EMERGING TECHNOLOGY STUDIES

FOR IMPROVING SOCIAL INCLUSION

OF PEOPLE WITH DISABILITIES

Prepared by:

INNOSID

Innovative Solutions based on Emerging
Technologies for Improving Social
Inclusion of People with Disabilities

EMERGING TECHNOLOGY STUDIES
FOR IMPROVING
SOCIAL INCLUSION
OF **PEOPLE WITH DISABILITIES**

Authors
University of Zagreb, Faculty of Electrical Engineering and Computing
Jurica Babic
Ivana Gace
Dario Pevec
Iva Topolovac
Hrvoje Vdovic
Matea Zilak

University of Debrecen
Ildiko Papp
Marianna Zichar

Instituto Politécnico de Santarém
Pedro Matos
Maria Potes Barbas

Universitat Politècnica de València
Carlos Hernandez Franco
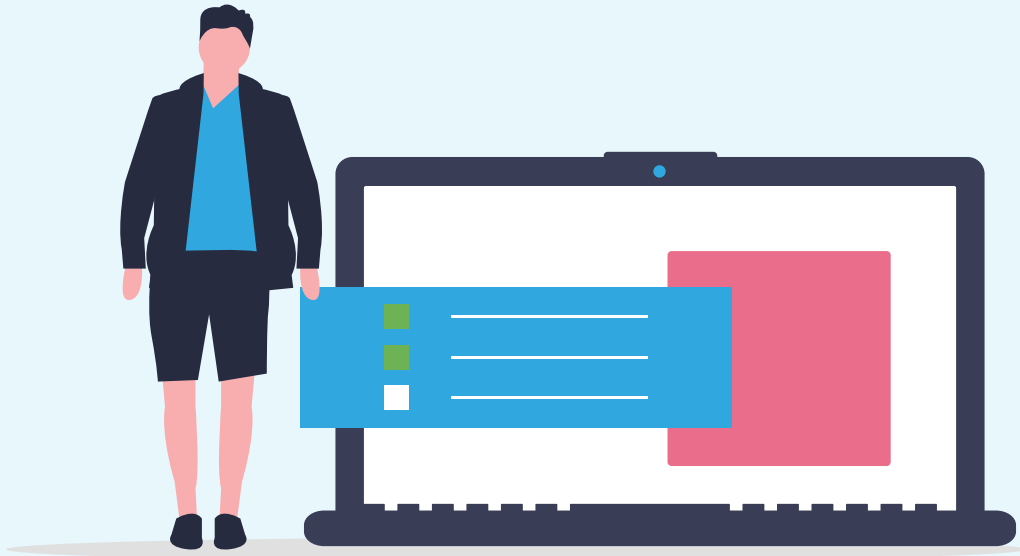Felipe Peneranda Foix

University of Dubrovnik
Ana Keselj
Krunoslav Zubrinic

Croatian Down Syndrome Association
Dinka Vukovic

Autonomy

Dinka Vukovic
dinka.vukovic@gmail.com
Croatian Down Syndrome Association, Croatia

But some people need to have guidelines and more time to repeat the activities to learn. The application uses emerging technology - AR to implement games for enforced learning. It uses virtual reality (VR) for the flat and items that are used in the flat.

TARGET GROUP(S)

Target customers are **all individuals who are preparing for independence**. Preparation for independence is very important for the young and adults with disabilities. Most associations would like to conduct trainings for independent living, but they cannot provide the necessary conditions for education, since it is necessary to have an equipped apartment or space where conditions can be created for learning activities in the kitchen, bathroom, living room, bedroom, bedroom. hallway, on the balcony.

Product is intended to i**mprove social inclusion of people with Down Syndrome** through independent living or autonomy.

VISION

This product is intended to be used as a virtual independence and autonomy guideline. It aims to offer a **new way of learning and preparation for the independence and autonomy for the young and adults with disabilities**.

Learning and preparation for the independence and autonomy can be difficult for people with disabilities, as there are a lot of every day's activities in a house or flat. Usually these activities are learned by living with family and partly in the school.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The product solves the challenge of social inclusion of people with Down syndrome. It helps them to perform activities in the house or apartment by giving them precise instructions on how and what to do.

WHICH BENEFIT DOES IT PROVIDE?

It offers customizable situation in the house or flat to improve knowledge about all things in the house and activities.

A game is included for learning about things and activities in the house or flat.

This product uses **augmented reality** and **virtual reality**.

PRODUCT

This product is a multi-platform application (Windows PC and Android). It will be good to have possibility to have an option that the application could be used by several persons at the same time and learning together. It will look like a virtual house or flat with all the main things in house. Virtual house or flat will be equipped with main devices and furniture. Each device and furniture can be learned through application. Second step could be learning about activities in flat:

- what to use for the activity (e.g. washing dishes, washing clothes, cleaning...)
- how to do the activity (e.g. washing clothes: sort clothes by colour, sort clothes by materials, connect it with some programs, maybe the temperature at which something can be washed, ...)
- how often to do activities in the house or flat
- what must be done every day (e.g. change underwear, arrange the bed after sleep, store clothes in the closet, etc.)

WHAT MAKES IT STAND OUT?

The application is characterised by high adaptability, VR and AR-based games for enforced learning and accessibility features. All of the above features distinguish this product.
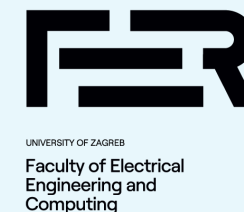
IS IT FEASIBLE TO DEVELOP THIS PRODUCT?

It is feasible to develop this product as it is a software product which can be developed on any PC with medium-range specifications.

BUSINESS GOALS

The company should provide necessary equipment and a budget plan for software maintenance. If possible, company should also provide a group of testers that are among the target audience, i.e., people with Down Syndrome, as well as any other potential consumer.

The company would receive the software solution which can be competitive on the market since it offers unique features when compared with similar solutions. This product would also have a positive impact on the company's corporate responsibility.

HRVATSKA ZAJEDNICA ZA DOWN SINDROM

UNIVERSITY OF ZAGREB
Faculty of Electrical
Engineering and
Computing

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

Gibalica

Jurica Babić
jurica.babic@fer.hr
University of Zagreb Faculty of Electrical Engineering and Computing, Croatia

VISION

It is intuitive that for the **overall wellbeing of people, especially people with disabilities, a proper level of physical activities is necessary. People who live stressful lives (e.g. long working hours), elderly people, or people who due to COVID-19 pandemic have restrictions in moving and access to workout facilities**, do not engage in enough physical activities as recommended by the World Health Organization (https://www.who.int/news-room/fact-sheets/detail/physical-activity).

This product is intended to be used as a **virtual fitness trainer**. It aims to encourage physical activities of all people. A special attention should be placed on accessibility features (e.g. speech-to-text, text-to-speech, alternative forms of presenting the content) so that people with different disabilities can use it. Such a product should be designed according to the "design for all" principles (http://designforall.org/design.php).

The expected impact on the users can be summarized as follows:
- improved knowledge and skills on basic fitness movements and/or poses (e.g. „both hands up", „T-pose", „squat");
- improved right-left orientation – through exercises that target right-left orientation (e.g. „raise your left hand up") ;
- improved physical fitness level – through exercises that encourages physical participation („e.g. do 10 squats").

The product will have fun elements (e.g. games such as http://www.pjesmicezadjecu.com/dobre-stare-igre/dan-noc.html) so the product will also serve for meeting the users' entertainment needs.
Last, the product will encourage the users to engage in physical exercises, thus promoting the overall wellbeing of the users.

TARGET GROUP(S)

Target customers are **people who would like to**:
- **engage in basic physical activities** such as "raising both hands up";
- **improve the left-right orientation**;
- **have fun playing games** such as http://www.pjesmicezadjecu.com/dobre-stare-igre/dan-noc.html (e.g. the user should squat when the app plays „sit down", and the user should remain standing when it says „stand up").

The product is intended to improve social inclusion of different group of people with disabilities through the positive changes listed above. Furthermore, all of this will have a ripple effect on confidence and wellbeing of people with disabilities. Specifically, the idea described in this document received a positive feedback from a representative of a Down Syndrome association. The students should investigate and assess the generalizability of the solution for different groups of people such as visually impaired persons and people with hearing difficulties.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The main problems that are tackled with this product are the lack of physical activities and difficulties related to left and right orientation.

WHICH BENEFIT DOES IT PROVIDE?
The key benefits for the users can be summarized as follows:
1. **the curated set of physical and coordination exercises** - which can be performed without any special equipment (ideally presented in alternative forms – e.g. videos, audio, animations);
2. **real-time feedback** – the product should be able to detect user movements and assess whether an exercise is completed or not;
3. **progress tracking** – the app should track the user's progress on completed exercises;
4. **entertainment** – in the form of interactive games such as http://www.pjesmicezadjecu.com/dobre-stare-igre/dan-noc.html;
5. **accessibility** – the product should be designed for all, meaning, it should also be accessible to the users who may have certain disabilities.

PRODUCT

The product is a **mobile application** (phone and tablet) which at least has a support for the Android operating system.
The **main feature of the app** revolves around the detection of the user and its pose (e.g. placement of head, hands, legs, torso…) using the live feed from the device's camera as an input. The mobile device would be placed on a stationary object such as table and its camera (i.e., front-facing, selfie camera) would face the user from head to toes.

Such a feature is then used in several modes available from the main menu. Many different modes can be considered for implementation, including the following:
- **learn mode** – the user needs to replicate the "pose" instructed by the app. For example, the app may ask the user to "raise a left hand up" and the user should raise a left hand.
- **challenge mode**
- **free mode** – the user makes a pose and the app informs (visually and audibly) about the detected pose
- **training mode** – the user can do workouts such as "10 squats", "left-right orientation", "choreography" (concept similar to: https://en.wikipedia.org/wiki/Simon_(game)#Gameplay)
- **game mode** – e.g. the user should squat if the app prompts "night" and should stand when it prompts "day"

The basic flow of any mode (except the free mode) is as follows:
1. user onboarding - instructing what the user should do before the activity starts
    a. find a location where you can place the device and move freely
    b. place the device on a still surface such as table and point the screen towards you
    c. make three steps back
    d. make sure the front-facing camera can see you fully from head to toe
    e. the app should prompt the user when it is ready to go (e.g. when the user makes the "T-pose" - https://knowyourmeme.com/memes/t-pose)

2. main activity – consists of series of tasks. E.g. in "learn mode", the app should prompt the user to make a pose "left hand up". When the left hand is raised, the app may reward the user with points, sound cues or something and then the next task

3. follow up – the screen which will present the user with the outcome of the activity (e.g. statistics, rewards) and offer navigation (e.g. restart or return to main menu)

Note: The free mode does not include "follow up".

The graphic design should be simplistic and engaging. The user should feel like he/she always interacts with an animated character (female, as per the app's name).

UI interaction should focus on two key modalities:
- simple UI on-screen buttons
- voice commands

WHAT MAKES IT STAND OUT?

The product aims to fill the gap in the current market of fitness-related applications which may not have the desired level of immersion and interactivity. For example, there are fitness applications which can be used to manually track the number of performed squats (through tapping the screen with a finger), but this product will be able to recognize when the user makes the pose (e.g. performed squat), which makes the app highly innovative. Furthermore, a unique selling point of the app are its accessibility features (e.g. navigating the app with voice commands, different forms of the content representation such as animation, image, or audio).

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?

It is feasible to develop this product as it is a software product which can be developed on any PC with medium-range specifications. There exists the technology stack which can be used to fully develop the product, see the next section for more details.
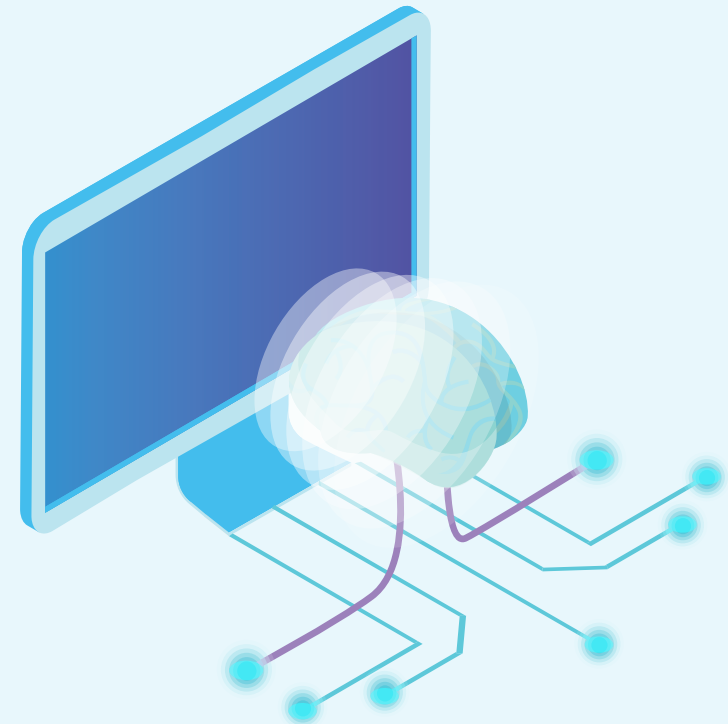
The product heavily relies on
the application of **machine learning** technologies
(e.g. pose estimation).

BUSINESS GOALS

Given that the product has a strong emphasis on innovative user experience and interaction mechanisms (e.g. voice commands and pose detection), perhaps the most useful contribution from the IT company would be to provide guidance on the UX design (and/or graphics design) of the proposed solution. Furthermore, given the underlying complexity of the solution, the company could help with the architectural design of the application.

In general, the company can use this unique opportunity to meet its CSR (Corporate Social Responsibility) goals. Through the joint collaboration with university and target users (e.g. people with disabilities), the company would be able to receive knowledge and experience in innovative applications of mobile AI such as pose estimation.

UNIVERSITY OF ZAGREB
Faculty of Electrical Engineering and Computing

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

Go independently

Ivana Gače
ivana.gace@fer.hr
University of Zagreb Faculty of Electrical Engineering and Computing, Croatia

VISION

Blind and visually impaired people have different problems in mobility because movement depends very much on the sense of sight. In fact, they must rely on their other senses to move independently. Pedestrian traffic lights are a big obstacle for them. Although there are audible traffic lights, they are only used in big cities and there are usually very few of them. Therefore, the main purpose of the application is to help blind and visually impaired people to use traffic lights that do not have acoustic support.

The application is intended to **enable visually impaired and blind people to move independently on routes where there are no audible traffic lights**.

TARGET GROUP(S)

The target group is **visually impaired and blind people** (or anyone who needs an acoustic traffic light to cross the road) who want to be more independent in their mobility.

Product is intended to improve social inclusion of visually impaired and blind people.
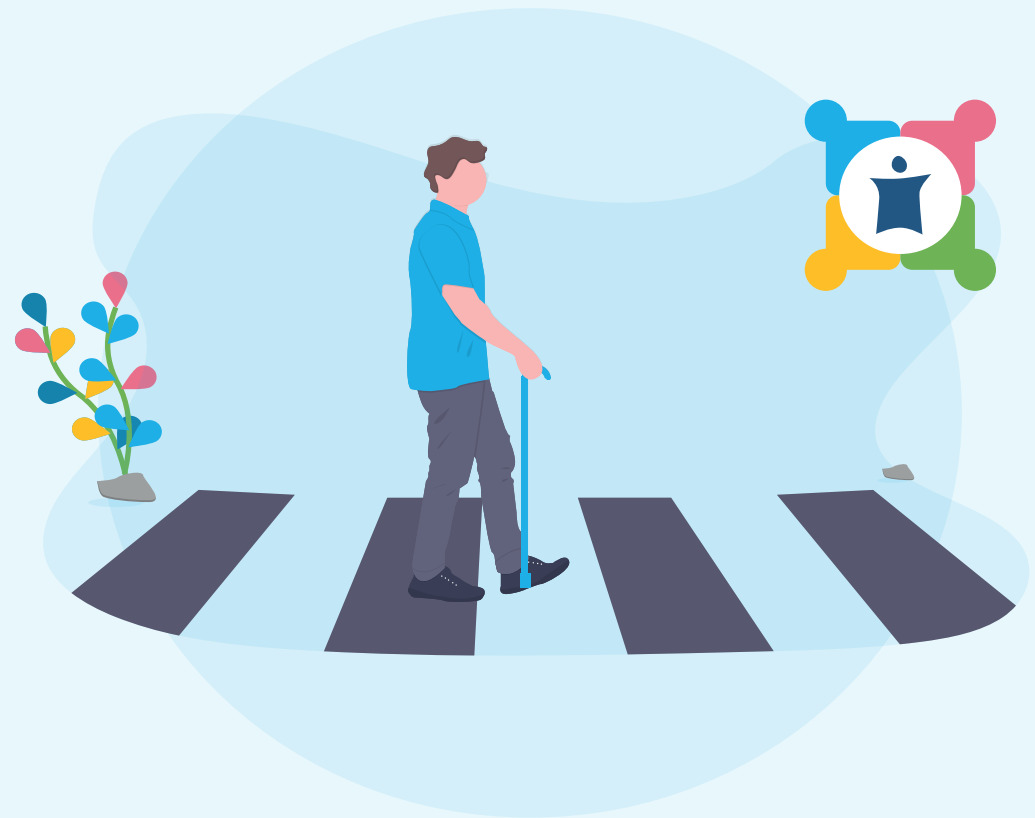
NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The product solves the problem of visually impaired and blind people in their daily mobility. These people need acoustic traffic lights to cross the road. However, these are not available everywhere, especially in smaller towns, or in some cases, when they are available, the sound is turned off after a certain hour. This creates a lot of problems for the people who use them. In the absence of an audible signal, they have to rely on their own instinct or wait until they can ask someone to help them cross the street.

This is a major problem as people often have to wait several minutes/hours for someone to arrive at the same traffic light. Some of the reasons are that the road is not as busy or it is an inconvenient time of day (e.g. late at night) and season (e.g. winter) when there are fewer people on the roads.

WHICH BENEFIT DOES IT PROVIDE?
The product acts as a pedestrian traffic light detector and detects when the traffic light is currently on. The independent everyday mobility of visually impaired and blind people will be improved with this solution.
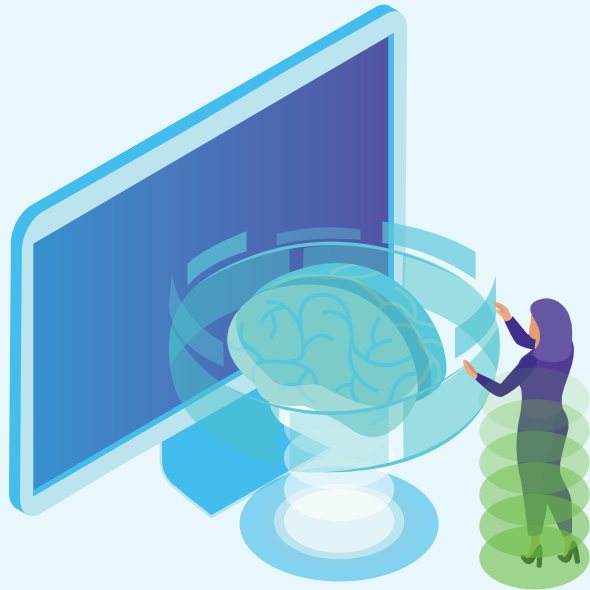
This product uses
machine learning and **artificial intelligence**.

PRODUCT

This product is a multiplatform application (Android and iOS). The application would use a built-in camera to detect the traffic light. Based on the user's own knowledge (e.g., they often pass that stretch of road) or the location of a traffic light known in advance (e.g., geolocation data), the user would position themselves near the traffic light. Using the camera and the ability to recognize objects, the learned model would recognize a traffic light. Object recognition will be developed using machine learning (ML). The user would then have to orient the camera to detect the light of the traffic light (also using ML). Of course, the device itself would guide the user on how to set up the camera. Since there may be a detection problem due to the light intensity, the option to develop a solution for night mode only is also a great help since this is one of the problems. When detecting light at a traffic light, the device would signal a visually impaired and blind person which light is currently at the traffic light. The signaling can be done through an audible signal and vibration. The application is optimized for use by visually impaired people, so all options must be read aloud by the phone's text-to-speech engine.

WHAT MAKES IT STAND OUT?
The application is a smart solution to solve a situation where the solution exists (acoustic traffic light for pedestrians) but is not applied everywhere. Therefore, there is a great demand for such a solution, so that the passengers who need it become independent.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?
It is feasible to develop this product as it is a software product which can be developed on any PC with medium-range specifications. However, extensive testing is required to determine the extreme safety of the application so as not to endanger the life of the user.
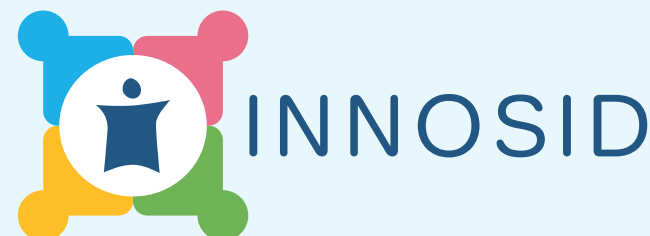
BUSINESS GOALS

The company should provide necessary equipment and a budget plan for software maintenance. If possible, company should also provide a group of testers that are among the target audience, i.e., visually impaired people, as well as any other potential consumer.

The company would receive the software solution which can be competitive on the market since it offers unique features when compared with similar solutions. This product would also have a positive impact on the company's corporate responsibility.

UNIVERSITY OF ZAGREB
Faculty of Electrical Engineering and Computing

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

Signing with AR & AI

Ivana Gače
ivana.gace@fer.hr
University of Zagreb Faculty of Electrical Engineering and Computing, Croatia

VISION

Hearing impaired people in their everyday communication faces various obstacles (e.g., programs on TV without subtitles or sign language, speech volume and distance of the interlocutor). In addition, other people often do not know how to communicate with hearing impaired people. The aim of this product is to **facilitate the everyday life of hearing impaired people as well as to bring sign language closer to everyone**.

The application is designed to help hearing impaired people in various real-life situations and everyone else to learn and be familiar with the sign language.

TARGET GROUP(S)

The target audience hearing impaired people (or anyone who needs to represent speech in text) and anyone else who wants to learn sign language.

Product is intended to improve social inclusion of hearing impaired people.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
This solution solves the problem in communication of heating impaired people. In fact, for successful communication, it is necessary for the speaker to use a simple vocabulary, to face the light and the person speaking, so that the hearing person can read lips. In the case of multiple speakers, they must speak individually. For example, in the current situation with Covid-19, wearing a mask makes it very difficult to communicate with hearing impaired people because they cannot see the speaker's lips. This application is a solution that would be of great help in this and similar situations for people with hearing impairment. The application is also meant for other users who can learn sign language. This will educate users about people with hearing impairment and users can learn a new skill - sign language.

WHICH BENEFIT DOES IT PROVIDE?
This product, with the main function of converting speech to text, facilitates the communication of people with hearing disabilities in everyday life. It is also used for learning sign language with the help of emerging technology.
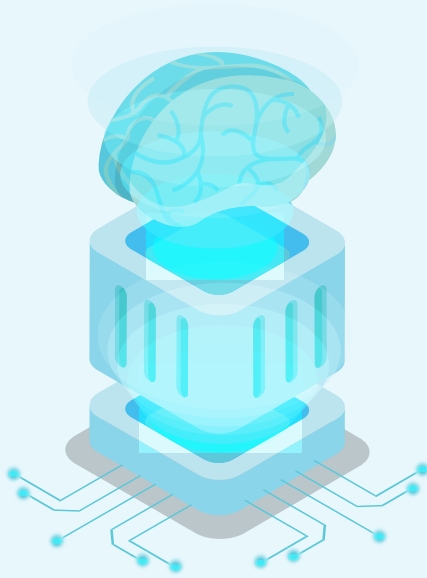
This product uses **artificial intelligence** and **augmented reality.**

PRODUCT

This product is a multi-platform application (Android, iOS and web application). The application has several modes of operation: (i) Speech-to-text part, that converts speech to text while the user is speaking (in the form of full-screen subtitles or the possibility of using a smartphone built-in camera with subtitles at the bottom of the screen); (ii) AR part, which is used to learn (using models or pictures) the basics of sign language (e.g. alphabet, basic signs). One idea is a 3D model of a teacher teaching the user sign language. Learning can be implemented by animating the hands of the teacher model to show sign language. If this is difficult to implement, the teacher can be an avatar that simply shows images and videos through which the user learns sign language. The AR part is included to make the application more attractive to the user; (iii) AI part, where the camera monitors hand movements and compares them to predefined movement rules for sign language (if it is correct, the task is done).

WHAT MAKES IT STAND OUT?
What makes the app special is that it can easily help people with hearing disabilities through a mobile device that they usually always have with them. Also, with interesting learning and tasks, users can learn the basics of sign language without paying large sums of money for courses.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?
It is feasible to develop this product as it is a software product which can be developed on any PC with medium-range specifications. However, a person who understands sign language must provide information that would be implemented in the learning part (ii) and the task part (iii) of the application.

BUSINESS GOALS

The company should provide necessary equipment and a budget plan for software maintenance. If possible, company should also provide a group of testers that are among the target audience, i.e., hearing impaired people, as well as any other potential consumer.

The company would receive the software solution which can be competitive on the market since it offers unique features when compared with similar solutions. This product would also have a positive impact on the company's corporate responsibility.

UNIVERSITY OF ZAGREB
Faculty of Electrical Engineering and Computing

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

VR Taxi Driver

Dario Pevec
dario.pevec@fer.hr
University of Zagreb Faculty of Electrical Engineering and Computing, Croatia

VISION

This product is intended as an **educational game for taxi drivers**. People who work in the increasingly popular taxi services, such as Uber or Bolt, often find themselves in situations involving people with disabilities. This game is designed to prepare them for these types of situations.

People who drive taxis will be more willing to deal with PWD in a professional manner without being deliberately insensitive and misrepresenting themselves.

TARGET GROUP(S)

Target customers are **taxi services that want to increase their quality of experience, especially towards people with disabilities**. Users would be the drivers working for these companies, e.g. Uber or Bolt.

Since this application puts the driver in a game where he meets certain people with disabilities, it can target several different groups: blind people, deaf people, people with Down syndrome or para/quadroplegic people.
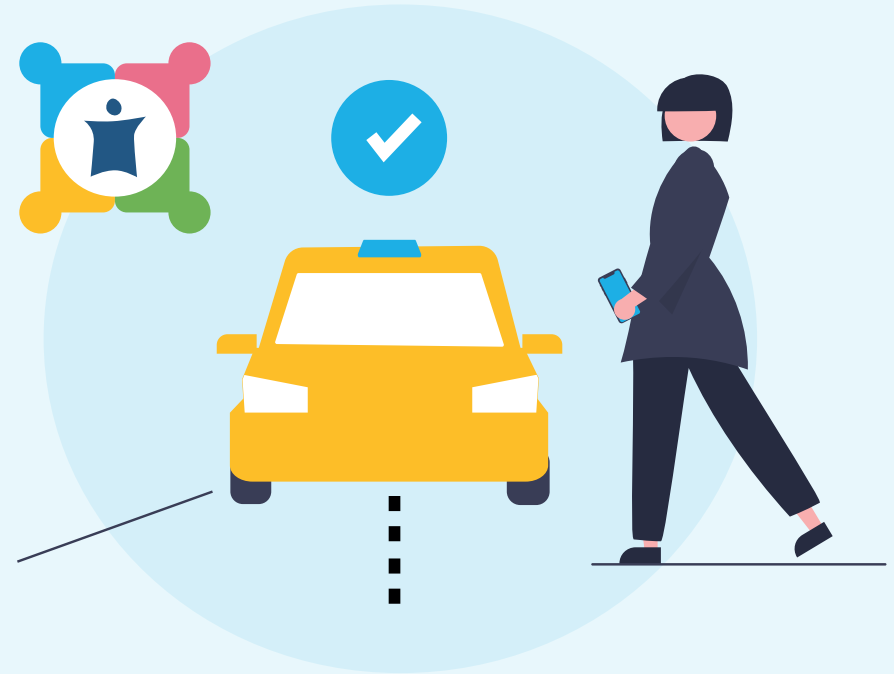
NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
This product would solve the challenge of insufficient information about different types of disabilities, and it would also teach the user how to respond in certain situations regarding PWD. Besides the aforementioned this product would solve the problem defined as lack of knowledge that produces fear to approach or converse with a PWD.

WHICH BENEFIT DOES IT PROVIDE?
The application provides a high level of customization, it can generate scenarios across several different types of disabilities. Moreover, the application provides a learning experience through the interactive game and increases the motivation to participate in this learning course.

This product uses
virtual reality.

PRODUCT

The product is an application developed for the PC. The use of VR devices (headset and controller) is mandatory. When the user puts on the VR headset, he is prompted with only one option - to get into the car. Once in the car, the user can then select the passenger from the console in the cockpit. With this selection, the user can virtually choose which group of people with disabilities they want to drive to a particular location. While driving, the driver must communicate with the people with disabilities through various dialog options. The aim of the application is to teach the driver which answers/questions are appropriate and which are not.

WHAT MAKES IT STAND OUT?
There are many education VR applications. However, there are very few, if any, that aim to raise awareness about people with disabilities. In addition to the goal, this application stands out for its high level of customizability. The administrator can use the administration interface to change the dialogs, choose from several different avatars and design the scene using these avatars.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?
It is feasible to develop this product because the technology used, namely VR, is widely used in entertainment and therefore well documented.

BUSINESS GOALS

On the part of the company, it would be necessary to ensure the pool of people for testing the application, both from the pool of users, i.e. Taksi riders, and PWDs who would benefit most from this type of application. Apart from the pool of test participants, the company should invest the money in the project in the form of software and hardware equipment as well as marketing for the product.

The company would profit from the product itself because the product is very competitive in the market due to its specifications and innovations. Besides the actual profit, the company would also generate positive impact on corporate responsibility by supporting the project.

UNIVERSITY OF ZAGREB
Faculty of Electrical Engineering and Computing

INNOSID
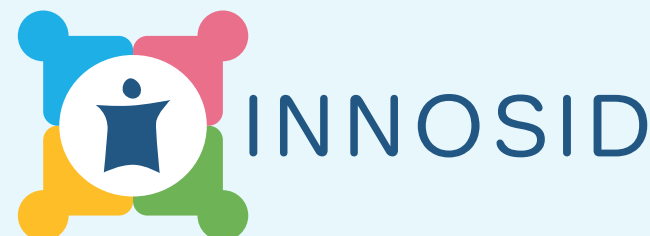
e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

Co-funded by the
Erasmus+ Programme
of the European Union

Geometry for all

Iva Topolovac
iva.topolovac@fer.hr
University of Zagreb Faculty of Electrical Engineering and Computing, Croatia

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The application solves multiple problems, one of them being social inclusion of visually impaired children. For those children, visualizing 3D objects can be challenging. Furthermore, it would be aimed at making the learning process easier for everyone.

WHICH BENEFIT DOES IT PROVIDE?
The benefit of such an application would be the unique approach to learning geometry. An approach that enables even the visually impaired (children) to be able to learn about such topics.

VISION

Learning about geometry can be confusing if one is not able to visualize 2D, let alone 3D objects. Even for children without visual impairments it can be challenging imagine the shape of an object, they have only seen on paper so far. The purpose of this application is to **create a new way of learning geometry** which would allow children to learn about 3D object by providing real objects for them to see and feel the shape of (important for children with visual impairments).

The application can be used by children with visual impairments which consequentially helps in socially including those children in education. Furthermore, the application will provide a unique learning experience for them as the 3D objects will be palpable and it will enable them to learn geometry more easily.

PRODUCT

The product would be an AR application which, in combination with 3D printed objects, allows for children to learn about geometry faster and more easily. The application would be used alongside a set of 3D objects (printed using a 3D printer) which would then be scanned with AR technology. After scanning those objects, a set of facts would appear, which would also be read aloud to be make them accessible for children with visual impairments.
The application would consist of small tasks each requiring a different level of knowledge. Apart from those tasks it would have a "learning lesson" in which all the 3D object would be presented and described. To enable the children with visual impairments to solve those tasks, the application would have to have a voice recognition system.

WHAT MAKES IT STAND OUT?
Combining two emerging technologies such as AR and 3D printing, as well as the fact that it is an accessible (for visually impaired children) application for learning about geometry.

TARGET GROUP(S)

Children (with or without visual impairments) and **teachers**.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?
It seems so. Here is a link to a web page which states that some AR frameworks can be used to scan 3D object (e.g., Vuforia). These objects could be printed using a 3D printer.
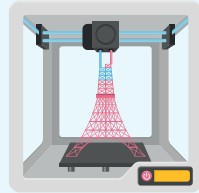
This application would use a combination of **augmented reality** and **3D printing**.

BUSINESS GOALS

Financial support to be able to pay for the development process and hardware support in terms of providing adequate equipment for the development.

The discovery of possibilities for research involving the combination of two emerging technologies: AR and 3D printing, as well as a highly competitive application considering there are no such applications in use.

FER

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

Shopping Eyes

Hrvoje Vdović
hrvoje.vdovic@fer.hr
University of Zagreb Faculty of Electrical Engineering and Computing, Croatia

VISION

Visually impaired people often have trouble while shopping. They cannot read the prices listed on the shelves and they struggle to recognize their banknotes while paying so they need help of their relatives before they go shopping or they have to use impractical tools. Shopping Assistant is a mobile application which aims to **solve this problem by providing a solution for reading out price tags and identifying banknotes** via smartphone camera.

The app will help visually impaired people with shopping tasks by reading product prices and identifying banknotes.

TARGET GROUP(S)

Target customers are **visually impaired and blind people** who would like to make their shopping easier.

Product is intended to improve social inclusion of visually impaired and blind people.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The product solves the challenge of social inclusion of visually impaired people by enabling them to perform shopping tasks more easily.

WHICH BENEFIT DOES IT PROVIDE?
It offers two main benefits: product price reading and identification of banknotes, both of which can be used in everyday shopping tasks by visually impaired people.

PRODUCT

The product is a mobile application (Android and iOS). On the main application screen, the user can select one of the two main modes: (i) product price reading and (ii) identification of banknotes, both of which use the smartphones built-in camera to identify real-world text and read it out loud. The application is optimized to be used by visually impaired people, so all options must be read out by the phones text-to-speech engine. Product price reading will be optimized to identify numbers and currencies as it is intended to be used to read out loud the product prices which are displayed in stores. The identification of banknotes option will allow scanning of the banknotes with the camera, after which the application will correctly read the amount and the currency of the bill.

WHAT MAKES IT STAND OUT?
The application is characterised by ease-of-use, accessibility features and flexibility.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?
It is feasible to develop this product as it is a software product which can be developed on any PC with medium-range specifications.

BUSINESS GOALS

The company should provide necessary equipment and a budget plan for software maintenance. If possible, company should also provide a group of testers that are among the target audience, i.e., visually impaired people, as well as any other potential consumer.

The company would receive the software solution which can be competitive on the market since it offers unique features when compared with similar solutions. The product can also be used to kickstart an OCR research within the company. This product would also have a positive impact on the company's corporate responsibility.

This product uses **machine learning** and **artificial intelligence**.

UNIVERSITY OF ZAGREB
Faculty of Electrical Engineering and Computing

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

VR Storytelling Helper

Matea Žilak
matea.zilak@fer.hr
University of Zagreb Faculty of Electrical Engineering and Computing, Croatia

VISION

This product would serve as a **software tool for improving the reading skills of children with reading difficulties**. It can also serve as a **tool for engaging deaf people/children to learn how to read**.

Virtual reality solutions proved to be very motivational and engaging for people/children with special needs since they usually easily lose focus and cannot be concentrated for a longer time. Having a VR solution in a form of a serious game that is based on the content usually used on speech therapies (e.g., Alternative and Augmentative Communication (AAC) symbols) can be a very innovative and fun approach for children overcoming reading difficulties. They could learn faster than with usual methods and their motivation to learn can be increased.

TARGET GROUP(S)

Target customers are **all individuals who like to read children stories and engage themselves in virtual worlds**.

Product is intended to improve social inclusion of children with reading difficulties as well as deaf people/children.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
Today's problem of children with difficulty in reading is that they need support for recognizing and understanding the meaning of complex words. Also, many of the deaf people do not know how to read and therefore the only way for them to interpret the written content is if that content is translated on sign language. Since this is not the case with most of the content online, on TV or other social media, deaf people are excluded from society in this sense.

WHICH BENEFIT DOES IT PROVIDE?

Besides providing an innovative way of learning new words and how to read, it offers two ways of using this product: first involves hearing a children's story while being immersed in a virtual story world (360° video with children story characters and objects and their captions), while the other one involves full immersion with the possibility of interaction with parts of the story (pause the story when wanting to play with a story character or an object, choose a word whose visualisation wants to be seen and similar).

This product uses
virtual reality
(VR cardboard and a smartphone and/or
VR headset with controllers or hand tracking device).

PRODUCT

This product is a multi-platform application (Windows PC and Android). It can be used with either just a smartphone and a VR cardboard (existing or it can be made by users themselves) or on a PC with a VR headset and controllers (such as Oculus Go or HTC Vive) or VR headset and Leap Motion.

First case – limited interaction: it will be possible just to play a certain children's story YouTube video on the smartphone and put the smartphone in a VR cardboard. The videos will be recorded through the application from the second case (story without user interruption). For this case smartphone and a VR cardboard are used.

Second case: on the main screen of the VR application, a user can choose one of a few offered stories. Once chosen, the user find himself in a virtual world that correspond to that story. He can look around and after that start the storytelling. The story is read section by section and the user has a possibility to pause the story, return to a word that was not clear to him, see its meaning, and then continue. In the meantime, certain interactions with virtual characters or objects are enabled. For this case, PC and a VR headset with controllers are used.

WHAT MAKES IT STAND OUT?

The usage of a VR application can be adapted for every user. The stories have their shorter and longer versions. Also, the visual representation of certain words in stories can be chosen, e.g., it can be an AAC symbol, a 3D model with animation, or a video if it is necessary to better explain the meaning.

The possibility of adding the translation of certain words in sign language for the deaf is also something that can make it stand out, but even without this option, it can be of great benefit for the deaf.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?

It is feasible to develop this product as it is a software product which can be developed on any PC with medium-range specifications.

BUSINESS GOALS

The company should provide necessary equipment and a budget plan for software maintenance. Also, if it is a software development company with knowledge of VR development, they can provide a developer and/or a software tester.

The company would receive the software solution which can be competitive on the market since it offers unique features when compared with similar solutions. This product would also have a positive impact on the company's corporate responsibility.

UNIVERSITY OF ZAGREB
Faculty of Electrical Engineering and Computing

INNOSID

Home phARmacy

Ildiko Papp, Marianna Zichar
papp.ildiko@inf.unideb.hu, zichar.marianna@inf.unideb.hu
University of Debrecen, Hungary

In the case of symptoms with pictograms, the application will suggest which medicine to take. In the case of the syndrome described by the pictograms, the application makes an offer of which medicine to take. If necessary, it sends an alert to the designated contact persons.

TARGET GROUP(S)

The application can be useful for **elderly and people with cognitive disabilities** who live an independent lifestyle but they have difficulty in memorizing the dosage of their medications, or who have difficulty in choosing the right medication based on their symptoms.

Product is intended to improve social inclusion of elderly and people with cognitive disabilities.

VISION

This customizable application is to **support users in taking and administering medications, vitamins and dietary supplements, and also presents basic first aid information**.

The application contains the user's own home pharmacy in a virtual form in which the usual basic vitamins, supplements, painkillers and antipyretics, bandages, etc. are recorded. In case of illness or therapy, it sends an alert about which box to choose and how to dose exactly. It also warns the user about taking vitamins and supplements that he or she takes regularly. Perceived symptoms (fever, pain, swelling, etc.) are represented by pictograms.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The product solves the challenge of social inclusion of people with disabilities. In this case, the independent living of people with disabilities is supported by helping to administer their medications.

WHICH BENEFIT DOES IT PROVIDE?
Customizable virtual home pharmacy offers which medicine to take and what dosage based on user's own home pharmacy. It also presents basic first aid information.

This product uses **augmented reality**.

PRODUCT

This product is an application for Tablet or Mobile Phone on Android. It will look like a virtual home pharmacy with AR-supports. On the main application screen, the user can select one of the following options: (i) Home pharmacy, (ii) Suggestions based on symptoms, and (iii) First aid instructions. Then, if the user has selected the Home pharmacy option, they can browse through content of their own home pharmacy with their usual dosage. If the Suggestions based on symptoms is selected, the user can compile their own set of symptoms using pictograms. Scanning pictograms, the application suggests the medicine with dosage (e.g., fever, headache.) in AR extension. Finally, in the menu item First aid instructions the user gets help in the form of easy-to-understand pictograms in treatment of wounds and other activities. Here, there is possibility to send alerts to contact person.

WHAT MAKES IT STAND OUT?
The application is characterised by high adaptability, AR-based suggestion for enforced learning and accessibility features. All of the above features distinguish this product.
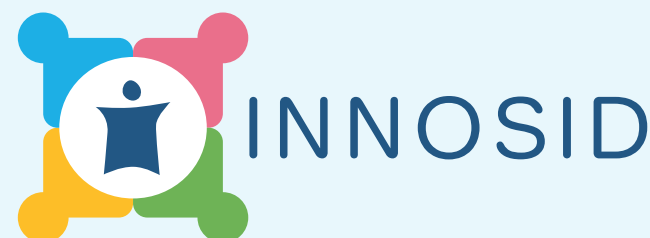
IS IT FEASIBLE TO DEVELOP THIS PRODUCT?
It is feasible to develop this product as it is a software product which can be developed on any PC with medium-range specifications.

BUSINESS GOALS

The company must provide the necessary equipment and a budget plan for maintaining the software. If possible, the company should also provide a pool of evaluators who are among the target audience, i.e. people with disabilities, as well as any other potential consumers.
Great attention should be paid to the data protection. Since application is dealing with users' medical data, so 5G technology could potentially applied in this case.

The company would receive the software solution which can be competitive on the market since it offers unique features when compared with similar solutions. This product would also have a positive impact on the company's corporate responsibility.

UNIVERSITY *of*
DEBRECEN

UNIVERSITY OF ZAGREB
**Faculty of Electrical
Engineering and
Computing**

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

SmARt Help

Marianna Zichar, Ildiko Papp
zichar.marianna@inf.unideb.hu, papp.ildiko@inf.unideb.hu
University of Debrecen, Hungary

For example, potted plants have to be watered, but differently; metal cannot be put into the microwave owen, vacuum cleaner should be cleaned regularly, etc. The application helps to remember these important information in an exciting way using AR.

TARGET GROUP(S)

Target customers are all **individuals who have difficulties with remember lots of information**.

Product is intended to improve social inclusion of people with Down Syndrome or elderly people.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The product solves the challenge of social inclusion of people with Down syndrome. It helps them to remember details related to objects around them. At the same time elderly people could benefit from the product as well.

WHICH BENEFIT DOES IT PROVIDE?
When a new object has come to the household, its important information can be saved, and later can be retrieved any time when needed. At the same time the user can play simple games to develop his/her memories.

VISION

This product is design to give a **help in not forgetting details about things that are surrounding us and their maintaining or usage require specific information**.

At home we are surrounded by different kind of objects that finally belong to our home and give the feeling of comfort. But these things' nature can be rather different, and living with them or using them require some information that should not have been forgotten.

PRODUCT

The product is a multi-platform application (Windows PC and Android). On the main application screen, the user can select one of the following options:

(i) **Record or edit new info**,
The user can record or edit information and generate a marker

(ii) **Get info**,
The markers are placed on objects we have recorded information. The app read the marker and provide the information on the screen.

(iii) **Game**.
After reading a marker a question is asked that should be answered by the user. Because of the diversity of information some AI also could be used to generate simple questions either with 3 answers, or the answer should be typed.

WHAT MAKES IT STAND OUT?
The rate of customization makes the product very attractive. AR-based components build a real bridge between the physical objects and the stored information. It could work as a personal assistant. All of the above features distinguish this product.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?
It is feasible to develop this product as it is a software product which can be developed on any PC with medium-range specifications.
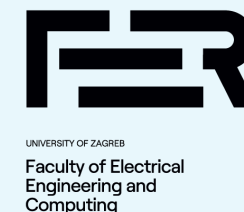
This product uses **augmented reality**.

BUSINESS GOALS

The company could generate some predefined information in a simple form about his products. This information could be accessed from a cloud, and even the markers could be attached to the product. Even user manuals could have a simplified version to provide help with pictures. Besides, the company should provide necessary equipment and a budget plan for software maintenance. If possible, company should also provide a group of testers that are among the target audience, i.e., people with Down Syndrome, as well as any other potential consumer.

If the products of a company had such a complimentary service for people with disabilities, their products would be more popular among the PWD, and maybe among their relatives as well. It could a way to increase the social responsibility of the company.

UNIVERSITY of
DEBRECEN

UNIVERSITY OF ZAGREB
Faculty of Electrical Engineering and Computing

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

Digital Portfolios

Maria Potes Barbas, Pedro Matos
mariapbarbas@gmail.com, pedrojqmatos@gmail.com
Instituto Politécnico de Santarém, Portugal

Therefore, having either a mobile aplication or a virtual space that can replace the traditional CV and Cover Letter can be a effective strategy to boost their opportunities.

TARGET GROUP(S)

Target customers are **all individuals who need an effective strategy towards their professional inclusion** and want to have an application acting as a digital portfolio.

Product is intended to improve social and labour inclusion of people with Down Syndrome.

VISION

This product is intended to be used as a digital portfolio. It aims to **replace the standard methods of introducing newcomers**, specially with disabilities, towards the labour market (e.g., cv, cover letter, etc.) introducing an application supported by a dynamic digital interface in which each **user has displayed their personal info, competencies, skills and previous experience or training if it is the case**.

Having a more **dynamic way of presenting yourself to the labour market** is a key success factor for everyone. However, it is particularly important for young people with disabilities to have an adapted tool or assisted technology that can enhance their outs towards employability.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The product solves the challenge of social and labour inclusion of people with Down syndrome. It provides an effective and intuitive strategy, based on an adapted digital solution, to create their own digital portfolio to replace the traditional tools when seeking for a job (CV, Cover Letter, etc). In addition, it also addresses the needs of specific target groups like people with disabilities in a sense that online solutions like Europass (https://europa.eu/europass/en) are not fully intuitive or accessible, in terms of design and interaction, for these target groups.

WHICH BENEFIT DOES IT PROVIDE?

It offers an intuitive, accessible, and dynamic virtual environment in which the user can create his own profile and fill it with info concerning its competencies, skills, professional experience, training experience, etc. It operates like a modern, customizable, and fully accessible online CV and Portfolio in which the user can demonstrate his professional and personal profile.

PRODUCT

The product is a multi-platform application (Web version, Windows PC and Android). It will look like a virtual space with the following options:

 - Create your own personal profile: in this section the user can upload a profile picture, fill their personal info, and add main competencies, skills as well as, to identify previous work experience or other important info.

 - Share your portfolio: generating a QR Code in which other users can scan it and access their personal digital portfolio. This way, this application also adds a social networking component.

In terms of general layout, it will have an initial screen/home page in which the user has the option to create its own profile or share it. These options will de displayed by two buttons.
After this option, the user will have several fields to fill with the required information to complete his profile (like a quiz). A progress par will be noticed to facilitate navigation. It is also important that the design must be responsive and minimalistic ensuring good accessibility and usability.

WHAT MAKES IT STAND OUT?

This application is characterised by its interactive elements as well as an intuitive experience for the user since it simplifies the field options to be filled along the progress of completing its own personal profile/digital portfolio. All these options make it a unique application for users with disabilities.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?

It is feasible to develop this product as it is a web-based software product which can be developed on any PC with medium-range specifications. Besides, it can also be easily "converted" to a mobile application or PC application.
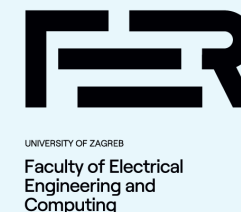

This product uses
augmented reality.

BUSINESS GOALS

The company should provide necessary equipment and a budget plan for software maintenance. If possible, company should also provide a group of testers that are among the target audience, i.e., people with Down Syndrome, as well as any other potential consumer.

The company would receive the software solution which can be competitive on the market since it offers unique features when compared with similar solutions. This product would also have a positive impact on the company's corporate responsibility.

[IPSantarém]
INSTITUTO POLITÉCNICO DE SANTARÉM

FER
UNIVERSITY OF ZAGREB
Faculty of Electrical
Engineering and
Computing

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

My 3D Avatar

Maria Potes Barbas, Pedro Matos
mariapbarbas@gmail.com, pedrojqmatos@gmail.com
Instituto Politécnico de Santarém, Portugal

VISION

This product is intended to be a digital **application in which the user can create its own 3D Avatar** by using Augmented Reality components. The **concept is to define their own personal avatar and represent them as their own "digital entity" throughout the several media and social channels in which they could be possibly involved**.

Instead of the user having only one option and being stuck with a single solution (in this case the upload of a profile photo which is the standard of most social networks and other network platforms) with the implementation of this digital application the user would be able to create his own custom avatar. With a high level of customization and corresponding to the user's needs. In addition, the user also has the opportunity of creating a dynamic 3D avatar of himself being able of printing it to become a more physique and tangible result. Furthermore, this solution also promotes a more secure way of sharing your personal image through internet ensuring an higher privacy level for the user.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The product solves the challenge of social and digital inclusion of people with Down syndrome. It provides an alternative and diverse solution for their own digital identity and representation throughout social network and other digital platforms that have a higher ratio of networking functionalities. It also covers privacy issues and security, since its not a regular profile picture or cover photo that is being generated but a fully personalized 3D Avatar.

TARGET GROUP(S)

Target customers are **all individuals who desire a solution based on the possibility of creating their own persona/avatar in 3D achieving a more diverse solution for a digital representation of themselves besides a profile picture or a cover photo**.
Product is intended to improve social and digital inclusion of people with Down Syndrome.

WHICH BENEFIT DOES IT PROVIDE?

It offers an intuitive, dynamic, and diverse experience of creating not only digital content but also a 3D virtual representation of the user. In addition, it also provides a unique experience since the user can also add levels of creativity that are not covered by other digital solutions.

PRODUCT

The product is a multi-platform application (Web version, Windows PC and Android). It will user AR elements and 3D components to create a personalized 3D Avatar. Therefore, it will be based on the following options:

 - The first screen will have the option "Start Creating" which will trigger the customization of the 3D Avatar. It can use AR elements like wardrobe, accessories, or other objects to enrich the user experience of creating a unique character or by using a pre-loaded library of assets with several options (types of hair, eye colour, etc.) that the user can select.

 - Share your avatar, which will allow users to share their created avatar in social media or other digital platforms.

 - Print your avatar, which will generate a file to print their own 3D avatar by using a 3D printer.

Some basic concepts to have in mind are:
 - Minimalistic and intuitive layout.
 - Fully Accessible application (either in web version or in mobile version).

WHAT MAKES IT STAND OUT?

This application is characterised by its unique content that is offered to users. It allows a fully diverse creation processes of a digital 3D Avatar. It also includes AR (Augmented Reality) functions and 3D printing solutions. In addition, for users with disabilities it facilitates in the process of creating and generating their own avatar. If we compare with other software, games, or solutions (like SIMS or other online alternatives) they are by far too complex systems for these users to decipher and have an enjoyable experience.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?

Despite of being a concept a tad more complex to develop or at least a more challenging approach it is feasible to the develop this type of product. Nowadays, there are a lot of frameworks and other AR solutions that facilitate this type of development.
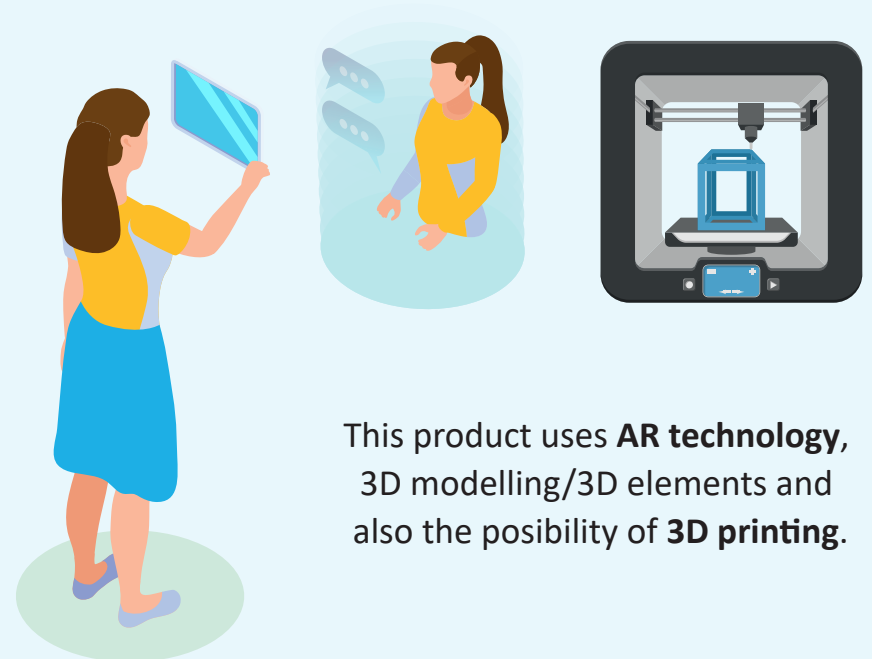
This product uses **AR technology**, 3D modelling/3D elements and also the posibility of **3D printing**.

BUSINESS GOALS

The company should provide necessary equipment and a budget plan for software maintenance. If possible, company should also provide a group of testers that are among the target audience, i.e., people with Down Syndrome, as well as any other potential consumer.

The company would receive the software solution which can be competitive on the market since it offers unique features when compared with similar solutions. This product would also have a positive impact on the company's corporate responsibility.

[IPSantarém]
INSTITUTO POLITÉCNICO DE SANTARÉM

FER
UNIVERSITY OF ZAGREB
Faculty of Electrical
Engineering and
Computing

INNOSID

ARound Me

Carlos Hernández Franco
chernan@dcom.upv.es
Universitat Politècnica de València, Spain

VISION

This application would support the **learning of the use of the most common tools in an occupational center** (carpentry, kitchen, textile, printing, etc).

In people with intellectual diversity, normally the learning processes can be slow and/or require repeating and remembering procedures and tasks. This application could help in this necessity.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The product solves the challenge of social inclusion of people with disabilities. In this case helping to learn a specific trade, through precise instructions for the use of the most common tools.

WHICH BENEFIT DOES IT PROVIDE?
For people with disabilities, autonomy is a vital aspect that makes it possible to increase self-esteem. This tool can be very useful in achieving this.

TARGET GROUP(S)

Target customers are **all the people who attend wherever an occupational center with the aim of learning a trade and want to have an application that acts as a virtual assistant**.

Product is intended to improve social inclusion of people with cognitive disabilities. On many occasions, knowing or remembering the operation of certain objects or tools may imply the need for help and therefore limit the autonomy of the person with functional diversity and in turn their self-esteem. Therefore, promoting the resolution of these situations with the support of augmented reality can be very useful in the context of functional diversity.

PRODUCT

This product is an application for Tablet or Mobile Phone on Android. It will look like a virtual Manual based on Augmented Reality. In the main screen of the application, the user can select one of the following options: (i) Workshop (ii) Tool editor and (iii) Online help. The first option streamlines the process of identifying the elements. The second allows adding / expanding the information that is available. Finally, the third option allows the user to communicate in real time with an instructor who solves possible doubts.

WHAT MAKES IT STAND OUT?

The application is characterized by high adaptability. The different options of the same make learning more dynamic and increase self-esteem.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?

It is feasible to develop this product as it is a software product which can be developed on any PC with medium-range specifications.

This product uses **augmented reality**.

BUSINESS GOALS

The company must provide the necessary equipment and a budget plan for maintaining the software. If possible, the company should also provide a pool of evaluators who are among the target audience, i.e. people with disabilities, as well as any other potential consumers.

The company would receive the software solution which can be competitive on the market since it offers unique features when compared with similar solutions. This product would also have a positive impact on the company's corporate responsibility.

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

FER

UNIVERSITY OF ZAGREB
Faculty of Electrical Engineering and Computing
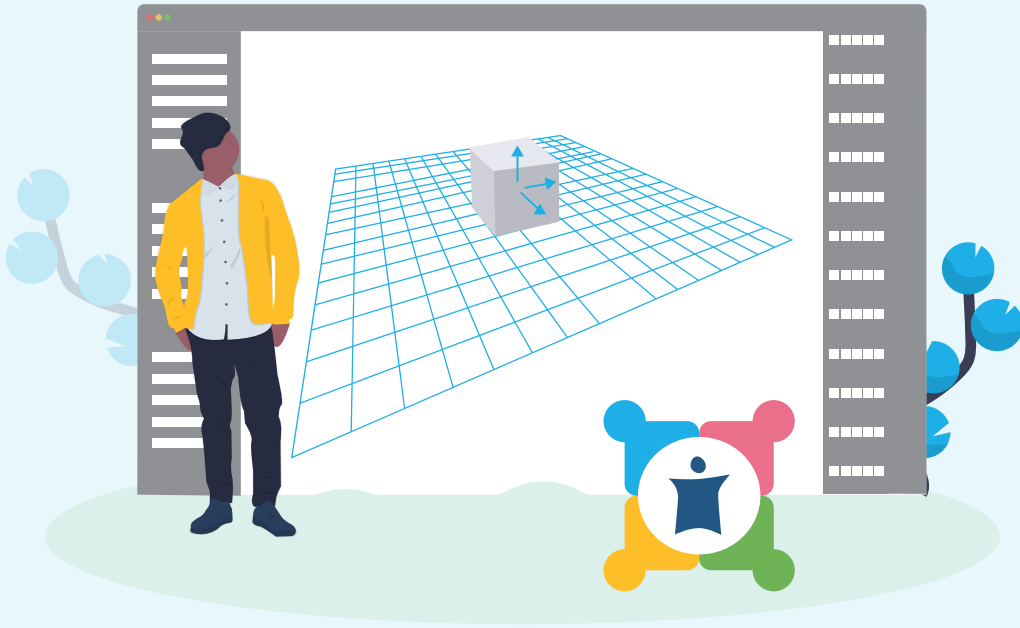
INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

3dAR

Felipe Peñaranda Foix
fpenaran@dcom.upv.es
Universitat Politècnica de València, Spain

TARGET GROUP(S)

Target customers are all the **people who attend wherever an occupational center with the aim of learning a trade and want to have an application that acts as a virtual assistant**. And, at the same time, the centers themselves are a target customer in order to offer very favorable digital skills for its users and their families.

Product is intended to improve social inclusion of people with cognitive disabilities. Typically, people with disabilities are not taken into account in the use of emerging technologies. However, the use of the same, with the corresponding adaptation and training, can eliminate barriers in their day-to-day life, promote sociability with other people and groups, being able to make the tasks and processes in which they work even more efficient and faster participate.

VISION

This application would **support learning techniques related to 3D printing in a vocational center**.

For people with intellectual diversity, learning processes can usually be slow and/or require repetition and recall of procedures and tasks. This application may help with that need.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The product solves the challenge of social inclusion of people with disabilities. In this case, it helps to learn a particular trade that supports or requires the use of 3D printing.

WHICH BENEFIT DOES IT PROVIDE?

For people with disabilities, autonomy is an important aspect of increasing self-esteem. This tool can be very helpful in this regard as it helps in performing a particular task with precise instructions.

PRODUCT

An application for tablet or mobile phone in Android environment is proposed. Its main objective is to digitize objects in order to analyse and/or modify them using 3D design and printing programs. Different types of objects are made in a vocational center such as cups, pen holders, ashtrays, hooks, etc. The customization of the same is done through trial and error in manufacturing. The idea is to simplify and streamline this process by using 3D printing on scale models before sending a final design to a manufacturing workshop.

WHAT MAKES IT STAND OUT?

The application is characterized by high adaptability. The various options make learning more dynamic and increase self-confidence. On the main screen of the application, the user can select one of the following options: (i) scanning (ii) object information (iii) assistance and (iv) online help. The first option scans and identifies the objects. The second one allows to provide other available information. The third option shares the finished model in free social design networks. Finally, the fourth option allows the user to communicate in real time with an instructor who solves possible doubts.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?

It is feasible to develop this product as it is a software product which can be developed on any PC with medium-range specifications.

This product uses
augmented reality.

BUSINESS GOALS

The company must provide the necessary equipment and a budget plan for maintaining the software. If possible, the company should also provide a pool of evaluators who are among the target audience, i.e. people with disabilities, as well as any other potential consumers.

The company would receive the software solution which can be competitive on the market since it offers unique features when compared with similar solutions. This product would also have a positive impact on the company's corporate responsibility.

UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA

FER

UNIVERSITY OF ZAGREB
Faculty of Electrical Engineering and Computing

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

HoloGeometry

Ana Kešelj
akeselj@unidu.hr
University of Dubrovnik, Croatia

Application offers different modes so users can either learn basics of geometry, recognize geometrical shapes or test the knowledge. This application use holography technology which should help with visualizing 3D objects.

TARGET GROUP(S)

Target customers are all **individuals who like mathematics and want to learn geometry**.

Product is intended to help with learning which also results in improving social inclusion of people with Down Syndrome. Since people with learning difficulties, including people with Down syndrome and autism have the need to learn mathematics in order to better function as citizens in a complex society, and to support them in this endeavor, mathematics education usually focuses on arithmetic or concept of numeracy. These concepts of mathematics are undoubtedly important in order to understand the world quantitatively and they also improve communication skills as well as abilities to think, reason and learn. The abstract ideas that geometry conveys from direct experience make the world more understandable for them, so it is worth developing a method to teach them geometry. Mathematics, especially geometry, has been specifically developed by humans to embody abstract ideas from experience. Therefore, the choice of this subject as a path to help them to a better understanding of the world could specifically enhance their areas of cognitive strength.

VISION

This product is intended to help students **learn geometrical objects**. In geometry, it is important to bear in mind the Ostensive Phenomenon that constitutes an obstacle for students. This phenomenon arises from the appearance of figures and geometric bodies drawn in textbooks from a single perspective, which means that, when placed in another spatial orientation, students are not able to apply the knowledge they have learned, that is, they are not able to extrapolate. This application provides them **visualization of geometric bodies in space with possibility of interaction**. It serves needs of learners who process information primarily through visuals, as well as increase learning for all students. This product enables students to see and conceptualize geometrical objects clearly and enhance tactile hand-eye-mind connections that improve the ability to recall facts and retain learning.

NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
The product solves the challenge of learning three dimensional geometrical shapes. The abstract ideas that geometry conveys from direct experience make the world more understandable for everyone, including the people with Down syndrome, so it is worth developing application that can help them teach/learn geometry.

WHICH BENEFIT DOES IT PROVIDE?
It offers customization of geometrical shapes and interaction with it using leap motion. Three games are included: a game to learn about geometrical shapes, a game about recognizing geometrical shapes and game where user can check/test knowledge about it.
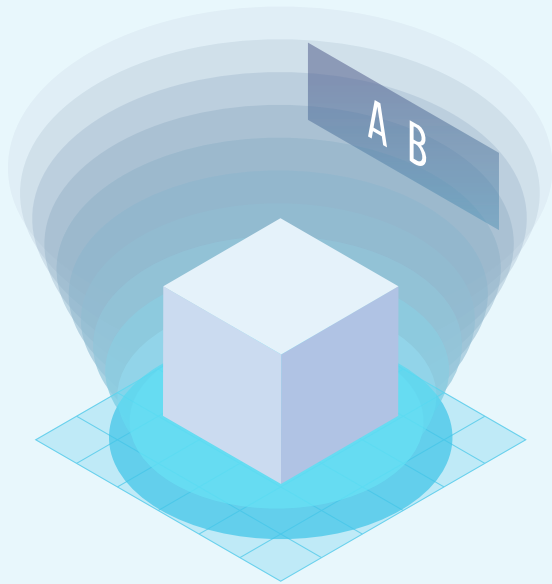
This product uses
holographic technology and **holograms**.

PRODUCT

This product is a multi-platform application (Windows PC and Android). On the main application screen, the user can select one of the following options: (i) Learn geometrical shapes, (ii) Recognize geometrical shapes, and (iii) Test your knowledge. If user has selected the option "Learn geometrical shapes", it is possible to select one of the offered geometrical shapes. Then, the selected geometrical shape is projected on hologram while the text about it appears on the screen of the phone. Hologram is device which projects three-dimensional image or gives the impression of one. It is possible to turn on the option of narration which reads the text about geometrical shape of the screen of the phone. This function helps visually impaired people to use this application. User can change the color of geometrical shapes and its size. Second option is "Recognize geometrical shapes" where random geometrical shape projects on the hologram and the user must select one of the three proposed geometrical shapes. If user chooses correct answer, he or she gets a new question. If user chooses wrong answer, he or she can try to answer the same question until he or she answers this question correctly. Application also has functionality that assists users by helps them answering the correct question if the correct answer hasn't been chosen the first time. Then, if the user has selected option "Test your knowledge", a quiz with simple questions is started where user must select the correct answer. As a reward for successfully solved quiz, a user gathers points with which he/she can open rewards. Rewards are avatars and different kinds of patterns which can be applied on geometrical shapes.

WHAT MAKES IT STAND OUT?
The application is characterised by high adaptability, holography-based games for enforced learning and accessibility features. Most of the games that help to learn mathematics resolves around arithmetic and numeracy. All the above make the product stands out.
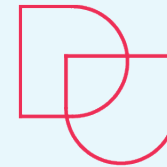
IS IT FEASIBLE TO DEVELOP THIS PRODUCT?

It is feasible to develop this product as it is a software product which can be developed on any PC with medium-range specifications.

BUSINESS GOALS

The company would provide necessary equipment and a budget plan for software maintenance.

The company would receive the software solution that is completely unique and therefore very competitive with its unique feature of using holography to enhance knowledge of geometrical shapes. Since software solution is unique, it is highly possible that many people will download it. One of the most important things for company is brand. The more audience trusts the company, the more likely they'll be listening to later sales pitches and commit to the brand and company. Brands can outstand their presence in the application and users get exposed to certain offers and discounts.

SVEUČILIŠTE U DUBROVNIKU
UNIVERSITY OF DUBROVNIK

UNIVERSITY OF ZAGREB
Faculty of Electrical
Engineering and
Computing

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

SchedulAR

Ana Kešelj, Krunoslav Žubrinić
akeselj@unidu.hr, krunoslav.zubrinic@unidu.hr
University of Dubrovnik, Croatia

VISION

This product is intended to be a **virtual reminder and guide** for person on specific activities or tasks that user need to do in specific time frame. It allows **planning of upcoming activities**, and thus encouraging the independence with a range of activities.

Application **encourages the independence** of people with Down syndrome, people with different disabilities or memory issues. Schedule ensures predictability and consistency. It also increases the understand of what's following and clear all expectations.

TARGET GROUP(S)

Target users are **all individuals who need help with organization of their schedules and daily activities**. Target customers are all users and persons who are responsible for them (e.g., parents of children).

Product is intended to improve social inclusion of people with Down Syndrome, people with different disabilities, memory issues or simply any person (young or senior) who need or want to organize their day or acquire habits of regular performance of specific tasks.
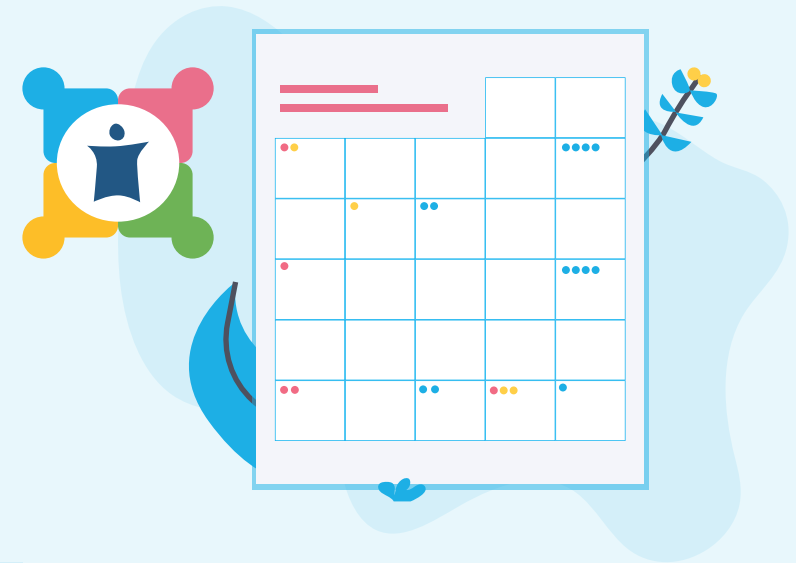
NEEDS

WHAT PROBLEM OR CHALLENGE DOES THE PRODUCT SOLVE?
Product solves the challenge of social inclusion of people with Down syndrome, people with different disabilities or memory issues. It reminds them on their daily tasks or obligations and helps them to perform those tasks or obligations by giving them precise instructions on how to do it. This application helps them with their daily schedule and enable design of instructions in different ways that best suit a group of users. E.g., some studies suggest that the processing and recall of spoken information is improved when it is supported by relevant picture or multimedia material. This information endorsed the importance of using visual supports including pictures, signs and print when either teaching children and people with Down syndrome as this approach makes full use of their stronger visual memory skills. Other categories of users can prefer other type of representing information, e.g., voice message or video.

WHICH BENEFIT DOES IT PROVIDE?
It offers customization of daily activities and helps them to solve them. Three options are included: (i) Learn new activity (ii) Insert or edit activity, and (iii) Schedule your day.

PRODUCT

This product is **mobile application**. On the main application screen, the user can select one of the following options: (i) **Learn new activity** (ii) **Insert or edit activity**, and (iii) **Schedule your day**. If user has selected the option "Learn new activity", they can browse through daily activities such as different household chores. By clicking on the activity, it sequences tasks with multiple steps or multiple consecutive events which help individual to solve it. New activity can be added by selection Insert or edit activity. Also, it is possible to edit default activities to be in accordance with individuals and their needs. Last option is "Schedule your day". In this option, the user puts a reminder of the events and activities that need to be done on some day. Use of emerging technologies can add value to description of some activity. E.g., if task is to empty the dishwasher and put dishes on the appropriate shelves, in first step, when user points the cell phone towards the kitchen, application can automatically recognize dishwasher and direct the user towards it, or user can learn about some objects in his or her environment. Automatic recognition of objects can be performed using machine learning. Due to the hardware limitations of the mobile device, the application will be able to recognize objects from a predefined (limited) set of objects (e.g., common household objects). The AR components in the application are used to mark objects with informative symbols (e.g., to display direction toward object) or to describe specific object using text. Information about objects can also be displayed in different ways, adapted to people with different disabilities (e.g. information about object can be spoken for the visually impaired person). After user successfully finish some activity application can inform responsible person about it, and award user on some way (e.g., praise him or her for well-done job or give him or her to play some game).

WHAT MAKES IT STAND OUT?
The application is characterised by high adaptability, augmented reality-based descriptions and games and schedule that enforces independency and accessibility features.

IS IT FEASIBLE TO DEVELOP THIS PRODUCT?
It is feasible to develop prototype of this product (or basic version which uses simple emerging technologies) as it is a software product which can be developed on any PC with medium-range specifications.
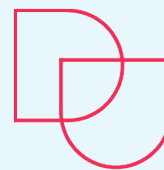
This product uses **augmented reality**.

BUSINESS GOALS

The company would provide necessary equipment and a budget plan for software maintenance. Company should also provide information about target audience and potential consumers.

The company would receive the software solution that is completely unique and therefore very competitive with its unique feature of using AR to help people with Down Syndrome, with different disabilities or memory issues to be more independent.

SVEUČILIŠTE U DUBROVNIKU
UNIVERSITY OF DUBROVNIK

UNIVERSITY OF ZAGREB
Faculty of Electrical
Engineering and
Computing

INNOSID

e-mail: **innosid@fer.hr**
web: **http://sociallab.education/innosid**
Project reference: **2019-1-HR01-KA203-060959**

INNOSID

Co-funded by the
Erasmus+ Programme
of the European Union