Kineage - Adapted Kinect game for exercise and fun

Bilbao, España
Amaia Méndez

Etapa del Proyecto:
Establecido
Website:
http://www.deustotech.deusto.es/

- Aging
- Disability
- Recreation
- Technology

Resumen del Proyecto

Presentación del Proyecto!

Resumen conciso: Ayúdenos a presentar esta solución! Proporcione una explicación en 3 o 4 frases cortas.

Serious game for the elderly, configurable to different physical disabilities and valid for users in wheelchairs, promoting exercise and leisure.

About Project

Problema: ¿Qué problema está tratando de abordar este proyecto?

The current increase in the aging of our population and the lack of knowledge the elderly have of new technologies implies that they are immersed in the digital divide. This implies that older people are not able to participate and are therefore excluded from digital society. Many new technologies that could improve their quality of life are not accessible to them, it is for example the case of smartphones, computers, video games, etc. In particular, it has been tested that the use of games can benefit their quality of life, health and wellbeing, as they reinforce cognitive and physical exercise by means of accessible leisure. One of the latest tendencies in the field of video games is the use of devices that do not require the use of remote controls, such as the Kinect sensor. This sensor recognizes the movements of the user, who controls the game with the body. On the market there exist various products made with kinect aimed at older people. Nevertheless, these games do not work with users in wheelchairs, not being able to use this type of games. There are also older people with physical disability, such as those with muscular dystrophy, where in most cases low mobility in either of the upper extremities is presented. These people are also not able to access this type of serious game, since it is not adapted to their specific needs.

Solución: cuál es la solución propuesta? Por favor sé específico!

The solution comprises a serious game in 3D to help the elderly exercise while having fun. The difference of this solution with other products available on the market is that it can be used even in wheelchairs, and it can be adapted to the particular necessities of the user. This way, exercise, rehabilitation and the enjoyment of an accessible leisure is promoted, also reducing the digital divide. A kinect sensor is used, which captures users' movements and permits to control the game without the need to use a remote control. The game consist of three different levels in which the user should collect various objects appearing on the screen by moving the arms, in order not to let the objects fall, promoting this way both the mobility of the user during the training (game play) and the cognitive process. Firstly, and in order to do the game more generalized, the game allows to specify the typology of the user, i.e., with or without any movement in their legs (use of the wheelchair), and giving the player the option to play standing or sitting. Additionally, users may present limit mobility in either arm (even absence of absolute movement in either of the two members), thus being the game configured in such a way that the user can choose if it wished to play with the left arm, right arm or both. The game displays three different levels of three minutes each to avoid fatigue in training. In the first level, the objects (cupcakes and bottles of wine) shall follow a vertical path. In the second level the number of these objects increases and in the level three the objects follow a horizontal path. At the end of each one of the levels the user shall reach a piece of cake, until achieving as a final reward a whole cake after finishing the three levels. Even by having a total lack of knowledge of new technologies, the users are able to play the game, learn about its use and apply this knowledge in other technological fields,addressing the problem of the digital divide.
**Impact: How does it Work**

**Ejemplo: Guíenos a través de un ejemplo/s específico/s de cómo esta solución hace la diferencia; incluya sus actividades principales.**

"La Misericordia" nursing home, Bilbao. Pepe, age 85, uses a wheelchair and has muscular dystrophy. He needs to practice regular exercise and wants to have fun, so he asks the nurses to switch on the game, and they configure it to be adapted to his needs: his right arm has low mobility and has a better use of the left one. Pepe selects the option "Play" moving his arm, and the level 1 of the game starts. The game has 3 levels of difficulty. In the first level, a low quantity of objects (pieces of cakes and bottles of wine) appear on the screen top-down following a vertical trajectory. In the second level, the difficulty increases, a wider quantity of objects appear in a vertical way. The third level is the most difficult one, where the objects follow a horizontal path. Pepe has to pick them moving his arms. If he achieves to pass all levels, his prize is a cake. By using the game, Pepe enjoys making exercise (rehabilitation) and is able to use the game even in a wheelchair.

**Sustentabilidad**

**Mercado: ¿Quién más está abordando el problema aquí descrito? ¿Cómo difiere el proyecto propuesto de esos enfoques?**

Currently, there exist various products carried out by different enterprises and research centres made with Kinect, and are addressed to promote active aging. Examples of this can be: Kinelabs (University of Hong Kong) which benefits the elderly and people with motor disabilities after stroke for rehabilitation and improvements of their quality of life. The studies conducted by Ganesan and Anthony (2012) reported a work in progress focused on older adults, aiming for finding the factors that play an important role in motivating them to maintain a physical exercise routine. ROGER (Realistic Observation (in) Game and Experiences (in) Rehabilitation) is a serious game developed by Fishing Cactus, uses Kinect for medical rehabilitation and it is dedicated to patients suffering from a lack of logic and organizational skills. Lange et Al (2011) reported a game-based rehabilitation tool for balance training. Nonetheless, our solution is the only one working with users in wheelchairs, being also possible to adapt the exercise to the user’s specific physical needs. With the aim of developing our project, we cooperate with other institutions, research centres and user collectives.

---

**Sobre ti**

**Nombre**

Amaia

**Apellido**

Méndez

**Correo electrónico**

amaia.mendez@deusto.es

---

**Implementer(s) and cooperation partners**

**Name**

Deustotech-Life (eVida) from the University of Deusto

**Type**

University

**Country where main implementer is located**

VZ, Bilbao

**How long has the main implementer been operating?**

Más de 5 años

**Please provide a short description of the main implementer.**

The Deustotech-Life (eVida) research team from UD, composed by telecommunications and computer science engineers, has been recognized since 2010 with B category of Excellence by the Basque Country Government for the high quality of their research works. The activities of the team are focused on technological developments for people with disability and active ageing, in the fields of telediagnosis, telerehabilitation and Serious Games for Health. The research team has been participating in more than 50 national and international research projects within those fields since 2002.

---

**Cooperation partner**

**Type**

Seleccione

**Página Web**

How does this cooperation partner support the initiative? What competencies and resources does this partner bring to the initiative?

Approximately 50 words left (300 characters).
**Cooperation partner**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Página Web</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**How does this cooperation partner support the initiative? Which competencies and resources does this partner bring to the initiative?**

Approximately 50 words left (300 characters).

---

**Cooperation partner**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Página Web</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**How does this cooperation partner support the initiative? Which competencies and resources does this partner bring to the initiative?**

Approximately 50 words left (300 characters).

---

**Cooperation partner**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Página Web</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**How does this cooperation partner support the initiative? Which competencies and resources does this partner bring to the initiative?**

Approximately 50 words left (300 characters).

---

**Problem and solution**

**Which of these fields of Active and Healthy Ageing are addressed by your initiative?**

- Personalized health management
- Prevention and early diagnosis of functional and cognitive decline
- Independent living solutions

**If none of the above, answer here:**

Please describe if and how your stakeholders (cooperation partners, funders, users, etc.) have been participating in defining the problem and developing the solution.

The project is carried out by experts from different areas. On the one hand, the Deustotech-Life (eVida) research team from the University of Deusto (UD) is composed by computer scientists and telecommunications engineers. On the other hand, the team from La Misericordia nursing home is composed by psychologists and physiotherapists, and acted as external partners.

The problem was defined by means of a series of meetings between both groups where the experts from the nursing home presented their ideas regarding the real needs of the older people collective, previously described. In order to address this needs, the Deustotech-Life (eVida) research team worked on the different technological solutions existing on the market, and after analyzing the advantages and disadvantages of each one of them, and seeing that none of them covered the desired needs, they decided to create a new tool based on their experience.

UD team designed and developed the game adapting the Kinect sensor to the specific needs of the project. During all the process of creation, the experts from the nursing home and the end users participated, thus ensuring that their necessities are covered.

**Has your solution been tested in trials, experimentations, or pilot projects? If yes, please describe the process and outcome.**

Our solution was tested in a pilot project. Fourteen users (9 women, 5 men) aged between 65 and 94 were selected to take part in this study.

First of all, permission to carry out the study was obtained from the home nursing and the Institutional Review Board (IRB Committee). Participants provided prior informed consent written and were informed explicitly of each step in the process, the consequences of obtaining data and the purpose of collecting it. After this, they were asked to complete a general survey form.

Testing took place in participants' usual learning setting being the performance subject to the same environmental influences and distractions that prevail in the situation for which the system is intended. Each participant took part in an individual game session lasting nine minutes while physiotherapists sat alongside. Three sessions were performed in different weeks.

Feedback was taken from physiotherapists' observations and user experience questionnaires, which allowed adapting the game to their needs with a result of 86.25% of satisfaction. The tests showed that users were not aware that they were doing more exercise than what they actually thought.

**¿Hace cuánto que viene operando tu organización?**

for 15 years

**Please select the relationship between your solution and related solutions currently established in our society. Is your solution...**

substitutive (your solutions is substituting existing solutions because they do not meet needs or solve the problem appropriately)

**What barriers might hinder the success of your initiative? How do you plan to overcome them?**
We have identified several barriers:

First of all, in nursing homes it is possible to implement the solution, since they count with health-care professionals to help elderly people who have a higher level of difficulty to start the game. This solution is designed to be also implemented in homes. However, if there was a case where a person with a high level of disability wants to use the game, it would be necessary to count on health care staff to help the user to start the game. In order to overcome this barrier, the plan is to develop new techniques to make this solution more accessible to these users.

Secondly, the fast development of new technologies implies that systems quickly become obsolete. Our research team is continuously working with cutting-edge technologies and developing new solutions to address the latest needs.

Finally, the implication of public and private institutions is fundamental to ensure financial sustainability.

---

**Organization and funding**

**Regularly paid employees**
- 30

**Volunteers**
- 0

**Trainees**
- 0

**External advisers and experts**
- 2

**Others (please specify)**
- 0

**What are the specific professional backgrounds and competencies your team brings to the initiative?**

Deustotech-Life (eVida), composed by telecommunications and computer engineers, develops technological solutions for people with disabilities, neuropsychological disorders, active ageing and independent living. It has participated in more than 50 national and international research projects within those fields since 2002.

One of our priorities are Serious Games for Health, with several projects financed by the Basque provincial and regional Governments.

The team is complemented with the support of the external experts from the nursing home, forming a multidisciplinary group.

**Please describe your management or coordination structure in the initiative.**

Our team is structured as follows:

The head of the research group is Begoña García, the main researcher. She coordinates the other researchers of the group in the design and development of the solution.

As far as the external partners is concerned, there is a group of experts from La Misericordia nursing home, composed by a physiotherapist and a psychologist.

We collaborate with public and private research and funding institutions and companies for the development of our initiatives. This project is specifically funded by the BIZKAILAB program of the Regional Government of Biscay.

**Please provide the total yearly budget in Euro that your initiative spends on implementing the solution.**

30,000 €

**National public funding**
- 100%

**European Union public funding**
- 0%

**Economic return from own products/services**
- 0%

**Foundations and philanthropy capital**
- 0%

**Single donations from private individuals**
- 0%

**Donations from private companies**
- 0%

**Crowdfunding platforms**
- 0%
**Participation fees**

%0

Otras (por favor especificar)

%0

---

**Target group, scale and impact**

**Which target group(s) do you want to reach with your solution?**

We want to reach elderly people of either gender and any level of education from either nationality, aged approximately 65 and over, although it can be used by adults either age.

It is specifically designed for people in wheelchairs or with any type of physical disability. The game is designed in an accessible way, in order people with low knowledge of the new technologies to be able to use it. As it is a solution designed to be used in leisure time, it is appropriate for people in all employment situations.

The desirable environment for the solution would be nursing and private homes.

**Please estimate the number of persons within your target group (users, clients, etc.) that you currently reach directly with your solution.**

It has been implemented in La Misericordia nursing home in Bilbao, with more than 200 people.

**In which local/regional/national area(s) is the solution currently implemented?**

Local area of Bilbao, Biscay, Spain.

**What is the impact on your target group (users, clients) you want to generate?**

We want to offer elderly people who may suffer physical disabilities such as low mobility or who need a wheelchair the possibility of using games to improve their quality of life in terms of health and well-being.

By means of this game, the elderly will be able to access new technologies, covering this way the digital divide. Due to the fact that this game was developed by including the views and observations of the end users and experts during all the stages of the project including its design phase, and not just on the validation of it through questionnaires, a wider impact will be achieved.

**What is the wider impact on society you want to generate?**

The impact desired to be gained in society implies, on the one hand, to reduce the gap between generations by bringing new technologies closer to older people. Moreover, we want to make these technologies accessible to people with disabilities, since currently people with certain physical or cognitive impairments are not able to access these particular type of solutions.

On the other hand, we want to promote active ageing through leisure, physical exercise and the use of technology.

**What are the impacts on your target group you already achieved?**

We have achieved to approach older people to new technologies, reducing their fear and lack of knowledge towards them.

We have also succeeded in helping those people to keep a healthy lifestyle by performing physical exercise while having fun, doing more exercise than what they actually thought.

This tool is actually an encouraging method for the elderly to make daily physical activities and to promote accessible leisure.

**How has the impact of your initiative been assessed?**

External evaluation of impacts based on qualitative methods (interviews, focus groups, etc.), External evaluation of impacts based on quantitative methods (quantitative measurement of impact indicators).

---

**Public information and strategy**

**What information on your initiative is publicly available?**

Mission and strategy, Organisational structure, Information on team members, Activity report, Working method and ‘theory of change’.

**Please indicate webpage or contact for obtaining the respective information.**

http://www.deustotech.deusto.es/ (click in LIFE -> Projects -> Serious Games -> Active Ageing)

**What are your milestones for further developing, implementing, and establishing your initiative in the next three years? Please describe 1-3 milestones.**

1. Future work will add sensors to the system, in order to obtain physiological measures, using galvanic skin response, heart rate and electromyography. For example, if the user’s heart rate increases out of normal limits, the system will decrease the intensity of the game.

2. Dissemination and implementation of the project on nursing and private homes on local, regional and national levels.

3. Adaptation of the system to other collectives such as people with Alzheimer. We will add cognitive-type exercises for neuropsychological rehabilitation.

---

Source URL: https://www.changemakers.com/es/innovationinaging(entries/kineage-adapted-kinect-game-exercise-and-fun#comment-0