# sign language

It can be difficult for people to communicate with deaf people. The amount of people who speak American sign language (ASL) ranges between 500,000 and two million. This means that only approximately 0.5% of people in America alone who understand ASL. Making it difficult for deaf people to communicate with hearing people who will most likely not understand ASL.

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## Impact on society
What impact is expected from your technology?

### What is exactly the problem? Is it really a problem? Are you sure?
Most people do not understand sign language. So, it's difficult for most people to communicate with deaf people. This technology offers a solution for both deaf and hearing people to make it possible to communicate even if one party cannot understand sign language.

### Are you sure that this technology is solving the RIGHT problem?
The problem this technology is that deaf people have difficulty communicating with people who do not understand ASL. The solutions that deaf people use now is to write down what they want to say. This technology will be much faster for both the deaf and hearing people.

### How is this technology going to solve the problem?
The goal of this technology is to translate ASL gestures into text. Although at first the features will be limited, in the future we will expand the glossary to include more gestures/words.

### What negative effects do you expect from this technology?
This technology will run on a device with a camera, like a phone or a laptop. Of course, there will always be people who do not have one of these devices. Either because they never bought one or because they cannot afford them. This creates a barrier of entry. Then these people might be shunned for not using this technology. And if this technology becomes so widespread it might force them to but a device.

### In what way is this technology contributing to a world you want to live in?
This technology is not only helping the deaf people communicate with other who do not understand ALS. But also giving the people who want to learn to speak ALS a platform to practice their skills. This will not only increase the number of people who understand ALS. But also raises awareness of the struggles that deaf people go through on a daily basis with communication. As this app is being developed we could supply businesses with devices for communication with deaf people. So that the deaf community no longer has to worry about going shopping with a language barrier for example. Hopefully a society will emerge with more acceptance for people with a disability, and offers them help with their daily tasks.

# Technology Impact Cycle Tool

**sign language**

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**Now that you have thought hard about the impact of this technology on society (by filling out the questions above), what improvements would you like to make to the technology? List them below.**

A big problem with this technology is the barrier of entry. So we need to make sure that everybody is able to use this technology. A solution might be for businesses to have their own device that has the app. Therefore deaf people no longer have to worry about bringing their own devices.

## Hateful and criminal actors
What can bad actors do with your technology?

### In which way can the technology be used to break the law or avoid the consequences of breaking the law?
It could be that a bad actor could label the gestures wrong on purpose. This will result in the model giving the wrong translations. Making the app unusable.
Also a  bad actor could hijack the camera of the device that is using the technology. So, this should be made secure.

### Can fakers, thieves or scammers abuse the technology?
We do not think that this technology could be used to hurt people or groups. Because it does not store any personal data, it would be difficult to target someone.

### Can the technology be used against certain (ethnic) groups or (social) classes?
Because this technology works on devices. It could exclude the people who do not want a device, or cannot afford one.

### In which way can bad actors use this technology to pit certain groups against each other? These groups can be, but are not constrained to, ethnic, social, political or religious groups.
A bad actor could make sure that certain words will not be translated or translated incorrectly. This could be used to target certain groups. To exclude words that they would be use frequently. Hindering communication between the people within these groups. Also a bad actor could make a clone of our product, and then charge a high price for it. This could be used to exclude people who cannot afford it.

### How could bad actors use this technology to subvert or attack the truth?
Also a bad actor use this technology as an example of how we have become to dependent on technology. And if this technology would no longer be available, we would not be able to recover without a replacement. But this would be unlikely.

### Now that you have thought hard about how bad actors can impact this technology, what improvements would you like to make? List them below.

We should make sure that the dataset of words is moderated correctly so that gestures need to be checked out before being added/changed.

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## Privacy

Are you considering the privacy & personal data of the users of your technology?

### Does the technology register personal data? If yes, what personal data?

This technology does not register personal data.

### Do you think the technology invades the privacy of the stakeholders? If yes, in what way?

This technology does not register personal data.

### Is the technology is compliant with prevailing privacy and data protection law? Can you indicate why?

This technology does not register personal data.

### Does the technology mitigate privacy and data protection risks/concerns (privacy by design)? Please indicate how.

This technology does not register personal data.

### In which way can you imagine a future impact of the collection of personal data?

This technology does not register personal data.

### Now that you have thought hard about privacy and data protection, what improvements would you like to make? List them below.

I have no improvements.

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## Human values
How does the technology affect your human values?

### How is the identity of the (intended) users affected by the technology?
This technology will improve the lives of both deaf people and not deaf people. Because they are now able to communicate.
This will give deaf people more incentive to go out without having to worry about their ability to communicate with other people.

### How does the technology influence the users' autonomy?
This technology allows the used to expand their communicative skills to people who do not understand ASL. It does not make these people dependent on this technology, because when they do not have access to their device. They could still write down what they want to say.

### What is the effect of the technology on the health and/or well-being of users?
With this technology communication with people who don't understand ASL will be easier. Hopefully this will encourage deaf people to go out and socialize with more people. Reducing the chances of them getting lonely.

### Now that you have thought hard about the impact of your technology on human values, what improvements would you like to make to the technology? List them below.
We think that in the future it might be a good idea to form a community around this technology. Giving deaf people a platform to talk to others to and share experiences.

## Stakeholders
Have you considered all stakeholders?

*This category is only partial filled.*

**Who are the main users/targetgroups/stakeholders for this technology? Think about the intended context by answering these questions.**

**Name of the stakeholder**
Deaf people.

**How is this stakeholder affected?**
Deaf people will use this app to make it easier to communicate to people who do not understand sign language.

**Did you consult the stakeholder?**
Yes

**Are you going to take this stakeholder into account?**
Yes

**Name of the stakeholder**
People who want to learn sign language

**How is this stakeholder affected?**
This technology might be a useful tool for people who are trying to learn sign language. It could be used to practice the gestures, and see if you can do them correctly.

**Did you consult the stakeholder?**
Yes

**Are you going to take this stakeholder into account?**
Yes

**Name of the stakeholder**
business owners

**How is this stakeholder affected?**
For businesses it is currently difficult to communicate with deaf people unless they have someone that understands sign language. This technology could help them more easily understand deaf people.

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Did you consult the stakeholder?
Yes

**Are you going to take this stakeholder into account?**
Yes

**Name of the stakeholder**
People who don't speak ASL

**How is this stakeholder affected?**
People who do not understand sign language will have a difficult time communicating with deaf people. This technology will make it much easier for them to talk with deaf people.

**Did you consult the stakeholder?**
Yes

**Are you going to take this stakeholder into account?**
Yes

**Did you consider all stakeholders, even the ones that might not be a user or target group, but still might be of interest?**
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**Now that you have thought hard about all stakeholders, what improvements would you like to make? List them below.**
I need to make sure that we look at both the deaf and hearing people equally.

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## Data
Is data in your technology properly used?

### Are you familiar with the fundamental shortcomings and pitfalls of data and do you take this sufficiently into account in the technology?
The dataset has images of gestures in various lighting conditions.
The resolution of the images has to be quite low. Because otherwise it would be to computationally expensive to create a model with all the different gestures. And the dataset does not have all gestures that exists in American sign language(ASL). So, this is means that some things can not be expressed with this technology. Also this data set only has still images meaning it will not work with gestures that involve movement. In this EDA we will be focusing on the letters because the process is the same for the rest of the dataset.

### How does the technology organize continuous improvement when it comes to the use of data?
Yes, we understand that languages change over time. New words will be introduced all the time. So, we have to make sure that these new words are incorporated into the technology as quickly as possible. We might also think about taking feedback on which words are missing. Or when certain gestures do not work as well as they should. This will improve the technology for everyone using it.

### How will the technology keep the insights that it identifies with data sustainable over time?
Over time the devices that we use will get better and stronger. This means that they could support better and more complex algorithms. This is the same for the data. In the future higher resolution images could be used for the algorithm.

### In what way do you consider the fact that data is collected from the users?
We think that the data used and collected for this technology should be openly available in an online public repository for example. So there will be no monetary profit from the data. But the data could be used to improve other application who might be in search of this kind of data. And we will be open to additions to this data. So that together we can improve this dataset for everybody.

### Now that you have thought hard about the impact of data on this technology, what improvements would you like to make? List them

**below.**

We need to make sure that the data is flexible. And that over time we improve and expand the dataset. And make sure that the dataset is publicly available so that together we can improve and expand it.

## Inclusivity
Is your technology fair for everyone?

### Will everyone have access to the technology?
This technology will run on a users device. This does mean that people without a device will not have access. But when this technology become more widespread we could supply businesses with their own devices. This means that these businesses will no longer have to rely on the people to bring their own devices.

### Does this technology have a built-in bias?
Because most of the data that has been collected contains the hand of white people. So this technology will most likely have a bias towards people with dark skin. Though we make sure that the data has lots of examples with gestures in suboptimal lighting conditions. We cannot be sure that this technology works in all lighting conditions. Also this technology reflects the time in which it was made. So the dataset needs to be updates as the language evolves.

### Does this technology make automatic decisions and how do you account for them?
This technology should not be able to make decisions for the user. But the users will also not have an account. This technology should be used as a tool, not a platform. But this might change in the future. Even then this technology should not make decisions on it's own.

### Is everyone benefitting from the technology or only a a small group? Do you see this as a problem? Why/why not?
The people who will benefit the most from this technology are the deaf people. But because deaf people are then able to partake in society better, we think that everyone will profit from it.

### Does the team that creates the technology represent the diversity of our society?
This team strives to be as diverse as possible. We think that everybody should be able to voice their own opinion about this technology.

### Now that you have thought hard about the inclusivity of the technology, what improvements would you like to make? List them below.
We think that the dataset should be diverse. And we think that we should

ensure that our team is also diverse

## Transparency

Are you transparent about how your technology works?

### Is it explained to the users/stakeholders how the technology works and how the business model works?

The way this technology works should be pretty easy to understand. This technology could have a website on which is explained how it work and how the data is collected.

The business model of this technology is to make communication between deaf and hearing people easier. We are very clear about this.

### If the technology makes an (algorithmic) decision, is it explained to the users/stakeholders how the decision was reached?

It should be explained to the users how this technology works. For example the app could have a tutorial that will explain to the users how the use the app, and how the algorithms work to a certain degree.

For example when a gestures is recognized it could get a score of how confident is. An example of this could be seen in the proposal.

### Is it possible to file a complaint or ask questions/get answers about this technology?

When people have questions they could look at the FAQ on our website. This should answer the most common questions people have about our technology. If they still have questions they could email us. And it a question is frequently asked, we could add it to the FAQ.

### Is the technology (company) clear about possible negative consequences or shortcomings of the technology?

We understand we will not be able to add all possible gestures to our dataset. But we will try our best to add as much as possible. And when new words/ gestures are introduced they should be added as quickly as possible. Adding new gestures will take time. Because we first need to create/find the data. We are aware of the shortcomings and we will try our best to improve them for the future.

### Now that you have thought hard about the transparency of this technology, what improvements would you like to make? List them below.

It should be easy to add new gestures to the dataset. Therefore the dataset should be flexible. Not only for adding but also for updating and removing gestures.

## Sustainability
Is your technology environmentally sustainable?

### In what way is the direct and indirect energy use of this technology taken into account?
Because this technology does not have a centralized server, we don't have to worry about the energy consumption. This technology will most likely be used as an app on users phone of computer. Therefore energy consumption is non of our concern.
But because this technology uses the camera it does require more energy than other apps. Therefore it might quickly drain the battery of mobile devices.

### Do you think alternative materials could have been considered in the technology?
This technology is software, therefore we do not have to worry about materials.

### Do you think the lifespan of the technology is realistic?
As technology improves newer versions of operating systems will come out. And we should adapt our software to these changes. So hopefully there will be no end of life.

### What is the hidden impact of the technology in the whole chain?
Because this app will use the camera of the device, the battery will drain more quickly. So it could happen if the app is used very often the device could wear out faster than intended. Meaning that the user will have to buy a new device more often. This means that e-waste will be greater.

### Now that you have thought hard about the sustainability of this technology, what improvements would you like to make? List them below.
Make sure that this technology will use as little resources as possible so that it can be used on many devices and they wont wear out faster due to our technology.

## Future
Did you consider future impact?

**What could possibly happen with this technology in the future?**
In the future the model will only be improved over time by adding more gestures to the dataset.

**Sketch a or some future scenario (s) (20-50 years up front) regarding the technology with the help of storytelling. Start with at least one utopian scenario.**
This technology is now used widespread by almost everybody. Not only the people themselves, but also all the businesses. Everywhere a deaf person goes they are able to easily communicate with others.

**Sketch a or some future scenario (s) (20-50 years up front) regarding the technology with the help of storytelling. Start with at least one dystopian scenario.**
No one uses the technology. Deaf people are still not able to easily communicate with people who do not understand sign language.

**Would you like to live in one of this scenario's? Why? Why not?**
I would like to live in the utopian situation. This would be a world where all deaf people are able to be heard by everyone.

**What happens if the technology (which you have thought of as ethically well-considered) is bought or taken over by another party?**
It could happen that this technology is bought by big company. They could mark up the price so that only certain people could use it. This would create a divide between the rich and the poor deaf people.

**Impact Improvement: Now that you have thought hard about the future impact of the technology, what improvements would you like to make? List them below.**
Make sure that this technology is easy and intuitive to use for everybody. And make sure that the technology will be free or at least at a low cost.