package contains a multicast repair frame that the bridge deencapsulates and sends through all its links, flooding it until reaching the bridge that detected the failure of the link, and establishing this frame as it passes through the network, a confluence tree where it can reach to the bridge of the destination terminal, whose branches, one or more, will be used by the frames in transit to the destination.

These mechanisms can be implemented in specialized hardware devices or partially or totally as software programs executed in specialized as well as generic hardware devices. Its most important application is in switches for Networks defined by software.

ADVANTAGES AND INNOVATIONS

The combination between the functionality of a bridge with OpenFlow interface to controller, and a semi-autonomous ARP-Path bridge on the same bridge, has the advantage of being able to avoid the need for the controller to control all the data flows of the network, by delegating on the bridges the function of basic forwarding of frames in layer two of the flows that are not explicitly controlled by the OpenFlow controller.

The reconfiguration of paths before failure is slow and complex both in pure SDN networks with central controller for its complete centralization, and also in ARP-Path bridge networks distributed by their extreme distribution.

This invention combines the advantages of having a central controller, with those of conducting a direct and distributed path exploration by the network from the destination bridge.

SYSTEM AND METHOD OF DISTRIBUTED CHARACTERIZATION OF DISPERSION PROFILE OF AN OPTICAL FIBER

Patent
ES2596260B1

Code

TIC_UAH_30

Application areas

- Information and Communication Technologies

- Industrial Manufacture, Material and Transport technologies

- Energy

Type of Collaboration

- Technical cooperation

- Commercial agreement and Technical assistance

- License agreement

Main Researchers

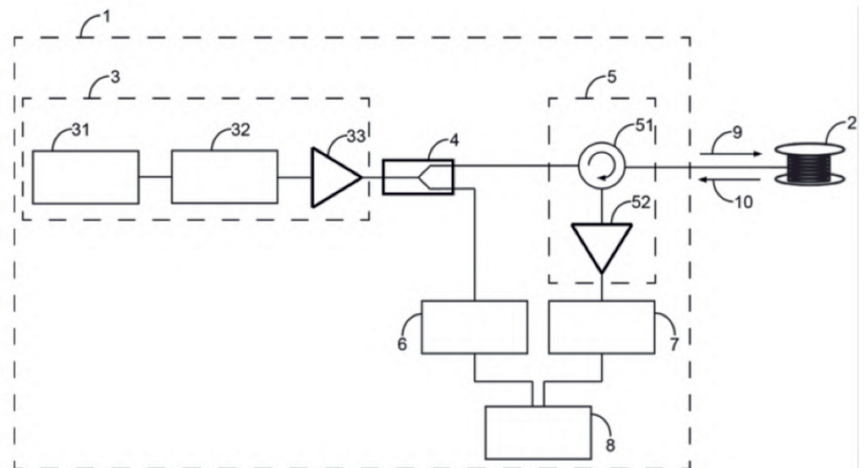Prof. Miguel González Herráez
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ABSTRACT

It is a system and method of distributed characterization of optical fibers that provides an absolute measurement of the dispersion profile of the fiber. The present invention is applied to the field of telecommunications and, in particular, to the industrial area of sensing and distributed characterization of optical fibers. Comprises a system, a method and a computer program for the distributed characterization of optical fibers that provides an absolute measure of the dispersion profile (scattering) of the fiber, by comparing the phase and amplitude of a pulsed light and of the Rayleigh scattering generated by that pulsed light, being the Rayleigh scattering measured through, at least, a differential photonic detector.

ADVANTAGES AND INNOVATIONS

With the system, method and computer program of the invention, an absolute dispersion profile of high resolution and high sensitivity is provided. The measurement range is limited only by the intensity of the pulsed light, allowing the incorporation of distributed amplification systems. Additionally, the optical fiber under test is characterized in an absolute and continuous way, without comparing multiple states, and the results can be provided in real time. Distributed fiber optic characterization technique capable of measuring the absolute dispersion profile in a long sensing range with high spatial and temporal resolution. It takes into account the phase and amplitude of the signal and not only the intensity of the scattered signal. The optical fiber under test is characterized in an absolute and continuous way, without comparing multiple states and the results can therefore be provided in real time.

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ADAPTATION OF A LEARNING PLATFORM TO THE PERSONAL NEEDS OF THE STUDENT. IMPROVEMENT OF THE ACCESSIBILITY IN ONLINE EDUCATION.

Patent
ES2681918

Code

TIC_UAH_31

Application areas

- Information and Communication Technologies
- Socioeconomics
- Education

Type of Collaboration

- Technical cooperation
- Commercial agreement and Technical assistance
- License agreement

Main Researchers

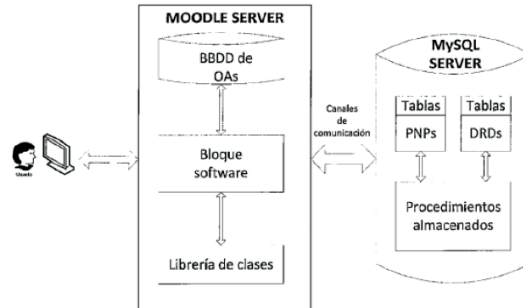Dr. Concha Batanero Ochaíta

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ABSTRACT

This invention relates to a method for adapting a learning platform to the personal needs of students. This is a procedure for adapting the Moodle learning platform through which students with vision and/or hearing problems can introduce a personal profile of accessibility that allows the system to identify the problem. When the student selects a specific educational resource, the adaptations belonging to this resource that suit his/her personal needs are shown. In addition, teachers are authorized to publish adapted material associated with original content (video, subtitles, audio description or sign language).

Parallel to this resource, another one runs in background: the refresh of the web cache of the student's computer with those resources adapted to their personal needs that have been updated by the teacher and that have a high probability of being selected by the student in their next actions. The server 1 governs the execution of the procedure, supports the reading of the personal needs that the student introduces and the loading of the learning targets by the teacher, harbor the database of learning targets and their adaptations, establishes the channels of communication necessary for the exchange of information between the servers and manages the refreshing of the web cache on the student's computer. The software installed on server 1 has been mostly designed independently of Moodle technology, allowing its reuse and system scalability. Server 2 supports databases of students' personal needs and digital resources, making them portable to any other system, being this, the main reason why an exclusive server has been used for this purpose.

ADVANTAGES AND INNOVATIONS

The learning platform has been adapted following the latest version of the IMS AccessForAll version 3.0 standard, that provides greater facilities of use of the application. The data models have been reduced considerably, allowing a greater understanding of students and teachers. It allows the student to select more than one value in the metadata value spaces, creating a profile more adjusted to reality.

It offers the possibility of generating student profiles automatically. In case of manual creation of profiles, the tool fills in automatically the most of the accessibility metadata based on the basic metadata entered by the student. The system performs an efficient search and visualization and/or download of the adaptations that meet the student's profile (previous articles do not show this phase of adaptation). Two MySQL databases have been introduced that not only efficiently manage profiles and digital resources, but also allow them to communicate with other systems such as repositories and other learning platforms thanks to the chosen technology and the software implemented.

- Simplicity of data models

- Possibility of extensions to new types of functional diversity Possibility of communication with other applications

- Saving the waiting time by downloading the learning objects, since they were pre- viously downloaded in parallel with other tasks.

SYSTEM FOR IMPROVING ACCESSIBILITY IN LEARNING PLATFORMS BY USING PUSH BUTTONS FOR PEOPLE WITH MOTOR DISABILITIES

Patent
ES2684592

Code

TIC_UAH_32

Application areas

- Information and Communication Technologies

Type of Collaboration

- Technical cooperation

- Commercial agreement and Technical assistance

- License agreement

Main Researchers

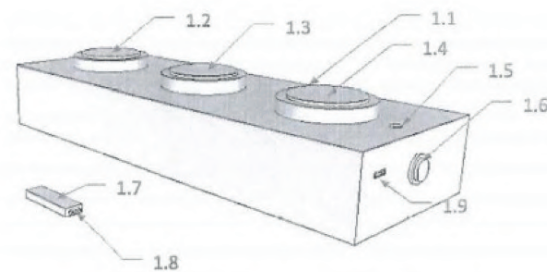Dr. Concha Batanero Ochaíta

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Aspecto externo del sistema de pulsadores

ABSTRACT

This invention provide a technical solution for the improvement of accessibility in online education.

At present, students with mobility problems can't access the teaching material published on the learning platforms, due to their inability to move the computer mouse and/or conventional keyboards.

The present invention therefore relates to a hardware and software system, ergonomic and adapted to the needs of people with reduced motor functional capacity, consisting of the creation and control of a scanning applied to a learning platform, which allows them to access to the information provided by a learning platform through a push button sys- tem.

The adapter receives the information from the push buttons and adapts it to the computer interface. The software part generates an automatic or manual scanning managed by the pushbuttons, whose speed and sound are configurable.

This system provides students access to the menu offered by the platform, allowing them to reach the information by using two different types of virtual buttons or push buttons:

- Virtual buttons: they appear on the computer screen and offer the settings of the scanning speed and the activation or deactivation of the sound.
- The physical buttons form the access adapted to the ergonomics of the student since they can be easily pressed.

ADVANTAGES AND INNOVATIONS

- Creation and control of a scanning applied to a learning platform.
- Joint action of a system of push buttons for interaction with the computer in the learning platforms and the possibility of adaptation for any application. Web for people with disabilities of motor origin.
  The system offers the possibility of executing the scanning in automatic or manual mode.
- It uses large ergonomic push-buttons so that they can be used by people who present a high level of difficulty in the movement of hands or upper extremities.
- It implements energy saving by automatically detecting the ambient light level and conveniently switching the buttons off or on. In addition, the way of working of the microcontroller entails an energy saving to maintain usually in sleep, waking up periodically for the tasks completion.
- The cost of the final development and the subsequent commercial exploitation will be low.

EFFICIENT SENSING TECHNIQUES FOR SMART CITY APPLICATIONS

TECHNOLOGY OFFER

Code

TIC_UAH_33

Application areas

- Information and Communication Technologies

Type of collaboration

- Interested in companies or institutions to conform a consortium for a project proposal to make it the system real

- Manufacturating Agreement

- Services Agreement

Main researches

Prof. Felipe Espinosa
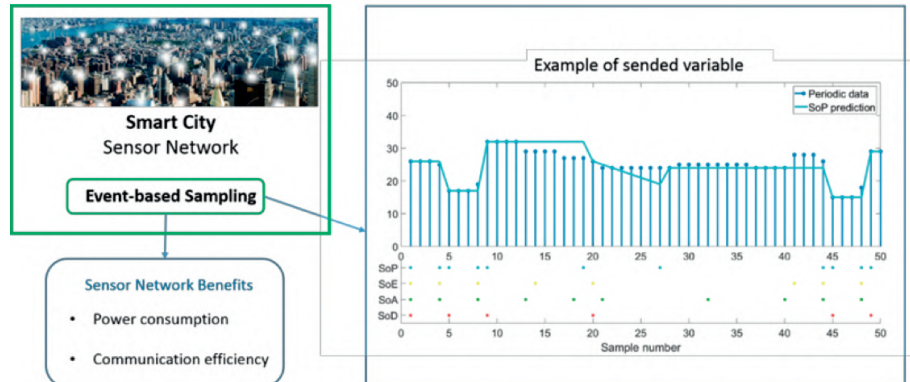Prof. José Luis Lázaro Galilea

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ABSTRACT

The city of the 21st century demands a set of digital services that provide citizens with improved access to resources such as transport, education, health care, energy, safety and the environment. Giving intelligence to these services means having an extensive network of sensors and the management of information supported by the Internet of things (IoT). Wireless sensor networks present two major challenges: efficient communication and energy autonomy. Event-based sensing techniques help to optimise both by analysing the information registered in the sensor and making it available to the network only when necessary. In the GEINTRA group we have experience in event-based sensing techniques and their application to the field of Smart Cities.

ADVANTAGES AND INNOVATIONS

Compared to classic techniques of network periodic sensing, wired or wireless, this technology offer has the following advantages:

- Adaptation of the decision strategy of when to measure and, above all, when to transmit the information to the processing central node.

- Extension of the average battery life powering the sensory node and therefore the node life.

- Optimization of the massive use of the communication network allowing the link between sensory nodes and these with the processing central node.

- Selection of the most appropriate event-based estimation technique, taking into account trigger thresholds and maximum waiting times.

- Modelling the sensed variable behavior to evaluate the triggering mechanism implementation outside the sensorial node itself.

- Integration of event-based sensing techniques with available IoT solutions and cloud processing.

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INTELLIGENT SYSTEM FOR AUTONOMOUS CONTROL IN ROBOTICS COOPERATION

TECHNOLOGY OFFER

Code

TIC_UAH_34

Application areas

- Information and Communication Technologies

Type of collaboration

- Subcontracting
- Manufacturating Agreement
- Services Agreement

Main researches
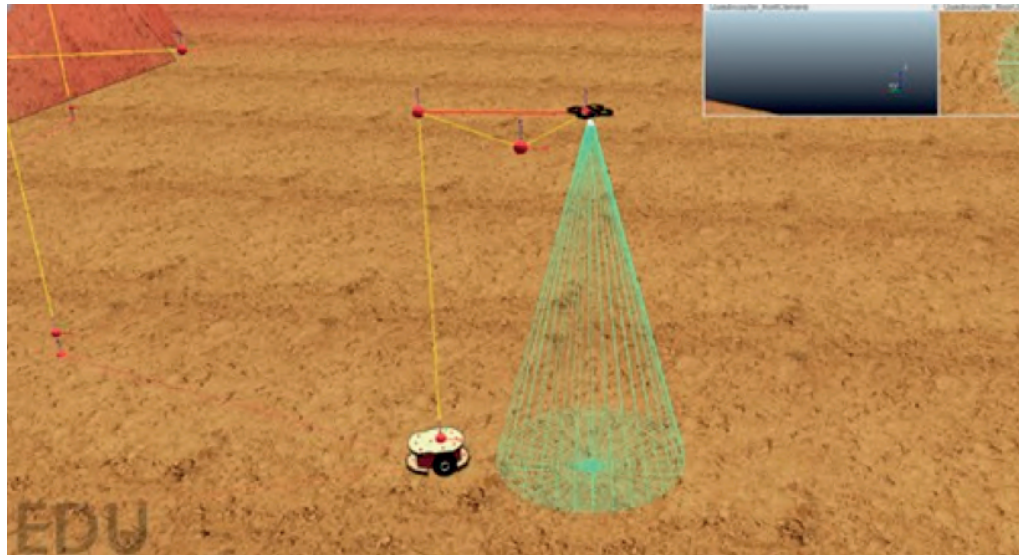
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ABSTRACT

Over the last decade, there has been a strong scientific and industrial concern in robotic cooperation. From problems of surveillance in industrial, commercial or domestic environments, or rescue and help in catastrophic areas, till problems of efficient package delivery in companies like Amazon or DHL, require mathematical optimization algorithms that solve these problems optimally and efficiently through the deployment of cooperative robot teams.

The cooperatTive ExploRation Routing Algorithm (TERRA) is a planning system that, using artificial intelligence techniques, allows a team of robots to combine their capabilities to complete more complex tasks. For this, TERRA implements a novel robotic cooperation paradigm that offers a solution to the problems mentioned in the previous paragraph. This exploration paradigm uses a ground vehicle to reach terrestrial targets and, a drone team to reach the aerial targets.

Unlike other route planners, TERRA coordinates and plans efficient routes that meet the objectives set in the shortest time with the greatest cost savings.

ADVANTAGES AND INNOVATIONS

- Autonomous and heterogeneous robotic cooperation
- Routing and tasking optimization
- Multi-objective optimization
- Intelligent, efficient and robust explorations

Universidad de Alcalá

SYSTEMS AND APPLICATIONS BASED ON INDOOR POSITIONING VIA LED-LIGHTING

TECHNOLOGY OFFER

Code

TIC_UAH_35

Application areas

- Information and Communication Technologies
- Indoor positioning system
- Positioning Real Time System
- Infrared localization
- Embedded sensors

Type of collaboration

- Interested in companies or institutions to conform a consortium for a project proposal to make it the system real
- Manufacturating Agreement

Main researches

Prof. José Luis Lázaro Galilea
Prof. Alfredo Gardel Vicente

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ABSTRACT

The general objective is to obtain an indoor positioning system that is capable of estimating the position of "smart" devices or of simple detectors designed for that purpose (receivers) from the emission of codes embedded in the lighting light of a room / building. The achievement of this system shall allow the development of multiple applications for the set-up of routes and help guiding. The use of LED lamps available for lighting of different parts of a building or room in such a way as to allow the transmission of very high frequency codes non-perceptible by humans together with the illumination lights. These codes (one unique code for each LED lamp) will be decoded by light detectors included in smart-devices, or by detectors designed particularly for this purpose. From the code information, the device positioning can be determined with high precision.

ADVANTAGES AND INNOVATIONS

The accurate indoor position determination from lighting opens up a wide range of possibilities. The system could be applied in very different fields and applications such as museums, shopping centers, supermarkets, logistic warehouses, etc

- In museums, by means of the use of mobile devices, flexible routes can be traced depending on the available time to do the visit, a specific interest or even the type of user, in such a way that when the smart device captures the position it can show on the screen where the visitor is located and guide him/her to the next item to be visited. Additionally, if a picture or object is reached, the system could auto- matically download its information.

- In shopping malls, given the precision in the indoor location the system might provide people with routes to the desired shops.

- In supermarkets, the list of products to be searched could be introduced in the smartphone and it would guide the user, positioning itself by means of lighting, along the optimal route until all products are picked up.

- In logistic warehouses the same device used for picking&pack plus a simple detector based on photodiodes, might offer the operators the quickest route for the collection of multiple products.

- In hospitals and health centers, by means of mobile devices or simple detectors, it would be possible to know the location of medical personnel, wheel-chairs, equipment, etc.

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SEQUENCEPRO19: SOFTWARE FOR THE ANALYSIS OF DNA AND PROTEINS

TECHNOLOGY OFFER

Code

TIC_UAH_36

Application areas

- Information and Communication Technologies
- Biological Sciences.

Type of collaboration

- Acquisition Agreement
- Commercial Agency Agreement
- Distribution Services Agreement

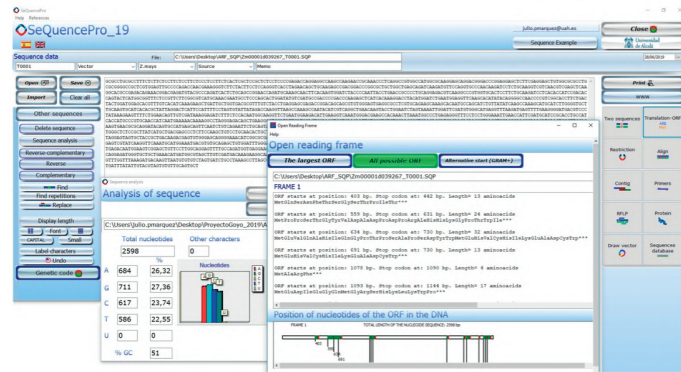### Main researches

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ABSTRACT

SeQuencePro19 performs about 115 different functions in a single application. It includes programs for editing, quantification and analysis of nucleotides or amino acids; translate reading frames and analyses amino acids; simulates restriction with enzymes, generates oligonucleotides (primers) for PCR, concatenates and aligns sequences and calculates molecular weights. Analyses sequence polymorphisms by RFLP simulation and design differential primers between ortholog sequences. The application generates databases to store the results. It also, make graphs that favour the interpretation of results; for example circular or linear restriction maps.

It is an application with a careful and clear design that, compared to others, is efficient. The access to all its functions is through buttons located on the screens of the applications and there are no menus and submenus. It is an easy-to-use and intuitive application. The user familiarizes with the program in minutes. SeQuencePro19 has applications that allows the user to manage several sequences simultaneously, which facilitates all the comparative analysis.

SeQuencePro19 creates its own files, but allows the inclusion of sequences from text or sequencing files (*.Seq) and also allows to paste nucleotide or amino acid sequences copied from any application or website.

ADVANTAGES AND INNOVATIONS

The set of applications included in SeQuencePro19 prevents the user from having to handle different applications from a variety of web pages, which facilitates his bioinformatic work of sequence analysis. The application works in Spanish or English, which can facilitate either its use or distribution.

Part of its power is based on the simplicity of its interface: the functions are accessed through buttons on the screens and not through menus and submenus. It is an open application that allows the incorporation of specific analysis software that may be required by researchers or scientific laboratories.

SequencePro19 contains some innovative bioinformatics applications, of possible biomedical use, whose algorithms have been originally described in scientific publications.