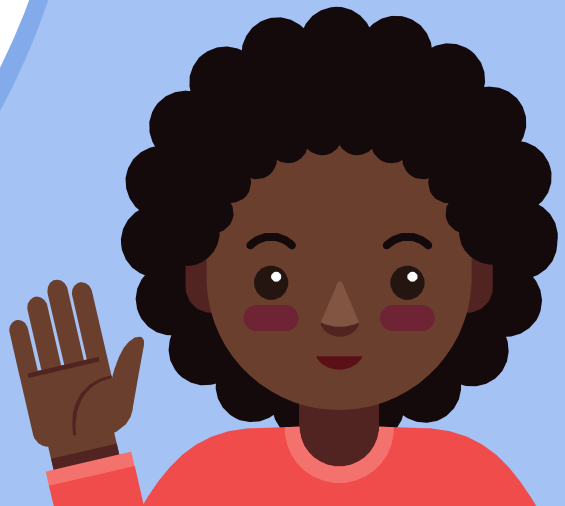
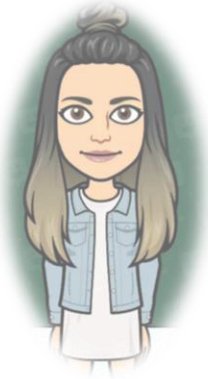
SIGNTEXT

University Politehnica of Bucharest
Faculty of Mechanical Engineering and Mechatronics
Coordinating professor: Ciprian Ion Rizescu



SignText Team Presentation

Cătălin
Developer
Co-CEO



Maria
Developer
Co-CEO

Andrei
Developer
Co-CEO

- We are Maria, Andrei and Cătălin. We are fourth-year students at the Faculty of Mechanical Engineering and Mechatronics, University Politehnica of Bucharest.
- Our passions integrate fields of close knowledge, more precisely process automation, data science, artificial intelligence, robotics, mechatronics etc.
- Our experience is gained through our university path, as well as by participating in various extra-curricular courses and different competitions in the field of engineering and programming.

23,564

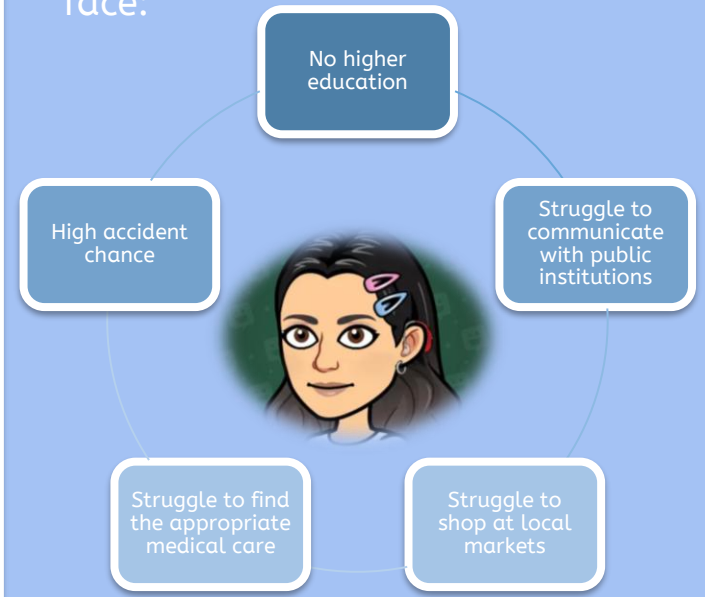
the number of hearing-impaired people in Romania according to A.N.S.R.

54

the number of accredited translators according to A.N.P.D

Take a normal activity we are doing daily, for example, going to school or buying groceries. Imagine doing that without no problem. Easy, right? Unfortunately for hearing impaired people this is a hard-going job with a lot of risks.
We are planning to introduce our solution to every ordinary location to socially integrate everyone with little to no ability to hear?
To be fair and efficient we are planning to perform a survey on the affected population to see where this solution can grant them the best quality of life.

Let's take a look inside the life of Emma. She is 26, and unfortunately, she is part of the hearing-impaired community.
Here are some issues that the members of her community face:



Our product

Our product consists in an application which uses neural networks and computer vision to recognise the video of sign language speaker, and then smart algorithms translate it into text/speech.

Mobile project

Tablet project

Desktop project

Product development

To develop the SignText app, we started by building a functional model through data training, using specific Deep learning procedures.

The initial and most crucial part of development is gathering good data. This consists of either data scraping or with the help of a sign language expert for the best results.

After we have gathered all necessary data the next step is a pre-process for the actual training. For this we will use MediaPipe's hand tracking/pose APIs with the OpenCV computer vision libary. OpenCV will take care of all image input while MediaPipe will strip all the positional data.

With their help we will only extract the data we need for training (lanmarks for the skeleton of the hands within the video and their coordonates) which will strip down the training data from maybe around 80 000 data points per frame to 46 per frame. This is done as an huge optimization for training.

The next step is an actual training and testing of the model.

The model consists of a combination of CNN (Convolutional neuronal network) layers combined with LSTM (Long short-term memory) layers, with a softmax categorical layer at the output of the model. The CNN layers are there for analyzing the actual images and give out an categorical output for them. The LSTM layers are there for understanding the series of movements that the hand is doing and give out a result after the motion is done.

For an actual implementation of the model we will require it to run on a backend server for the computing. For this we will use the AWS platform. On the frontend side the main focus will be with React Typescript which should make development easier between platforms.

A big focus will stand in the fact that the model will be easily implementable with other applications. So the end goal for implementation in other application is to be able to import our APIs with only a couple of required parameters (camera input, screen output, text/speech variable boolean), with a couple of optional ones (permitted accuracy of words, number of hands).

Production costs for our first year

With our economic education and with the help of our mentors, we were able to calculate our variable costs, final prices. Based on some private surveys and a market analysis, we came to the following decision: our product must be in the middle price range. Due to the current situation, the variable costs and contribution margins may differ.

The required infrastructure resources and the costs can be seen in the following figure:

Resource	Required quantity	Unit price	Cost (€)
PC	3	1500	4500
Laptop	2	1200	2400
Windows license	5	266	1330
AWS Hosting	12	1000	12000
Machine learning module			

The legal, marketing and accounting costs can be seen in the following figure:

Resource	Required quantity	Unit price (€)	Cost (€)
Legal advisor	1	700	700
Marketing team & products	1	6000	6000
Accounting team	1	700	700

Production costs for our first year

Regarding the costs required for the development team, they can pe seen in the following figure:

Role	Required quantity	Effort (PDs)	Unit Price (€)	Costs (€)
Developer	1	150	320	48000
QA Automation Engineer	1	150	300	45000
Business Consultant	1	50	240	15000
AWS Architect	1	50	480	24000
Expert in Sign Language	1	Partner	-	-

Selling prices

After considering the previous numbers, we decided to sell a basic package for 30 €. For institutions who require multiple licenses, we plan to sell packages with 10/50/100. Also, for maintenance support fee for institutions is 300 €.

Break even point

In order to calculate the break even point accurately, we first estimated the planned sales volume. After inserted the amounts calculated previously, we found out that we need to sell 7,600 units to make a profit.

Fixed Cost	**206,000 €**
Selling Price Per Item	30 €
Variable Cost per Item	2.023 €
Break-even point	7,605 units

What we expect?

We expect to be able to sell 10,000 licences until we reach the end of our third year of activity. To achieve this target, besides the standard licences we will sell API implementation in other apps that will be based on the size and usage of their user base.

After 1 year we expect the development of the translation model to be done and released, while the costs will only remain on development of user request improvements, bug-fixes and maintenance. After the initial launch we will also send optional surveys to our users in order to keep track of the impact of our solution and improving the user experience.

At the 2 year mark we expect for our community to grow and for us grow our team with 25%. At that point we should be very open with our customers and always keep a direct communication with them.

Market analysis

In Romania, the branch we are trying to enter allows room for innovation. Taking a look at our competitors, the Romanian market home to DLMG app. After analysing their product and feedbacks from different entities, the conclusion is that even their app is dedicated to translating the sign language, the algorithm is not able to translate sentences. It can only translate simple words. Another strong competitor is the team of accredited translators, but their number is too little compared to the need of the population.

Sponsoring

The Coronavirus crises and the international context demands a lot from companies. Our project is going to be funded using:

European funds

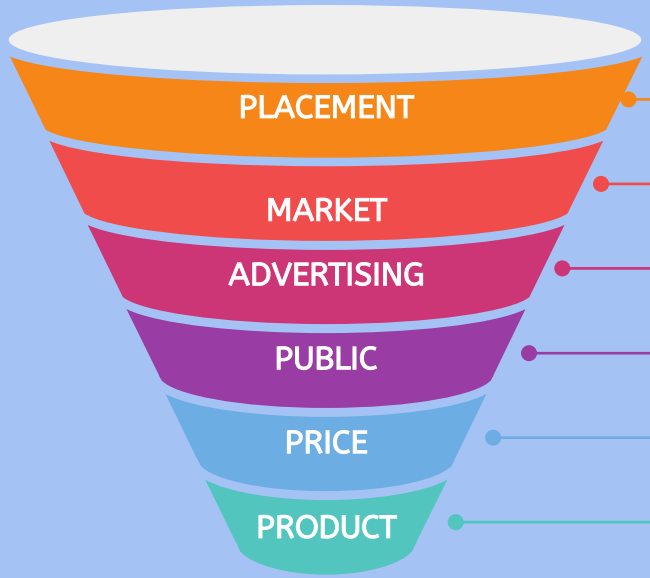
Funds from NGO's

Funds from private companies

Regarding the fund received from private companies, our team is on its way to obtain funding from Accenture Romania. We are looking forward to have similar discussions with more entities which can not only help us fund this idea, but also develop it faster.

Besides the funnel strategy marketing which can be seen below, we plan to give our sponsors the product for free. Also the maintenance package will be free for the first year.

Marketing activities



How our customers will take possession of the product.

Education and public system (town hall, financial buildings, etc)
NGOs for the affected population

Web Page, Social Media, Google ADS, Email Marketing

Community of the hearing impaired

Sale price of the product, European Founds, Partnership with private health companies

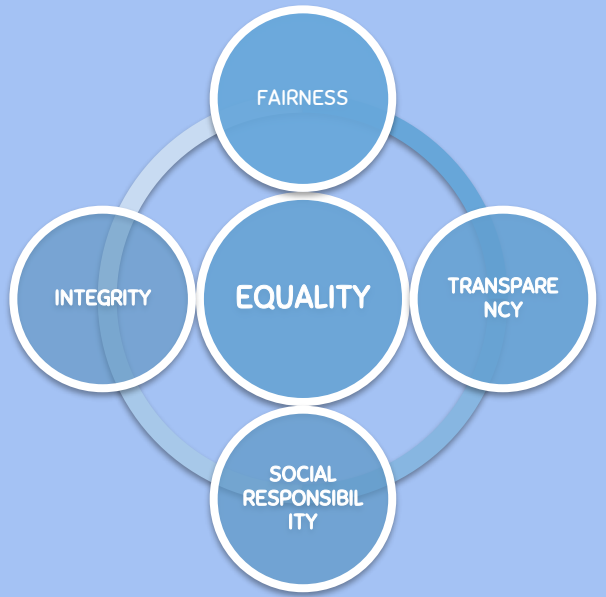
The application developed by the SignText team

Customer overview/target group

After analyzing the target group and the market need, our team concluded with the fact that our concept targets the Romanian hearing-impaired community. We are planning to introduce our application by collaborating with public institutions, educational system, medical system, labor market etc., just as said previously.

Ethics and social responsibility

Regarding ethics and social responsibility, we wish to facilitate a nice working environment, and also a divers one. We wish to accommodate whoever wishes to collaborate with us.



Our future potential

Our solution does not end at as we hit the finish line of our development cycle. Once the project has enough traction we aim for it to be the go-to sign language to text/speech conversion model. This applies to free users, as well as enterprises. Our wish is for it to not only directly help the hypoacusis by translation, but also work as a building block for other developers that want to construct similar applications.