



Universidad
de Alcalá



Comunidad
de Madrid

Dirección General de Investigación
e Innovación Tecnológica
CONSEJERÍA DE CIENCIA,
UNIVERSIDADES E INNOVACIÓN

CATALOGUE

Environment
and **e**nergy

Scientific and
Technological
Offer

Environment and Energy

— Facesmart sensors for energy efficient cities

— Risk management of the effects of solar activity: device and procedure of obtaining in real time and high resolution, the local geomagnetic disturbance at middle latitudes

— Service of vegetative propagation and molecular characterization of tree species

— Upgrading lignins from lignocellulosic residues for eco-friendly lubricants and adhesives production. A biotechnological approach with industrial perspectives

— Eneff-pilot: a cooperative system for sustainable energy-efficient communities



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FACESMART SENSORS FOR ENERGY EFFICIENT CITIES

TECHNOLOGY OFFER

Code

ENER_UAH_06_C

Application areas

- Generation of thermal energy maps in cities
- SmartCross system for pedestrian crossing monitoring
- Improvement of thermal insulation and energy distribution systems

Type of collaboration

- Commercial agreement with technical assistance
- Manufacturing agreement

Main researches

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Prof. David Fernández Lllorca

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ABSTRACT

Smart-sensors-based technology that can be applied to improve the energy efficiency of urban environments in an holistic fashion. This technology covers areas such as Intelligent Transportation Systems and Energy Efficient Measurement applications. Thermal imaging technology is also available to identify homes and buildings that may need improvements in their isolation installations. A specially vehicle is equipped with infrared cameras, GPS and rangebased sensors. It takes thermal images of homes in winter and summer months to automatically identify buildings showing poor isolation capabilities (heat and cool losses trough poorly isolated walls, windows and roofs).

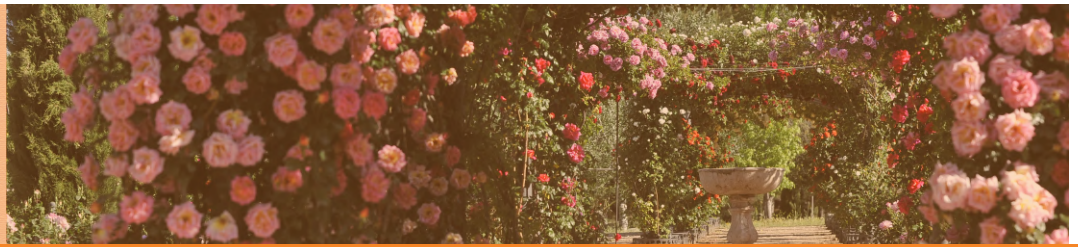
ADVANTAGES AND INNOVATIONS

In the context of transportation, innovative aspects come from the use of new sensors that provide richer information than current sensor technologies, as well as the novelty of the proposed applications. On the other hand, the automatic creation of thermal efficiency digital maps has not been proposed up to now. These maps will be very useful for local authorities to improve the energy efficiency of their local communities. A set of smart sensors have been created to optimise the use of transportation systems in urban environments. Among them we remark:

- Signalised roundabouts and intersections, adaptive to the current traffic status. Adaptive traffic monitoring and management.
- SmartCross: optimal traffic lights timing by pedestrian detection in pedestrian crossings.
- Prioritising public transport vehicles in roundabouts and intersections.
- Outdoor parking slots monitoring by a fleet of public transport vehicles applied to reduce the time needed to find a free parking slot.



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RISK MANAGEMENT OF THE EFFECTS OF SOLAR ACTIVITY: DEVICE AND PROCEDURE OF OBTAINING IN REAL TIME AND HIGH RESOLUTION, THE LOCAL GEOMAGNETIC DISTURBANCE AT MIDDLE LATITUDES

Patent

ES2640934B2
PCT/ES2017/070189

Code

ENER_UAH_07_P

Application areas

- Information and Communication Technologies
- Industrial Manufacture, Material and Transport technologies
- Energy, Physical and Exact Sciences
- Environment and risk prevention

Type of Collaboration

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

Main Researchers

Dra. Consuelo Cid Tortuero

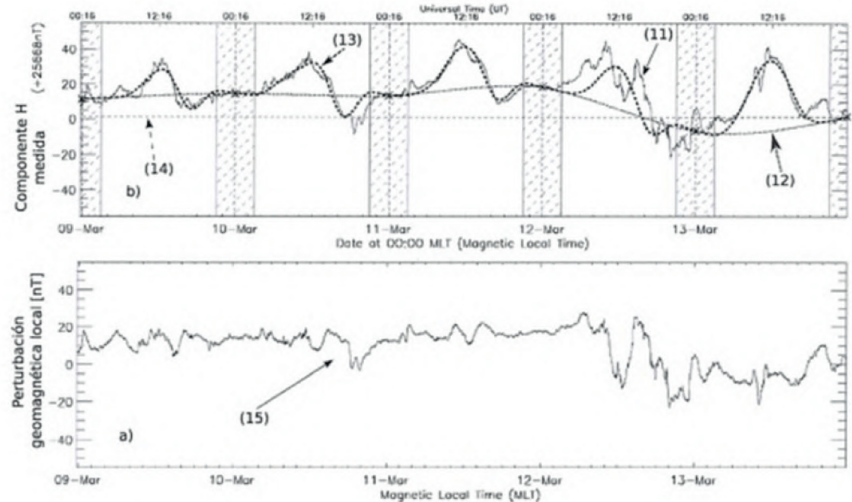
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ABSTRACT

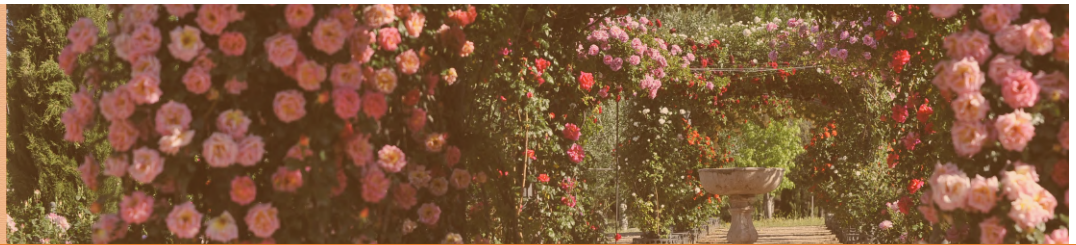
Device and procedure that, based on the measurement of the local geomagnetic field, is able to estimate the magnetic disturbance component associated with solar activity at middle latitudes. The determination of the magnetic disturbance component is especially relevant in cases of sporadic but explosive solar phenomena. The present invention describes a method and device capable of obtaining the local geomagnetic disturbance component at medium latitudes in real time and high precision (1 minute). The geomagnetic disturbance is obtained by removing different components of undisturbed geomagnetic field from the magnetic field measured on the earth's surface (solving the problems existing in the prior state of the art). In the invention, a day model in magnetic calm at medium latitudes is described for the horizontal component of the geomagnetic field. The procedure implies the characterization of a day of magnetic calm or disturbed day by evaluating the goodness of the fit of the invented model to the measured data of the horizontal component of total magnetic field, once subtracted an auxiliary curve of tendency of the night values.

ADVANTAGES AND INNOVATIONS

From the perspective of the actual user, the present invention constitutes an essential element in the risk management of the effects of solar activity on vulnerable technologies, both ground-based and satellite-based (electric power, rail transport, terrestrial and positioning navigation systems, radio and satellite communication systems ...), increasing the capacities of public administrations, civil protection and emergencies and the companies themselves, in order to prepare a successful strategy for adverse conditions related to the solar activity. The innovative character of the present invention is made possible by the application of a day model in magnetic calm at midlatitudes. At this latitude the regular magnetic variation (one day), associated with the current system generated by the solar radiation received in the illuminated zone on Earth, presents great variability and is difficult to obtain. The model invented to determine the daily geomagnetic variation, differentiates two types of points: (a) fixed to zero intensity, in the hours of night, and (b) free in intensity, for the hours of day.



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ENEFF-PILOT: A COOPERATIVE SYSTEM FOR SUSTAINABLE ENERGY-EFFICIENT COMMUNITIES

TECHNOLOGY OFFER

Code

ENER_UAH_08

Application areas

- Information and Communication Technologies
- Energy
- Physical and Exact Sciences



Type of collaboration

- Manufacturing Agreement
- Outsourcing Agreement
- Subcontracting

Main researches

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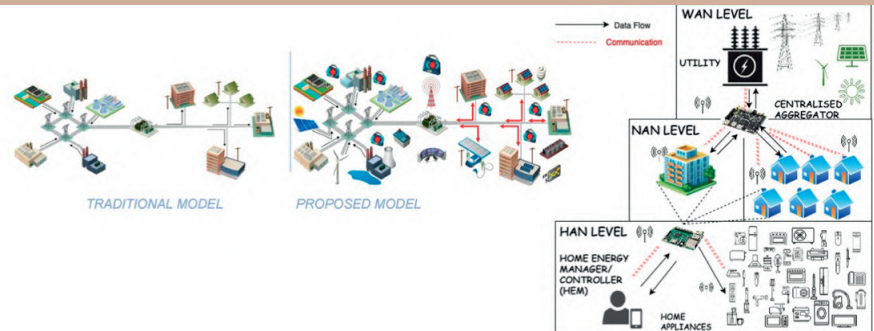
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ABSTRACT

The ever-increasing technological development over the last decades has significantly changed the energy efficiency environment. The research presents a cooperative demand response system aimed at promoting behavioural changes in small and large communities.

This project aims to provide sustainable and socioeconomic evidence for the Information and Communication Technology investment within the new IoT applications such as smart metering infrastructures that promote energy efficiency in residential dwellings. A cooperative demand response system is designed to promote behavioural changes in small or large communities with common interests. The involved entities will reach binding agreements and coordinated behaviour.

Consumers will adapt their energy consumption cooperatively on a centralised way, that is, sharing their demand schedule with a data collector, which facilitates the integration of energy consumption information into a common view. This integration is performed over the so-called Aggregator, an optimal system providing energy management services in order to efficiently manage demand. It allows to distribute locally the energy provided according to the availability of renewable resources. This energy management system will be connected to the Utility defined as a set of energy suppliers shared by customers.

The pilot system will demonstrate that a community of consumers cooperating based on their energy demand analysis can realize the potentials of energy saving measures. At the same time, the system will lead to a behavioral change in the electricity consumption habits through sustainability and environmental protection goals. Main goals:

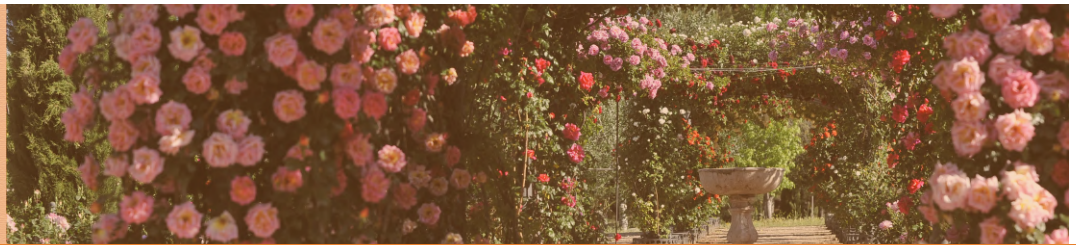
- To offer alternative resources in terms of accessibility and demand
- To develop of an energy efficient system

ADVANTAGES AND INNOVATIONS

- The system will lead to improved scenarios of energy efficiency by applying strategies for energy demand response applied to smart residential communities.
- Consumers will have the opportunity to reduce their electricity cost and/or peak-to-average ratio through scheduling their power consumption.
- The system will integrate the electricity supply available from renewable energy sources into the scheduling process.
- The research will provide empirical comparison of the developed algorithm design on different implementation strategies for player turn selection, optimisation heuristics as well as case scenarios of community's consumption patterns



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SERVICE OF VEGETATIVE PROPAGATION AND MOLECULAR CHARACTERIZATION OF TREE SPECIES

TECHNOLOGY OFFER

Code

AMBI_UAH_10

Application areas

- Energy and biomass
- Biological Sciences
- Agriculture and Marine
- Resources
- Agrofood Industry
- Environment and risk prevention



Type of collaboration

- Commercial agreement with technical assistance

Main researches

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ABSTRACT

The research group on Agroforestry Biotechnology at Alcalá University and the INIA's Unit on Forest Tree Genomics offer a mixed service consisting of vegetative propagation and plant genotyping, mainly tree species, through in vitro culture and molecular markers of high discriminatory power.

The in vitro culture is carried out at facilities of Alcalá University, being the INIA the institution in charge of the plant genotyping for their delivery once they have been molecularly characterized. Other plants obtained by other means can be also genotyped as well.

Both institutions seek to reach commercial agreements with forestry, reforestation, horticultural companies, plant nurseries, companies specialized on cultivation of woody species to obtain biomass, agrarian transformation companies, ornamental companies and municipalities or local administrations interested in the maintenance of native species.

Also, this service would be of special interest for pharmaceutical companies in obtaining bioproducts in general (i.e. willow-Acetyl Salicylic Acid, yew-Taxol, Maritime Pine-Pycnogenol and other active ingredients), and chemical companies interested in obtaining resins and other derivatives.

ADVANTAGES AND INNOVATIONS

Both groups have experience and know-how generated in both fields; obtained from the development of research in the framework of national and international projects during the last 25 years. This know-how is the base for the development of new protocols or for the optimization of existing protocols, which progressively and actively incorporate advances in micropropagation and in vitro culture, as well as characterization of genetic variability and genotyping of forest tree species.

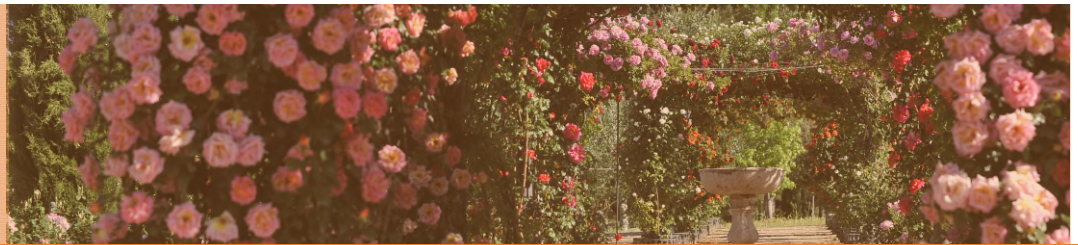
Experience in transfer of basic information in analysis tools for the multiplication and genetic characterization of materials provided by companies and administrations.

In vitro culture and analysis of the in vitro plants are developed by experts in specialized laboratories.

Uniformity and reproducibility of plant material, guarantee of origin, traceability, homogeneity and specific purity, varietal or clonal, obtaining a "superior" product, greater sanitary control, applicable to a wide spectrum of species, better planning during the year, save space, high multiplication rate and lower costs.



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UPGRADING LIGNINS FROM LIGNOCELLULOSIC RESIDUES FOR ECO-FRIENDLY LUBRICANTS AND ADHESIVES PRODUCTION. A BIOTECHNOLOGICAL APPROACH WITH INDUSTRIAL PERSPECTIVES

TECHNOLOGY OFFER

Code

AMBI_UAH_12

Application areas

- Other Industrial Technologies
- Biological Sciences
- Environment and risk prevention



Type of collaboration

- Acquisition Agreement
- Financial Agreement

Main researches

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ABSTRACT

The use of lignocellulosic biomass for technological applications constitutes one of the most important challenges in the actual research.

Recently, we planned to take advantage of the oxidative potential of the laccases to functionalize residual lignins both derived from the microbial action on two agricultural residues very abundant in Spain (wheat and barley straws) and commercial residual lignins (i.e. Kraft lignin). Our aim was to give added value to these polymers whose accumulation in terrestrial and aquatic ecosystems cause a great environmental impact.

We analyzed the rheological and tribological characteristics of the obtained oleogels. The results achieved show the suitability of the new oleogels obtained from residual commercial lignins and straw soda lignins as eco-friendly substitutes of the commercial greases on the basis of their high robustness, high biodegradability and low toxicity when compared with industrial lubricants.

ADVANTAGES AND INNOVATIONS

Nowadays there is an increased interest to drive the research efforts to the establishment of eco-friendly and sustainable technologies. Our principal aim is to try to transform agricultural residues and their residual derivatives (i.e. lignin) with microorganisms and/or their enzymes to achieve high added value products. Taking into account this plan we would be talking about a new approach to the economy, moving from the traditional "linear economy" to a "circular economy" where the wastes generated by the productive system are reused and transformed into raw materials that would enter again in multiple points of the value chain of productive system, promoting energy saving, the use of renewable energy sources and reducing greenhouse gas emissions.

The proposed technology to obtain oleogels from residual lignins to be used as thickening agents for new formulations of eco-friendly lubricants and adhesives offer environmental and economic advantages over the commercial greases. The use of previously selected microorganisms for their ability to transform agricultural residues through the production of a wide range of oxidative and hydrolytic enzymes, as well as their enzymes to functionalize residual lignins could contribute to technical and scientific development which tries to substitute total or partially the chemical procedures by biological approaches in order to achieve the planet sustainability.