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An Approach of Creating of an Intelligent Mobile Tutoring Eco-social Laboratory for Assisted Recreation

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Introduction

Development of preconditions for assisted and sustainable recreation may bring an incentive to stimulation of economics and minimization of social exclusion among elderly and people with some movement disabilities. An implementation of an Intelligent Mobile Tutoring Eco-Social Laboratory for Assisted Recreation may help to do that. Such a laboratory could be used as recreational tool for a typical European household/family as well as for research work of incoming guests, scientists and managers. This type of laboratory may help to automatically collect of an experience and knowledge in the process of development of preconditions towards of sustainable recreation of the elderly and/or people with movement disabilities based on their assisted activities in the mobile smart flat and an environment around it [1]. In the Klaipeda university, research work runs to developing of ambient intelligence by creating of: agent-based adaptive e-learning environment [5, 7], pattern recognition and artificial intelligent methods for gaining of social activities of socially isolated and ageing people by using embedded agents and communications between embedded agents in a distributed e-laboratory, models of intelligent bio-robots for e-health and e-social care support [4, 5–8]. The process of recognition of physiological state of an individual is based on non-invasive measurements of very small physiological signals taken from electrodes noninvasively attached on human body. The amplified electrocardiogram (ECG), electro dermal activity (EDA), and human's body temperature signals are used in the experimental models for emotion recognition, and an experimental environment for digital data acquisition and representation, the multi-channel oscilloscope is developed [9]. In this paper, the following steps of creating of an intelligent environment of tutoring eco-social laboratory for assisted recreation are presented by analysis of: principles of designing of sustainable power supply and selecting of professional bio-feedback hardware/software for mobile laboratory, development of an ambient intelligent architecture of the Laboratory, creating of algorithms for assisted recreation to be applied, and methods of dissemination of how the Laboratory could be used as recreational tool for a typical European household/family.

Sustainable power supply of mobile laboratory

As an example of usage of hybrid power generation approach, two different sustainable power supply systems are discussed. By [3], in the village of Xcalak, Mexico, PV is part of the largest hybrid generation system in the Americas. The system includes 6 wind turbines, 234 PV modules, 36 batteries, and a 40-kilowatt inverter to convert dc power to ac, a diesel generator, and a sophisticated control system, and it can be expanded.

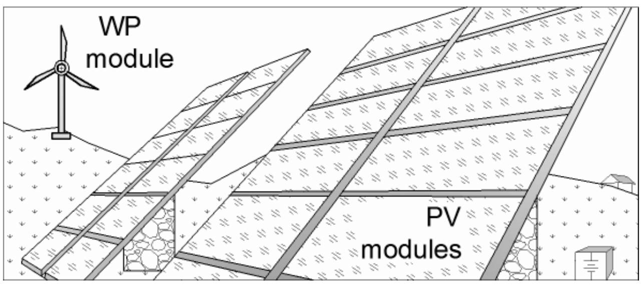


Fig. 1. The hybrid Photo Voltage & Wind Power System with battery storage

Another example by [3] is the hybrid PV-WP System with battery storage that supplies power to a Canon City, Colorado, home (see Fig. 1). It was installed by Solar Solutions Ltd. of Silver Cliff, Colorado, and this of 2.88-kilowatt system includes 24 120-watt modules, 20 Trojan L-16 6-volt deep-cycle batteries, two Southwest Wind-power AIR403 wind turbines, two tilt-up wind turbine towers, and a vented battery box. Analysis of those two examples allows selecting elements of sustainable power supply of the mobile laboratory of Fig.2. As solar panels, the 12 V of Polycrystalline PV Modules of either of BP 350J 50W (L x W x D = 839 x 537 x 50 mm, 6.0 kg, 249 Euro) or BP340U 40W (L x W x D = 655 x 537 x 50 mm, 5.75 kg, 235 Euro) may be used in a mobile laboratory to charge of 2 or 4 of 12V/105 Ah 27TM deep cycle batteries (L x W x H = 324 x 171 x 248 mm, 29 kg, 247 Euro) connected in series via controller such as 24VDC Morningstar SunSaver MPPT Charge Controller SS-MPPT-15L (167x70x56 mm, 0,748 kg, 179 Euro) on Fig.2a or 48VDC Morningstar PS-15M-48V Prostar 15 Charge Controller (153 x 105 x 55 mm, 0,34 kg, 185 Euro) on Fig.2b. The AIR X 403 wind generator (435 Euro) WP module can be used for hybrid power supply of the Laboratory of Fig.2. Its characteristics: Rated Output-400W at 28 mph, Rotor Diameter-116.8 cm, Number of blades-3, Blade Material-carbon reinforced thermoplastic, Lateral Thrust–68kg, Unit Weight–5,9kg, Voltages available-12; 24; and 48 VDC. The AIR wind module is engineered to be mounted on a rooftop, no tower required. The two types of Photo-Wind Power modules of 600W are proposed to supply of mobile laboratory of either of 1200W max (see Fig.2a) or 1500W max (see Fig.2b). The module of Fig.2a charges 2 x 12V/105 Ah 27TM batteries via WS24600 24V PV and Wind Hybrid charging controller (D x W x H = 220 x 137 x 77.5 mm, 196 Euro). It uses Single-phase Output Off-grid SN241KS 24VDC/220VAC Inverter (502 Euro) to produce of 220V 50Hz up to 800W power to main installation for the Mobile Laboratory (see Fig.2c). The WG1K5TL Small-scale Wind Turbine Grid-tied Inverter (288 x 417 x 126 mm, 11.5 kg) is used for converting of 220VDC into 220VAC 50Hz up to 1500W for the of Fig.2b. The PV and Wind Hybrid Charging Controller WS482K (180 x 137 x 77.5 mm, 236 Euro) is used for charging of 4 x 12V/105Ah 27TM batteries from both of AIR and the block of 4 x 12V/50W BP 350U. The 12VDC power can be given to supply of iLab agency for creating of Ambient Intelligent Environment and economic lightening system in the Laboratory via The 24/12 (Fig.2a) or 48/12 (Fig.2b) DC/DC converters are used to supply of iLab as well as sub feeding of hybrid car driving batteries in case if there would be a hybrid car used for pulling the fifth wheel trailer via smart DC/DC converter capable of feeding of car batteries by the range of 240 to 280 VDC. The WG1K5TL type inverter of Fig.2b can be used for feeding the Lab control actuators, standard equipment of the trailer as well as to the public power grid if desired. In this case, one could earn money in selling power to other consumers: when there is a surplus of PV power generated during the day and wind power, the excess power is feed into the grid and serves other customers: the power Meter runs backwards, reducing your electricity bill. Such a system allows buying AC power for extra car batteries charging if it is necessary.

Analysis of the professional bio-feedback hardware and software to be integrated in the Mobile Laboratory

The Heart Wizard HRV System (182 Euro), the *HRVW* is an interactive Internet tool capable to obtain and process of Heart Rate Variability (HRV) from a simple non-invasive sensor that clips on the earlobe or finger tip. The interpretation of this data provides valuable, and more importantly, useful insight into the psycho-physiological health status of both healthy people and those who are unhealthy. Computer requirements: A desktop or a laptop with OS Windows ME or newer and NET Framework 1.1.

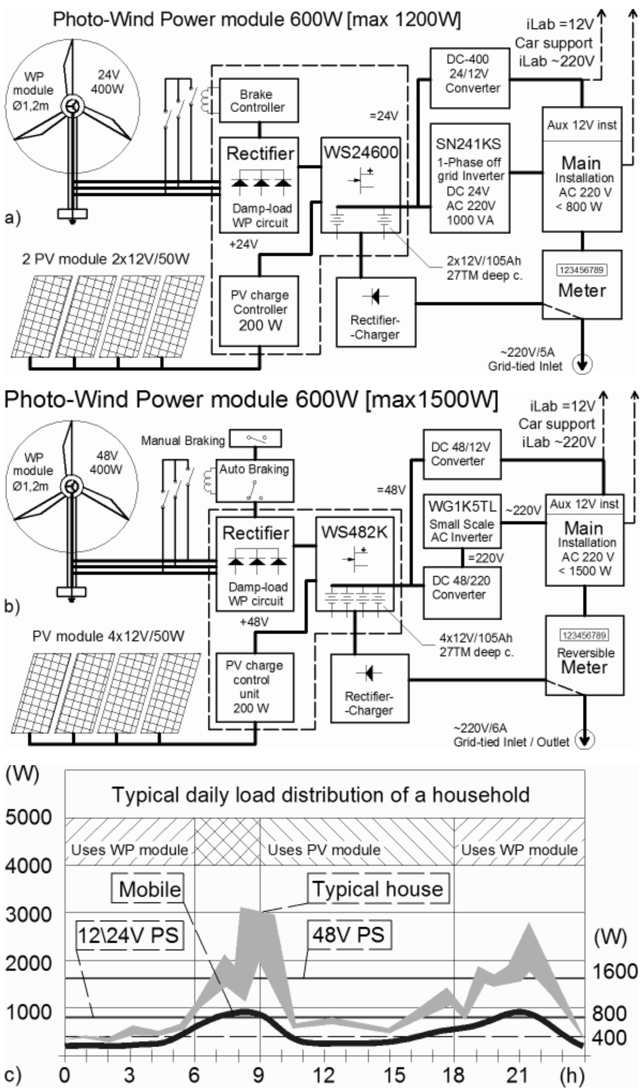


Fig. 2. The hybrid PV-WP supply system for mobile eco-social laboratory

Additional User Module for Heart Wizard (18 Euro) allows recording of more than one individual. Each user has one's own slot (module) to allow for individual tracking of personal wellness.

The HeartTracker 3.0 Stress Reduction Software (215 Euro) monitors the parameters of heart rate variability (HRV) derived from a PPG (photoplethysmograph) signal.

HeartTracker has lots of applications in stress management, optimum performance, fitness, education

The Compact EMG Monitor MyoTrac™ (365 Euro), the *EMGM* is for clinical assessment as well as for self-training. It allows total freedom of movement for ambulatory exercises and provides a bright light bar and proportional tone biofeedback.

The GSR 2 (M-10-2120-CalmLink+GSR/Temp2X 161 Euro), the *GSR2* home biofeedback device precisely monitors one's stress levels by translating tiny tension-related changes in skin pores into a rising or falling tone. By resting two fingers on the sensing plates, one can learn to lower the pitch and one's stress level. Cordless finger-rest sensor with built-in-tonal feedback automatically measures galvanic skin resistance (GSR).

The Biofeedback Starter Kit (428 Euro), the *BSK* utilizes several different physiological systems in order to provide an easy and inexpensive way to show simple relaxation techniques. The *CalmLink* Software for GSR2 (44 Euro) the *CalmLink* is the GSR2 PC Interface software for relaxation and stress control.

The Polar RS800 Heart Rate Running Computer (270 Euro), the *PolarComp* is a complete system for planning, monitoring and analyzing of one's training and allows you to create and name your own favorite time and/or heart rate. It provides an easy way to select and monitor the intensity of your training and to follow Poplar's sport zones based training programs.

The ProComp5 Infiniti™ (The ProComp5 Infiniti system, with 5 simultaneous feedback channels, includes the BioGraph Infiniti software, the EEG or Physiology Suite (2189 Euro)), the *PC5I* is housed in an ergonomically-designed case and requires only a USB port to connect to any IBM compatible PC. For viewing of raw EEG, EMG, EKG and HR/BVP signals, the following additional modules should be installed in the Laboratory: EMG module (281 Euro), the *EMGM*, EKG module (201 Euro), the *EKGM,* the GSR module (201 Euro), the *GSRM,* the Temperature module (146 Euro), the *TM*, Respiration module (201 Euro), the *RM,* and the Heart Rate/BVP module (201 Euro), the *HR/BVPM*

The Personal Efficiency Trainer ® *PET ECG* module (1381 Euro for PET ECG 2 channels Package) can be used for Heart Rate/Heart Rate Variability Monitoring and Feedback. The *BioExplorer* software is required for the PET WIRELESS ECG or PET WIRELESS ECG/EMG (347 Euro).

The *PET EMG* module (1381 Euro for PET EMG 2 channels Package) measures muscle tension in various muscle groups in the body. It can be used for research or as a tool to reduce tension and induce a more relaxed state. It can also be used to monitor or promote subtle changes in the muscle activity for peak performance training in sports.

The *PET GSR* Wireless Package (1352 Euro) can measure aspects of stress, orienting response, and vigilance, includes Wireless GSR module, GSR Sensor, *BioExplorer* Software v1.5. The *BioExplorer* is a Windows program for real-time biophysical data acquisition, processing, and display. For post-session review of recording the time, date, electrode locations, and subject name with each session, the *BioReview* **(**311 Euro) can be used.

Development of an ambient intelligent architecture of the Laboratory

The Laboratory can be treated as an intelligent dormitory containing areas for varied recreation activities such as sleeping, working, entertaining as well as of planning, monitoring and analyzing of personal biofeedback information during the recreation activities in the Laboratory. An intelligent environment of the Laboratory may be implemented in the UltraLite–type fifth wheel trailer (25807 Euro) which comes with all the necessities for luxury leisure time of the group of up to 6 persons. To make the Laboratory as responsive as possible to needs of its occupant's, it has to be fitted with an array of embedded sensors (such as temperature, occupancy, humidity, and light-level sensors) and effectors (such as door actuators, heaters, and blinds). Among these interfaces, the virtual reality modeling interface for controlling the Laboratory is to be implemented. It will be providing the user with a visualization tool showing the current state and enabling direct control of the various effectors in the Laboratory. The remote communications within the intelligent environment in the Laboratory may be performed by implementing of modified Fuzzy-Incremental Synchronous Learning, the FISL Architecture of Fig.3 proposed by [1]. The physically static computational artifact, the *iLab Embedded Agent* should be created to receive sensor values through the network, to contain of the learned behaviors of the logged in the iLab users, and to compute the appropriate control actions using the FISL system of Fig.3, which forms the learning engine of the *iLab's* embedded agent. The FISL system can provide lifelong learning and it adapts by adding, modifying, or deleting rules. The embedded agent is an augmented-behavior-based architecture, which uses a set of parallel fuzzy logic controllers (FLCs), each forming a behavior. In the architecture of Fig.3, the behaviors available to the *iLab* embedded agent are divided into fixed and dynamic sets, where the dynamic behaviors are learned from the behaviors of the users in the *iLab* and the fixed behaviors are preprogrammed based on signals to be read from sensors.

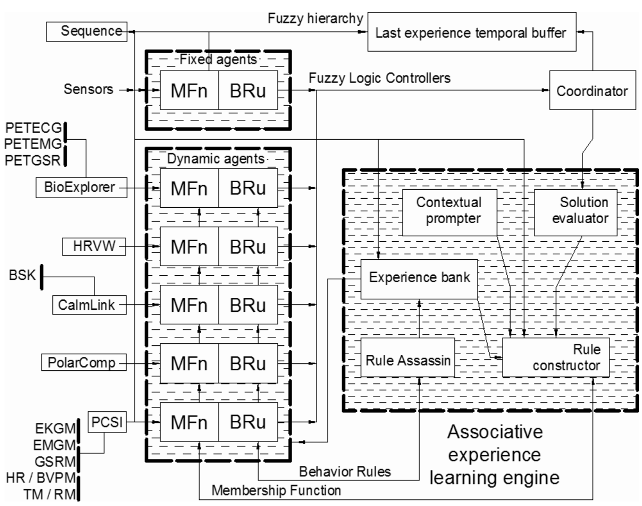


Fig. **3**. The modified Fuzzy-Incremental Synchronous Learning Architecture of the Laboratory proposed by [1]

For every logged into the system user, each dynamic FLC represents one parameter, the rule base for each behavior that is to be modified. The dynamic behaviors are to be learned for the users who are monitored by the following devices: *PETEMG, PETECG, PETGSR, HRVW, BSK, PolarComp, ECGM, EMGM, GSRM, HR/BVPM, and TM/RM.* In the architecture of Fig.3, each behavior uses a FLC by applying of a singleton fuzzifier, triangular membership functions, product inference, max-product composition, and height defuzzification. The equation that maps the system input to output is

$$Y_t = \frac{\sum_{p=1}^{M} y_p \prod_{i=1}^{G} \alpha_{Aip}}{\sum_{p=1}^{M} \prod_{i=1}^{G} \alpha_{Aip}}; \qquad (1)$$

where M is the total number of rules, y_p is the point having maximum membership in the p^{th} rule output fuzzy set, $\prod \alpha\ Aip$ is the product of the membership functions for each rule's inputs, and G is the number of inputs The rules and preferences are to be learned during the monitoring mode form the basis of the user rules, which are reactivated whenever the user logs into the system. During this initialization period, the system monitors the inputs and the user's action and tries to infer rules from the user's behavior. The user will usually act when a set of environmental and the users psycho-physiological conditions is unsatisfactory by altering the output vector (for example, the user needs to turn a light on or adjust the. Learning is based on negative reinforcement because users will usually request a change to the environment when they are dissatisfied with it. After the monitoring period, the ISL enters a control mode in which it uses the rules learned during the monitoring mode to guide its control of the room's effectors. Whenever the user behavior changes, it might need to modify, add, or delete some of the rules in the rule base. As in the case of classifier systems, to preserve system performance, the learning mechanism replaces a subset of the classifiers (the rules in this case). The worst *m* classifiers are replaced by *m* new classifiers. In this case, it shall be changed all the consequents of the rules whose consequents were unsatisfactory to the user. These rules should be obtained by finding all the rules firing at this situation whose firing strength is $\prod \alpha\ Aip > 0$. These rule consequents should be replaced by the fuzzy set that has the highest membership of the output membership function. This replacement is made to achieve nonintrusive learning, avoiding direct interaction with the user. The set of learned-consequent fuzzy rules is guided by the *Contextual prompter*, which uses sensory input to guide the learning. During the nonintrusive monitoring and the lifelong-learning phases, the agent encounters many different situations as both the environment and the user's behavior change. The learning system consists of different learning episodes; in each situation, the agent will fire only a small number of rules. The model the agent must learn is small, as is the search space. The accent on local models implies the possibility of learning by focusing at each step on only a small part of the search space, thus reducing interaction among partial solutions. The interaction among local models, due to the intersection of neighboring fuzzy sets, means local learning reflects on global performance. Thus, the global results can be obtained from the combination of local models and smooth transition between close models. The system has an *Experience Bank* that stores all the previous occupiers' rule bases. After the initial monitoring phase, the system tries to match the user-derived rules to similar rules stored in the *Experience Bank* that were learned from other occupiers. The system chooses the rule base that's most similar to the user-monitored actions. All the rules that are constructed and added to the system are symbolized by the *Rule Constructor* block in Figure 3. The system then operates in the control mode with this rule base until the behavior of the logged user indicates that his/her needs have altered; this change is flagged by the *Solution Evaluator*.

Methods of creating of an intelligent tutoring environment of the Mobile Laboratory

The knowledge base of the *iLab* agent of Fig.2 can be supplemented by making clusters of facts necessary for creating of *iLab's* learning engine [7] based on usage of the Self-Organizing Map (SOM) [2]. The Self-Organizing Map belongs to the class of unsupervised and competitive learning algorithms. The SOM algorithm proceeds iteratively. On each training step, a data sample x from the input space is selected. The learning process is competitive, meaning that we determine a winning unit c on the map whose weight vector m_c is most similar to the input sample x:

$$\|x - m_c\| = \min_i \|x - m_i\| \cdot \qquad (2)$$

The weight vector m_c of the best matching unit (BMU) is modified to match the sample x even closer. As an extension to standard competitive learning, the nodes surrounding the BMU are adapted as well. Their weight vectors m_i are also "moved towards" the sample x. The update rule may be formulated as:

$$m_i(t+1) = m_i(t) + h_{ci}(t) * (x - m_i(t)). \qquad (3)$$

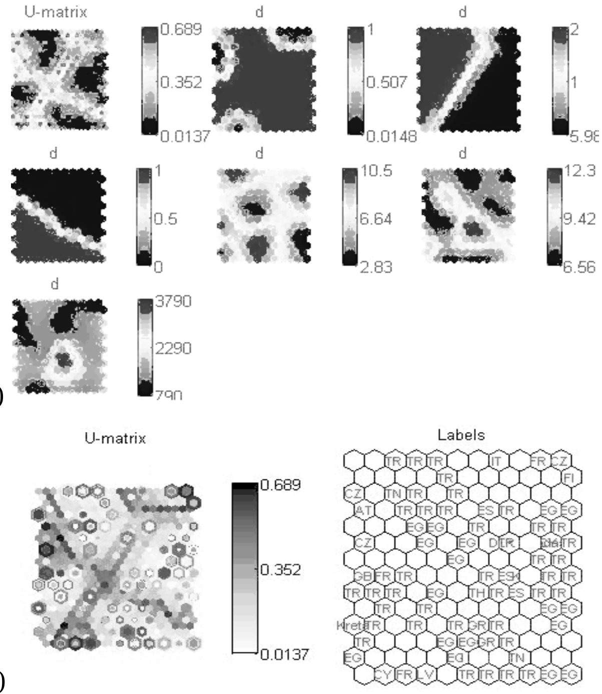
The scalar factor $h_{ci}(t)$ is often referred to as the neighborhood function. It is usually a Gaussian curve, decreasing from the neighborhood centre node c to the outer limits of the neighborhood:

$$h_{ci}(t) = \alpha(t) * \exp\left(-\frac{\|rc - ri\|^2}{2\ o(t)^2}\right) \cdot \qquad (4)$$

The $\alpha(t)$ is a scalar multiplier called the "learning rate". It may be regarded as the height of the neighborhood kernel. The improvement of the radius $o(t)$, or the width of the neighborhood kernel, specifies the region of influence that the input sample has on the map. In the http://www.cis.hut.fi/projects/somtoolbox/, a function package for Matlab implementing of the Self-Organizing Map (SOM) algorithm allows to: train SOM with different network topologies and learning parameters; use other data analysis methods related to clustering, dimension reduction, and proximity preserving projections.

Results and discussion on dissemination of usage of the Laboratory for recreation

To assemble of such mobile laboratory by prices of 2009/01/15 might cost of approximate 37,800 Euro. There would be a good choice to use a car such as Toyota Prius Hatchback 1.5 VVTI T3 Hybride for pulling the Laboratory which might cost of approximate18, 950 Euro. The Laboratory could be used as recreational tool for a typical European household/family. By applying all intelligent software as described above, it may turn into modern eco-and-human friendly movable camper. With the help of such camper, families or households may plan their leisure travel all across Europe and beyond. This would be efficient and economic way of spending your holiday: the need for accommodation is fully provided by the camper itself. Moreover, the camper enables travellers to get all basic utilities such as food preparation, sleeping etc. Even the need for external energy sources (while staying in camping) could be minimal as the renewable energy sources will be used for its operation. On the other hand, such holiday will have its cognitive meaning as the travellers will visit different countries and will learn respective cultures and natural resources. Combined with social/cultural educational aspect of such tours, the use of renewable energy sources along with monitoring the travellers' physiological condition will have a positive effect on people's travel and holiday trends. In case when this type of Laboratory would be rented by different customers for their recreation, the results of SOM type visualization in Fig.4 provide a useful knowledge about a profile of the tourists described in the Tourist Data of the Krantas Travel Co. [7] who might use that Laboratory for their recreation in the future. The 2nd map of Fig.4b displays clusters of tourists by destinations.



a)

b)

Fig. **4**. U-matrix representation (*a*, and *b*) of the SOM of the Tourist_Data(Transport(plane=1, bus=0); Type(group=2, family=1, single=0); Sex(m=1, fem=0); Month(1-12); Duration(1-18, d); Price/Person(300 – 2 000, Lt)) by [7]

The clusters with a label *TR* (Turkey) are clearly visible in it. One of them lies on the left side of the first 4 upper rows. In the right two columns of lower part of Fig.4b, the cluster with a label *EG* informs us that single both male and female type tourists visited Egypt by plane in an early spring time for about 10 days and for approximately 2000 Lt price per person. Another cluster with a label *EG* is seen in the middle and slightly to the left side of Fig.4b. By help of Fig.4a, both the family and group type tourists of this cluster visited Egypt by plane in an early spring time for slightly more then 10 days and for slightly more then 2000 Lt price per person. The cluster in the first column of the 3rd, 4th, and 6th rows of Fig. 4b , by using maps of Fig.4a, shows that the group type both male and female tourists visited Czech Republic and Austria by bus at the early autumn time for les then 6 days and for les then 700 Lt price per person. The cluster in the last two neurons of the first row of Fig.4b, by using information of maps in Fig.4a, informs us that at the beginning of summer a single female type tourists visited Check Republic and France by bus for les than 6 days and for les then 700 Lt price per person. The maps of Fig.4a indicate the following: those tourists used a plane as a transport (see the 2nd map of Fig.4a); they were group or family type tourists (the 3rd map); they visited Turkey during the summer and autumn months (the 5th map); duration of this visit was about 8-10 days (the 6th map); a price per person for this visit was about 1500 Lt (the 7th map). The cluster with a label *TR* on the right side of the last row of Fig.4b, by using SOM maps of Fig.4a, informs that the single male type tourists went by plane to Turkey during the summer months for a week time interval, and the cost per person for this visit was les then 1500 Lt. The cluster with a label *TR* in the middle of the right side of Fig.4b, by using information of Fig.4a, says that a single female type tourists visited Turkey by plane at early summer time approximately for a week time period for about 1500 Lt price per person.

Conclusion

An approach of designing of an Intelligent Mobile Tutoring Eco-Social Laboratory for Assisted Recreation is proposed in this paper. To assemble of such mobile laboratory by prices of 2009/01/15 might cost of approximate 37,806.00 Euro. The Laboratory could be used as recreational tool for a typical European household/family as a modern eco-and-human friendly movable camper. The need for external energy sources, while staying in camping, could be minimal as the renewable energy sources will be used for its operation. Combined with social/cultural educational aspect of such tours, the use of renewable energy sources along with monitoring the travellers' physiological condition will have a positive effect on people's travel and holiday trends.

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An approach of development of an Intelligent Mobile Tutoring Eco-Social Laboratory for Assisted Recreation is proposed based on description of: principles of designing of sustainable power supply and selecting of professional bio-feedback hardware/software for mobile laboratory, methods of creating of an ambient intelligent architecture of the Laboratory as well as of algorithms for assisted recreation to be applied, and methods to be applied for dissemination of how the Laboratory could be used as recreational tool for a typical European household/family. The Laboratory can be treated as an intelligent object containing areas for varied activities such as sleeping, working, entertaining as well as of planning, monitoring and analyzing of personal biofeedback information during the recreation activities in it. An intelligent environment of the Laboratory may be implemented in the *UltraLite*–type “fifth wheel” trailer which comes with all the necessities for luxury leisure time of the group of up to 6 persons. To assemble of such mobile laboratory by prices of 2009/01/15 might cost of approximate 37,806.00 Euro. This type of laboratory may help to automatically collect of an experience and knowledge in the process of development of preconditions towards of sustainable recreation of the elderly and/or people with movement disabilities based on their assisted activities in the mobile smart flat and an environment around it. Ill. 4, bibl. 9 (in English; summaries in English, Russian and Lithuanian).

А. Андзюлис, А. А. Бельскис, В. Денисовас, О. Рамашаускас, Й. Бельскене, П. Бельскис, Е. Гусейновене. Способы создания мобильной, интеллектуальной учебной эко-социальной лаборатории для ассистируемой рекреации // Электроника и электротехника. – Каунас: Технология, 2009. – № 3(91). – С. 61–66.

Предложен метод создания и развития мобильной, интеллектуальной эко-социальной учебной лаборатории, предназначеной для исследований ассистируемой рекреации. В статье также описан проект восстанавливающегося энергоисточника и профессионального программно-аппаратного оборудования для обеспечения мобильной лаборатории био-обратной связью. Предлагаемая лаборатория может действовать как интеллектуальный объект, содержащий в себе места для занятий и релакса, кроме этого, используемый как средство сбора и анализа данных, контроля личного здоровья, исследуемых с помощью системы биологической обратной связи. Интеллектуальная среда лаборатории реализована на базе UltraLite кемпера с необходимым снаряжением для комфортного проживания до 6-и людей. Общая стоимость лабораторного оборудоваия – около 37806 евро. Созданная лаборатория может помочь при сборе и накоплении данных о процессе реабилитации пожилых людей, с осложнениями передвижения, оказать помощь при восстановлении активности в привычной им обстановке, а также применяться и как средство досуга для типичной эвропейской семьи. Ил. 4, библ. 9 (на английском языке; рефераты на английском, русском и литовском яз.).

A. Andziulis, A. A. Bielskis, V. Denisovas, O. Ramašauskas, J. Bielskienė, P. Bielskis, E. Guseinovienė. Asistuojamajai rekreacijai taikytinos intelektualios mobilios mokomosios eko-socialinės laboratorijos kūrimo būdai // Elektronika ir elektrotechnika. – Kaunas: Technologija, 2009. – Nr. 3(91). – P. 61–66.

Pasiūlytas metodas kurti intelektualiai, mobiliai, besimokančiai eko-socialinei laboratorijai, skirtai asistuojamajai rekreacijai tirti. Sukurtas atsinaujinančio maitinimo šaltinio ir profesionalios biologinio grįžtamojo ryšio aparatinės-programinės įrangos, skirtos mobiliai laboratorijai, projektas, taip pat protingos architektūros laboratorijos kūrimo metodai ir asistuojamosios rekreacijos sukūrimo algoritmai. Tokia laboratorija galėtų būti panaudota kaip pramogų priemonė tipiškam Europos namų ūkiui/šeimai. Laboratorija gali veikti kaip intelektualus rekreacinis objektas, turintis darbo ir relaksacijos vietas, o dėl biologinio grįžtamojo ryšio gali būti naudojama ir kaip asmeninės sveikatos informacijos rinkimo ir analizavimo priemonė. Intelektuali laboratorijos aplinka sukuriama UltraLite tipo turistinėje priekaboje su visais pirmo būtinumo dalykais patogiam iki 6 asmenų grupės laisvalaikiui. Aprašytos mobilios laboratorijos įrangos kaina (2009-01-15) – 37806 eurai. Laboratorija gali padėti rinkti ir kaupti žinias pagyvenusių ir/ar judėjimo negalią turinčių žmonių reabilitacijos procese, grąžinti šiems žmonėms aktyvumą jiems įprastoje aplinkoje. Il. 4, bibl. 9 (anglų kalba; santraukos anglų, rusų ir lietuvių k.).