EYES OF THINGS

D4.12
Demonstrator 4, Test Report

HORIZON 2020
LE PROGRAMME DE RECHERCHE ET
D'INNOVATION DE L'UNION EUROPÉENNE

1. DOCUMENT INFORMATION

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Keywords	Demonstrator 4– Smart doll
WP/Task	WP4
Nature	Internal document
Dissemination Level	PU
Reviewed by	O. Deniz (UCLM)

2. DOCUMENT HISTORY

Person	Date	Comment	Version
A. Pagani	27.06.2018	Initial and delivered	1.0

3. ABSTRACT

The study is one of the 4 demonstrators of the project "Eyes of things", part of the European Project Horizon 2020. Its purpose is to test the functionalities of a "Smart Doll", as first step to explore the opportunities to use the EoT board empowered by an emotion recognition engine to potentially contribute to diagnose autism and monitor the disease progression in children. The EoT board and associated software had been developed by multiple Consortium partners prior to this study. A pilot was conducted on a panel of 12 children, aged between 4 and 10 years old, French speakers. One of the participants is affected by a mild form of autism. The aim of the pilot was to test the system stability as mounted on the doll and to verify the accuracy of the emotion recognition application in correlation with the observations taken by the researchers (which in this real scenario may be lower than in experiments with the standalone emotion engine). The system was proved functional and stable and the average accuracy of the emotion engine was 83.5%. The test on the software behaviour with the child affected by autism showed no difference in the level of accuracy of the emotion detected as compared to the researchers' observations. The results of the pilot suggest that the element of surprise generated by a doll that not only speaks, but also is able to interact and comment on what the children say, may be an attention catalyst across different children's ages.

4. TABLE OF CONTENTS

5. INTRODUCTION

This document describes the pilot conducted to test one of the 4 demonstrators of the project "Eyes of things", called "Smart doll".

The panel composition of the test group is described, as well as the test procedures and the tested functionalities. The results obtained are described and documented with images of the software interfaces used, graph elaborated by the system and graphs of aggregated results. Pictures of the experiments are also shown throughout the document.

The original goal of the pilot was to focus on children with different level of autism and verify the ability of the smart doll to help the disease monitoring. We have been unable to go through the authorization process to involve a group of parents of autistic children, for them to participate in the pilot. However, we are in contact with Dr. Med. Nadia Chabane, director of the CCA - Centre Cantonal Autisme of the Canton Vaud, Switzerland, and with Bruno Ferreira, member of the Committee of the Association Autisme Vaud, Switzerland. Given the interest shown by both parties, we are confident it will be possible to create a panel of children affected by autism in a next phase of the study.

6. DEMONSTRATOR TESTS

The final version of the demonstrator is an intelligent doll capable of analysing and interacting with a child in an empathic way. Two scenarios have been considered in this demonstrator targeting a usage of the interactive doll in play-mode in the first scenario and in a passive recording-mode in the second.

Scenario 1 – Interactive Doll – Talk to me
The doll will interact with the child through an audio interactive feedback based on his/her emotional state. Based on his/her emotion the nViso emotion engine embedded in the EoT platform will trigger predefined audio comments. During the playing time, a green LED on the EoT platform will indicate that the doll is in its interactive analysis mode.

Scenario 2 - Therapy Doll – I can help you
The doll will be used to monitor and record the emotional behavior of the child while playing with the toy. In this scenario, the doll can be used in two different modalities:

- **Recording mode:** In this mode the doll will passively record the emotion while the infant plays with it
- **Playing-recording mode:** In this mode the doll will record the session as per previous mode and it will also provide audio interactive feedback as in the first scenario

We undertook testing with the demonstrator by conducting a pilot which included 12 experiences with 12 different children in a controlled environment. During those experiences the doll was tested in play-mode, because play-mode encompasses recording-mode, hence the latter can be considered verified contextually.

1. Location of the pilot

NVISO SA's office in Switzerland, NVISO SA, Parc Scientifique EPFL, PSE-D, 1015 Lausanne. A room was specifically prepared for the tests and equipped with: Smart Doll on a toy high chair; a children's chair facing the doll within 1-meter distance; a camera behind the doll, facing the child once sitting on the chair; a chair for the facilitator and a desk for the researchers.
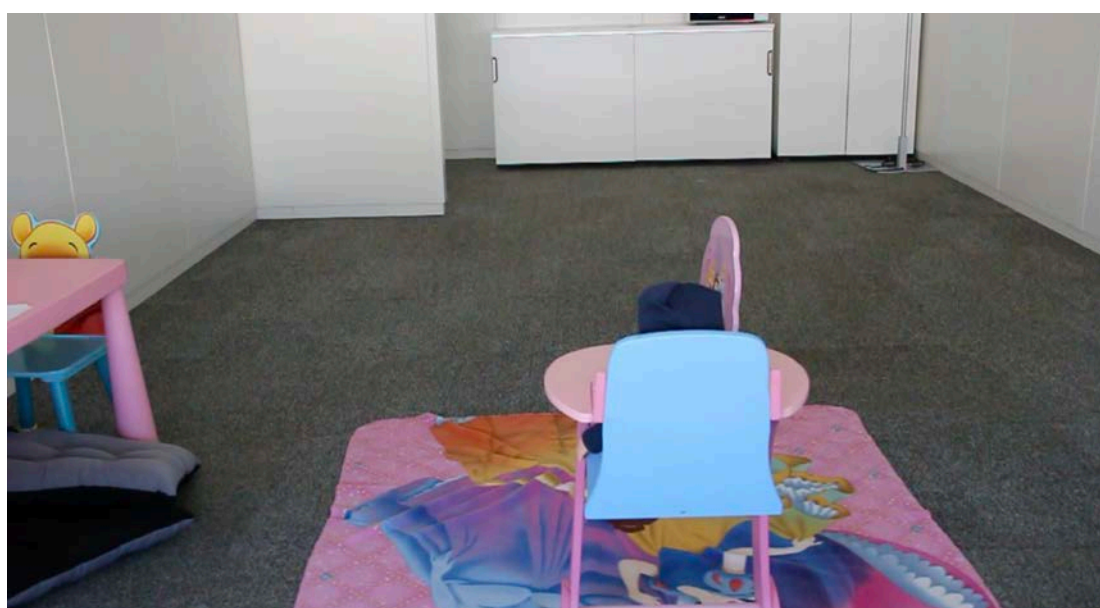
2. Room settings

Figure 1 Room setup – View 1

Figure 2 Room setup – View 2

3. Number of participants

The tests were conducted on 12 children recruited among families and friends, aged between 4 and 10 years old. The children are from various nationalities, and all of them are either French native speakers or are currently speaking French in everyday life (school). One child amongst the 12 children is affected by a mild form of autism. The only child aged 4 years old, once in the experience room, decided to not participate.

Table 1 List of children composing the panel (ID codes)

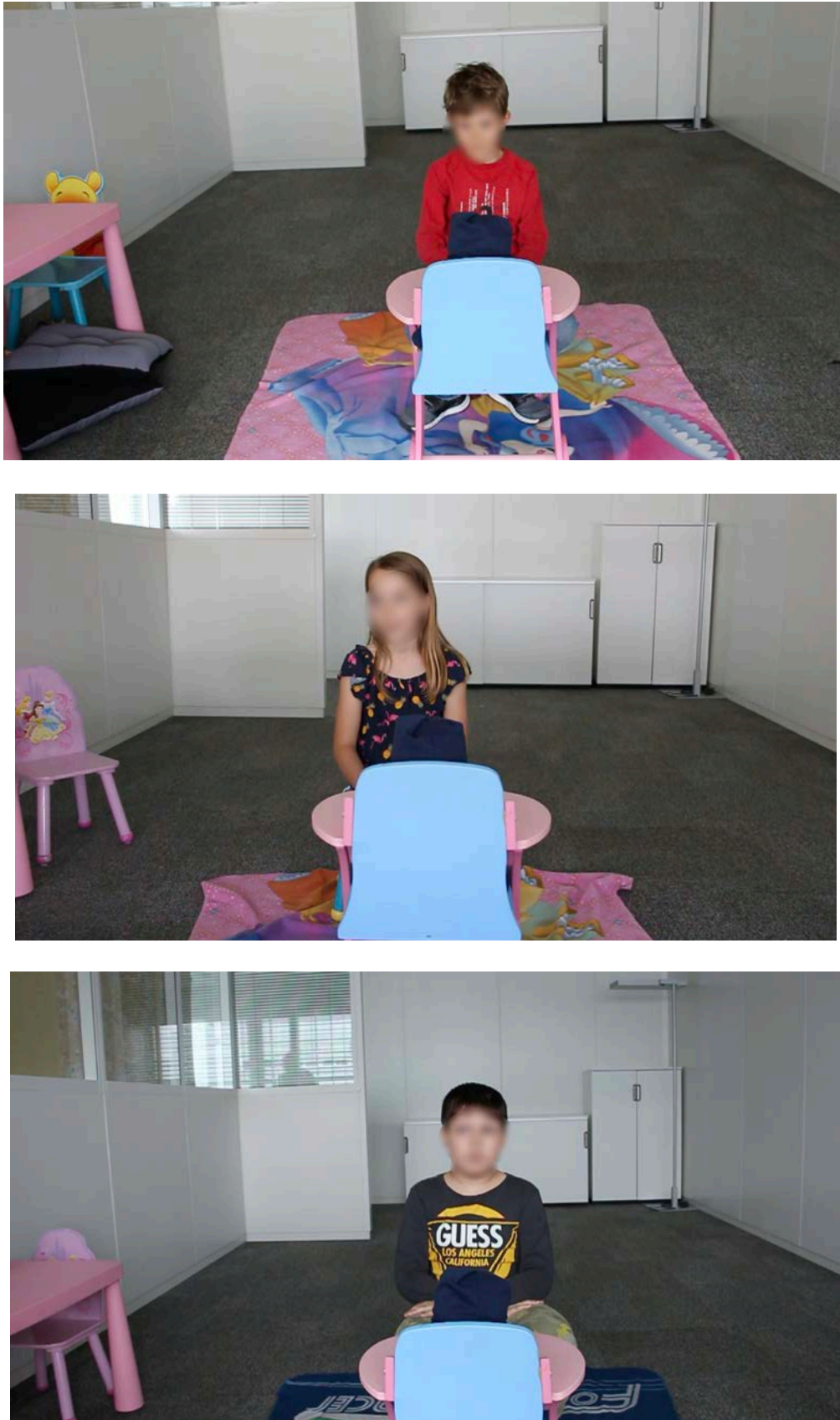|	Age	Gender	ID Code
DAY 1	7	M	001.M07
5/30/2018	9	M	002.M09
	6	F	003.F06
	10	M	004.M10
	9	F	005.F09
	6	M	006.M06
DAY 2	4	F	007.F04
5/31/2018			
DAY 3	7	M	008.M07
6/6/2018	9	F	009.F09
	7	M	010.M07
DAY 4	10	M	011.M10
13/6/2018	7	F	012.F07

Figure 3 External camera image - Participants during the test experience

4. Tested functionalities

The smart doll is designed to be used in play-mode in the first scenario and in a passive recording-mode. In this pilot the play-mode functionality was tested because play-mode also includes all the functionalities used in recording-mode.
The pilot was designed to test the following functionalities:

- Robustness of the system
- Ability of the doll to detect faces and process emotions while interacting with a child
- Accuracy of the inferred emotions by comparing them to the researchers' observations taken during the experience and fine-tuned by watching the video of the experiences offline.

5. Pilot purpose

The purpose of the pilot is to provide a first-step proof of concept for the use a smart doll with children.

- Verify the robustness of EoT board over the duration of each test (~15 minutes).
- Verify the doll's functionalities by correlating researchers' notes with the results given by EoT board empowered by the emotion engine
  Verify the children's level of engagement with the smart doll, and derive a high-level idea of the correlation between age and level of engagement

6. Pilot description

Children were asked to sit in front of the talking doll for about 10 minutes. Each child was in the room with a coordinator and 1 or 2 researchers, and they were informed that they would be asked some questions.
While the coordinator asked some generic question to the child, the doll greeted the child and introduced herself by surprise.

Phase 1 – Warm-up. During the first warm-up phase, the doll asked 3 introductory questions (name, age, place of residence).
Phase 2 – Conversation. Once the child's attention was gathered, the doll asked a sequence of 12 questions. Each question was followed by a comment made by the doll. The content of the comment was triggered by the emotion detected by the doll's camera.

Phase 3 – Close. During the last phase of the experience, the doll asked the child if they had enjoyed interacting with her and bid farewell.

See Annex I for the full list of questions, and Annex II for the list of comments.

7. Interaction Tool

To control the flow of the test, we have implemented an Interaction Tool. The tool is a python-based GUI used by one of the researchers to:

- Play a pre-recorded question on the doll
- Create manual annotations based on the researcher's observation
- Trigger the doll's comment to the children's answer NOTE: the doll would automatically choose the comment based on the child's reaction. Every question had three possible associated comments linked to three different groups of emotions. *See Annex II for the list of comments and group of emotions*
- The tool allowed us to combine the manual annotation with the emotion profiles recorded by the doll during the experience

During an experience, the interaction tool enables the moderator to perform the following actions:

- Playing the audio files for questions
- Playing the audio feedback for doll, based on the asked question and analyzed emotions by doll
- Taking notes during the experience
- Fetching and saving the analyzed emotion data from doll along with notes

Here is an example of an interaction:

- **RESEARCHER** – Triggers question n.1
- **DOLL** – Play question n.1: "Do you like ice-cream?"
- **CHILD** – Replies: eg. "Yes!"
- **DOLL** – Detect and stored emotion profiles and decides for the next comment.
  Eg. emotion detected: HAPPINESS
- **RESEARCHER** – Record the annotation corresponding to the emotion he/she has detected on the child's face. Trigger doll's comment.
- **DOLL**– Plays the comment associated to happiness: "My favorite is strawberry!"
- **RESEARCHER** – Triggers new question.

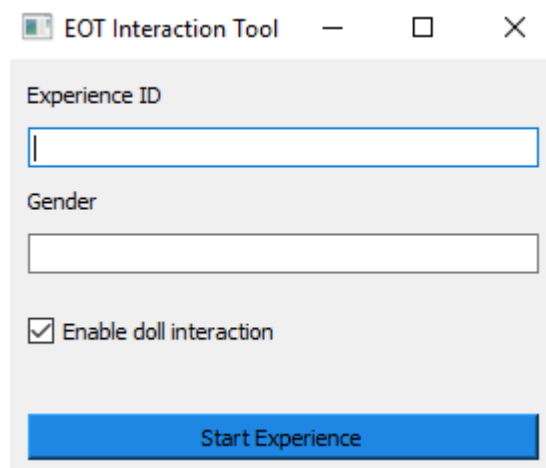Figure 4 depicts the launch screen for EOT interaction tool.

Figure 4: Launch screen for EOT interaction tool

Before starting the experience, the moderator needs to provide an experience ID and gender information (boy/girl) about the child taking the experience. Gender information is needed since the doll asks some questions based on gender.

Interaction mode selection

On the launch screen, there is a checkbox "Enable doll interaction" which allows the moderator to select the mode for interaction tool for each experience. If checked, the second screen displays all the controls needed to control the doll, else the local mode is selected which provides controls only to take notes and save these notes.

1. Local Mode

Figure 5 depicts the local mode for EOT interaction tool.

Figure 5: Local mode for EOT interaction tool

Local mode consists of a group of moderator feedback buttons, which allows the moderator to quickly note the emotional response of the child by just a press of the button.

In addition, it has a manual feedback area and a button next to it, hence any extra feedback can be added by the moderator.

The "Save Data" button saves notes at any point during the experience and "Start New Experience" button saves the notes for current experience and takes the user back to the launch screen where a new experience can begin.

2. Doll Interaction Mode

Figure 6 depicts the doll interaction mode for EOT interaction tool.
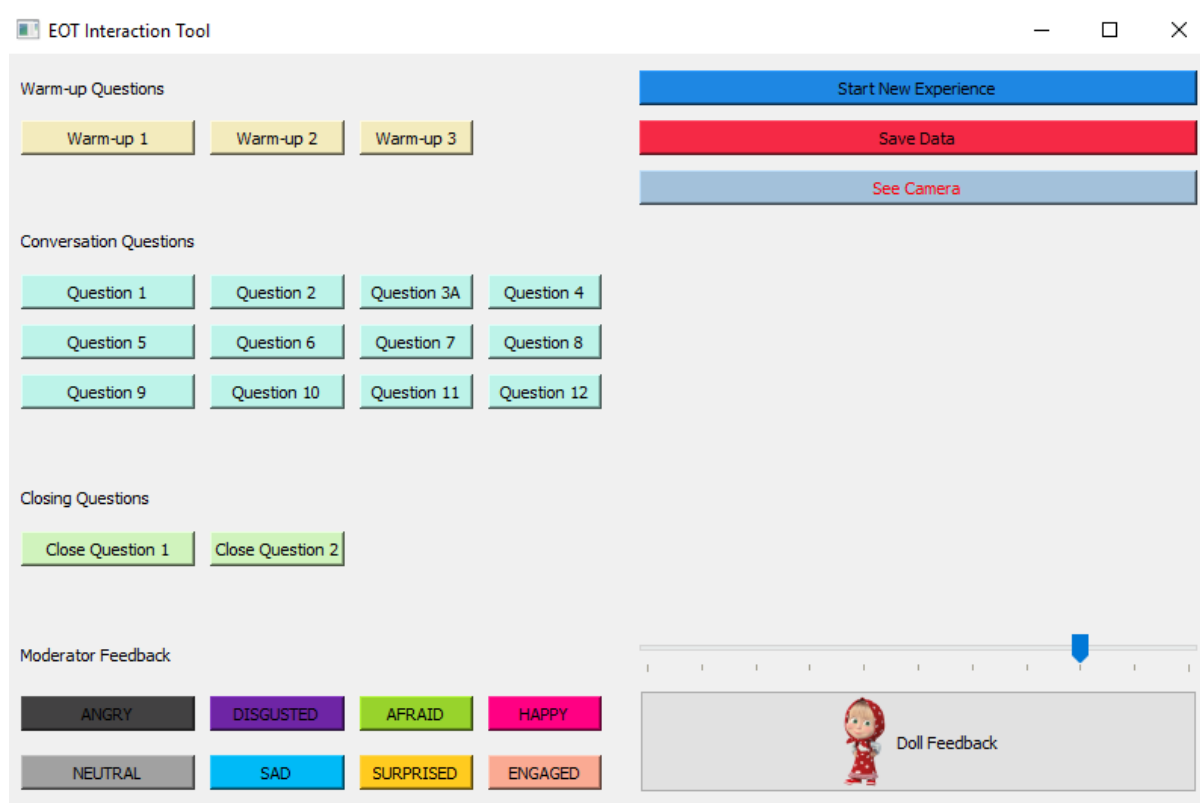

Figure 6: Doll interaction mode for EOT interaction tool

The doll interaction mode consists of 3 groups of question buttons which are "Warm up", "Conversation" and "Closing questions" for the experience. A press on any of these buttons prompts the doll to play the audio file for corresponding question. Once the question file is played successfully, the button changes its color to gray to let the moderator know that this question has already been played.

The moderator feedback section consists of buttons for the moderator to quickly note the emotional response of the child. The Doll feedback button plays the response for the doll, which is based on the last question asked by the doll and the emotional response of the child detected by doll. There

is a volume control on top of doll feedback button which allows the moderator to increase or decrease the volume for doll.

On the top right there are "Start New Experience" and "Save Data" buttons. If pressed, "Save Data" fetches the emotion data from the doll for the current experience and saves it with the notes taken by the moderator so far. "Start New Experience" saves the data like save data button, cleans the current experience emotion data on doll (so the next experience data is not appended in the current one) and takes the user back to the launch screen where a new experience can begin. The "See Camera" button is also very useful for the moderator as it fetches the images taken by doll's camera and displays it on the moderator's screen. This allows the moderator to see if doll's camera is capturing the images correctly to analyze the emotions. For both modes, the EOT interaction tool saves the data in JSON format which can easily be post processed for more insights and analysis.

8. Report generation

After an experience with a child the emotions detected and timings are stored in a file. These results files can then be processed to generate a report.

During the experience annotations where taken and these annotations were improved using the video of the child recorded during the session. Each note indicates the emotion that we can see on the face of the child at a point in time.

The inputs to generate a report are the emotions detected by the doll and the notes. The notes are used to define the accuracy of the doll emotion results.

The output is an HTML report showing the emotions detected and comparing them with the notes.

9. Ethical Guidelines

Parents were required to sign a detailed informed consent form (see Annex III). Children participated voluntarily and they were informed of the possibility to skip any question and to stop the survey at any time.

10.   Privacy

Recorded videos, images and backlog files, including the emotional profile of the children, is recorded on a SD card and immediately transferred to NVISO's secured server in Switzerland. The records are stored on NVISO's enterprise-grade NAS behind the company's firewall, secured with encrypted LDAP authentication and protected with internal replication of the data. This grants no possible access from outside, because the NAS is connected exclusively to the company internal network and it requires specifc credentials to access it. Only the research team will be able to access, view and listen to the recordings. The files may be transcribed by the researcher.

The material has been used for the solely purpose of this research conducted by NVISO.

Children information is assigned a unique code number. The list connecting names to the codes will be kept in a locked file. When the study is completed and the data have been analysed, this list is destroyed. More details about ethics/privacy are provided in Deliverable D1.6.

7. RESULTS

The results are derived by comparing the emotion profiles recorded by the EoT board powered by the emotion engine to the annotations taken by the researchers during the test experiences.

The results in the section will focus on:

- comparing the emotion profile to the researcher annotation and compute the accuracy;
- calculating the percentage of face detection. Missed faces are due to camera occlusion (eg. the child has a hand on his face, or waves a toy in front of the camera) or absence of face (eg. the child turns away from the camera)

In the next paragraphs, examples are reported on the emotion profiles generated by the system and their comparison with the researcher's annotations.

The two examples used show different emotion behaviors: one with predominance of happiness, and the second with prevalence of neutrality, the latter is the emotion profile of the child affected by autism.

11. Video processing emotion results

The images in Figure 7 and Figure 8 show the emotion profile processed and recorded by the doll in two of the experiences conducted with two different children. In the graphs, it is possible to see all the 7 emotions (including neutral) detected by the doll represented in different colors. Each vertical line corresponds to a point in time and the intensity of the emotion is proportional to the length of the colored line.

As the graph shows, there are moments when more than one emotion is detected, all with different intensities.

Figure 7 shows a predominance of happiness, while in Figure 8 neutrality is predominant.

In Figure 7 missing data represents points in time where face was not detected due to child turning away his face from the doll's camera, or due to occlusions (objects between the child's face and the camera).
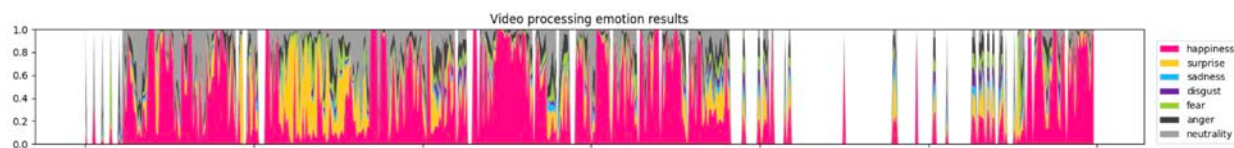
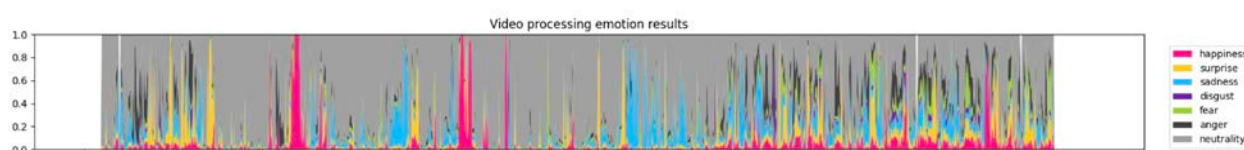Figure 7. Emotion profile over time for child 001;
Y = Emotion intensity, X = Time

Figure 8. Emotion profiles over time for child 011;
Y = Emotion intensity, X = Time

12.   Results of short sliding window

The images below show a simplified view of the emotion results depicted in Figure 9 and Figure 10. Only the emotion with the highest intensity are represented in these graphs and they are identified in time using an averaging sliding window.

This output provides a graph that is easier to correlate with the annotations taken by the researchers.
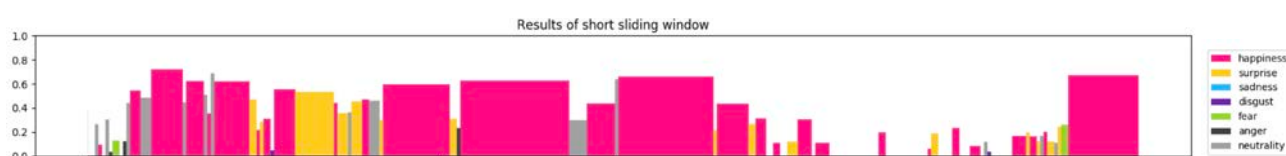

Figure 9. Emotion profile over time for child 001;
Y = Emotion intensity, X = Time

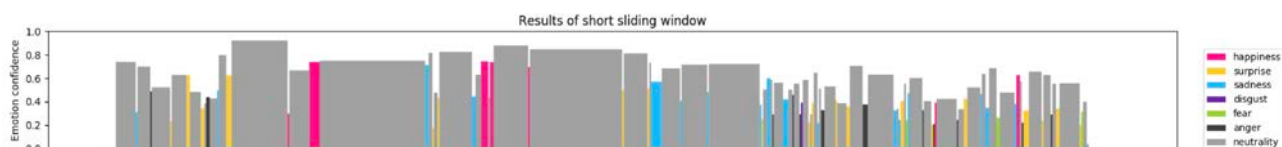Figure 10. Emotion profile over time for child 011;
Y = Emotion intensity, X = Time

13. Emotion details

Figure 11 and Figure 12 show the intensity curves of all emotions in 7 separate graphs. A low pass filter is applied to smooth the lines.

This representation allows to better identify and interpret the presence of multiple emotions at each point in time. For example, the presence of dominant happiness with a non-negligible level of surprise further highlights the engagement of the subject on the task he/she is performing, as in seconds 60 to 80 in the example in Figure 11. The same gaps in face detection shown in Figure 7 are visible also in the graphs below.
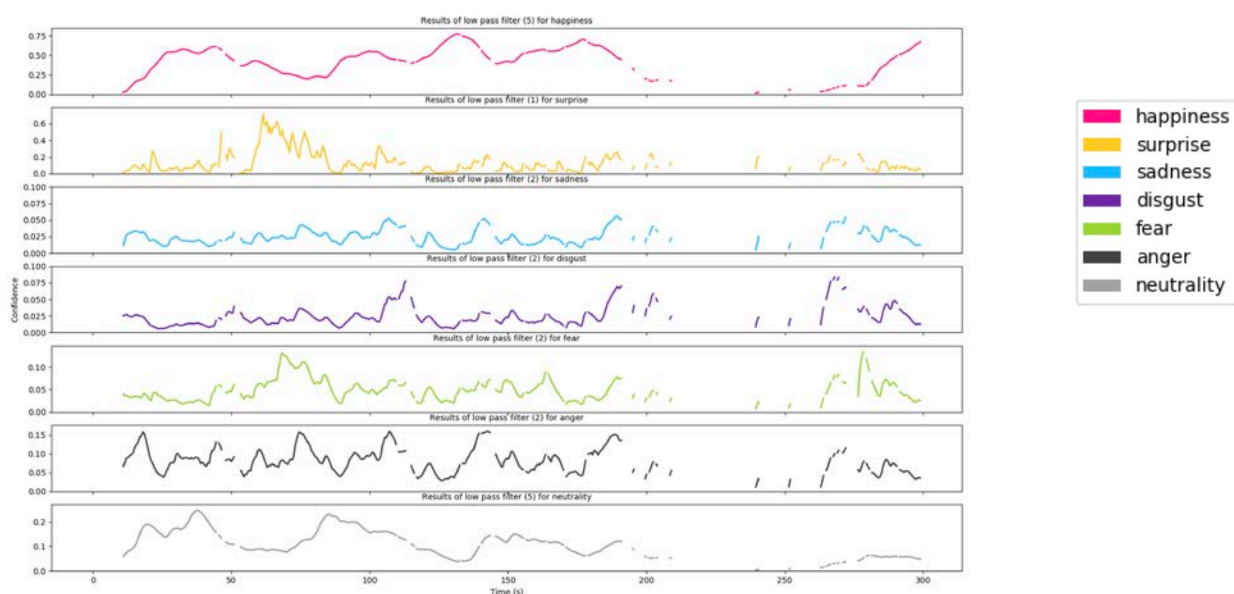

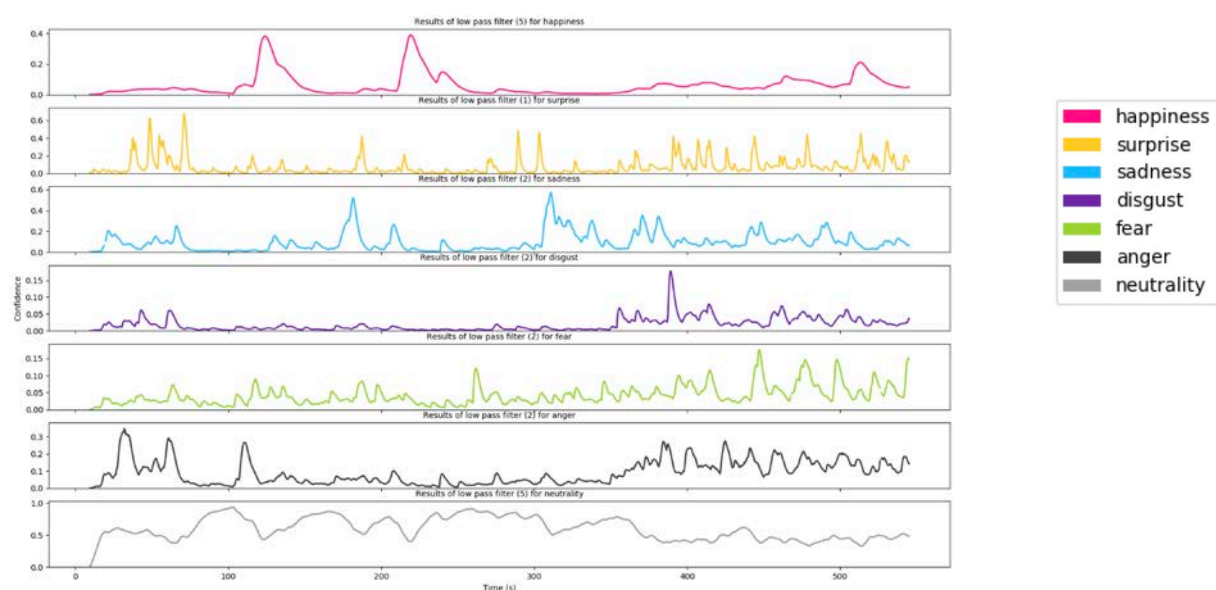Figure 11. Emotion curves over time for child 001

Figure 12. Emotion Curves over time for child 011

14. Comparison between doll records and the researcher's annotations

Figure 13 and Figure 14 shows the comparison between the emotion profile processed and recorded by the doll's camera and the annotations taken by the researchers.

Above the horizontal axis, it is possible to see the emotion profiles depicted in Figure 9 and Figure 10, below the horizontal axis the graph of the researcher's annotations.

The vertical pink lines represent the points in time where an audio file was played by the doll. The first pink line corresponds to the first warm up question.

As the two graphs show, different children interacted with the doll at different points, some children were more talkative, others gave more short and precise responses. This is true across the whole panel, with no significant impact on the average interaction time.

Average interaction time rom the first warm-up question asked by the doll to the last of the closing questions, of about 4,41 minutes.

Accuracy in Figure 13 is 85.3% and in Figure 14 is 82.4%.
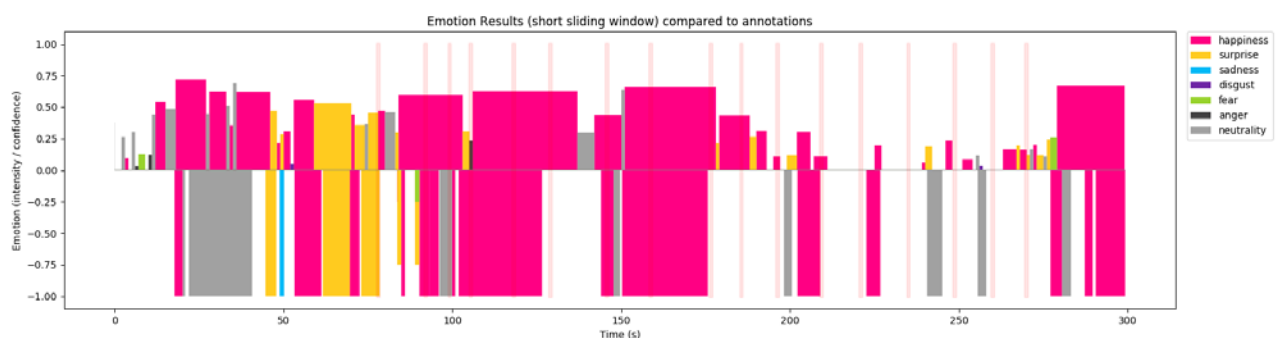
Figure 13. Emotion profile over time for child 001 compared to researcher's annotations
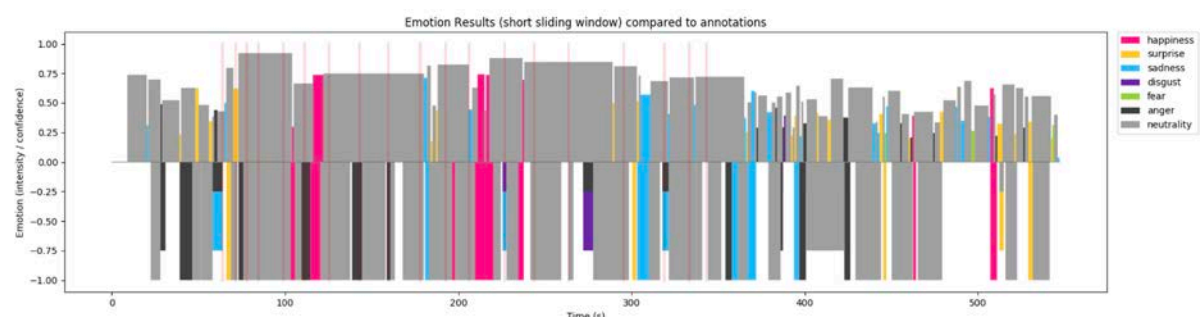
Figure 14. Emotion profile over time for child 011 compared to researcher's annotations

15. Aggregated results

Tested functionalities

Robustness of the system	**Checked and consistent throughout**
Ability of the doll to detect and process emotions while interacting with a child	**Average 77,5%** (See Figure 15)
Accuracy of the emotion detected compared to the notes of the researchers	**Average 83.5%** (See Figure 16)

Figure 15. Average face detection
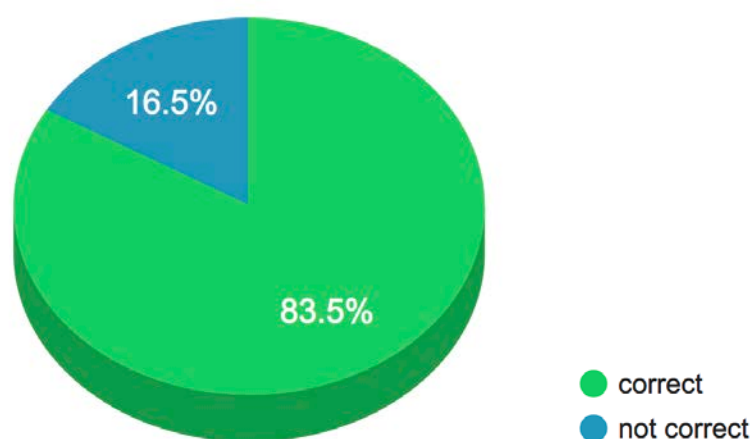
Figure 16. Average emotion detection accuracy

Figure 17. Doll camera image: face detected (emotion: happiness)

Figure 18. Doll camera image: face detected (emotion: neutrality)
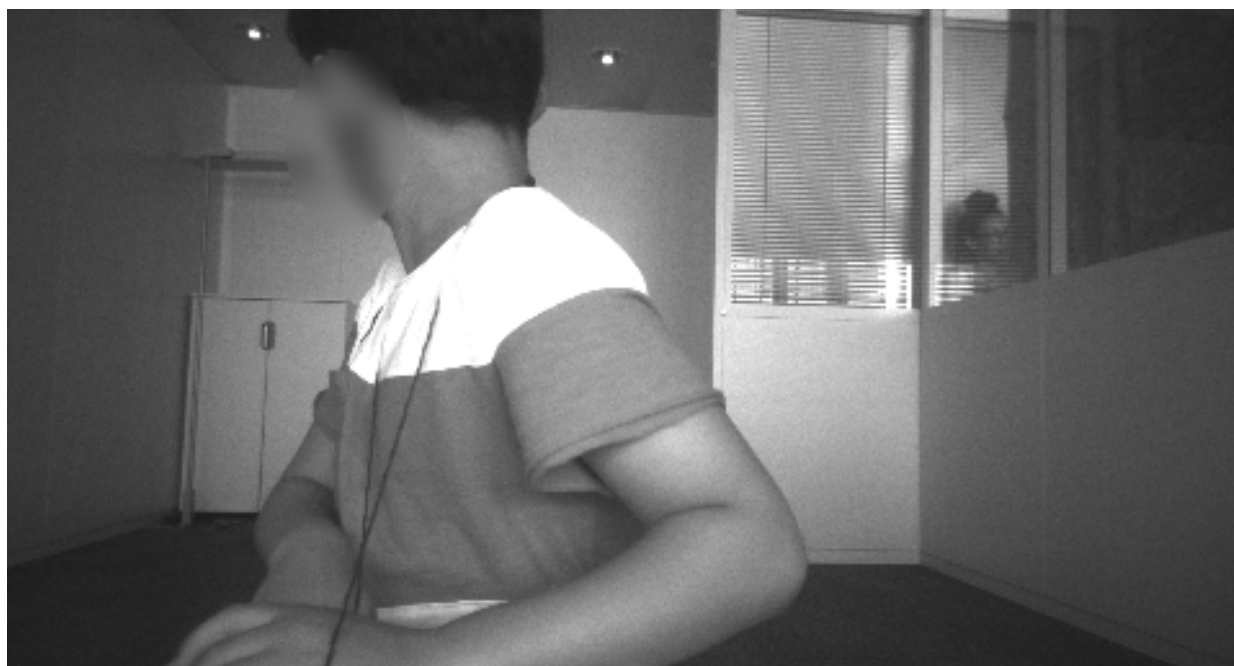
Figure 19. Doll camera image: no face detected (child turned away)

Figure 20. Doll camera image: no face detected (camera occlusion)

Children's engagement

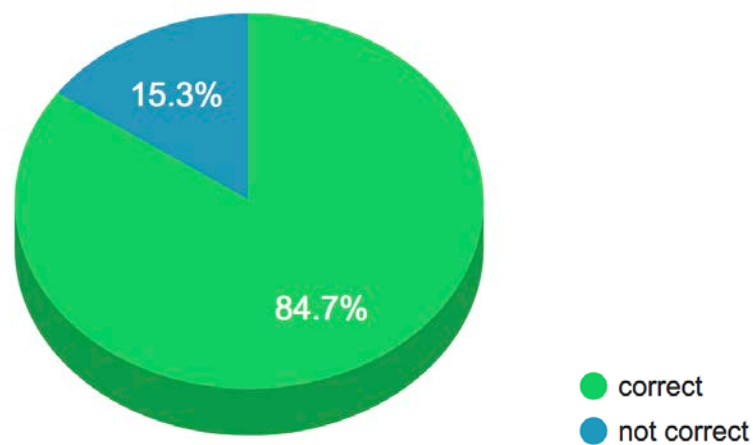| During the experience on average	*Prevalence of happiness (high level of engagement)*
Children who claimed they would like to have a similar doll (or an interactively speaking toy) at home	*8/10*

Figure 21 shows the percentage of the emotions detected across all the experiences. Well noticeable the predominance of happiness and neutrality. The first indicates engagement, while neutrality in association with peaks of happiness is correlated to punctual concentration.
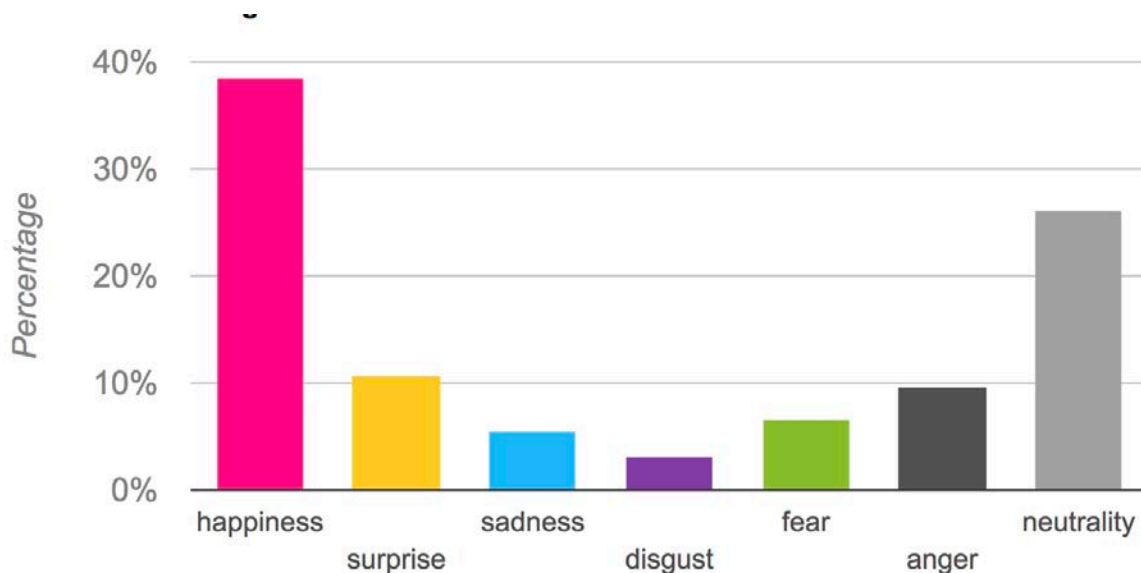
Figure 21. Average emotion predominance during the whole experience

8. CONCLUSIONS

The system functionalities were verified and the results of the tests show stability and an average accuracy of emotion recognition of 83.5% across the whole panel of participants.

The system was stable during all the tests: emotion detection and the doll's functionalities were consistently operational throughout the pilot. Only one case of instability was experienced due to local wifi network issues, which affected the connection between the doll and the interaction tool.

The system had a percentage of successful face detection of 84,7%. Any time a face was detected, the image was processed and the resulting emotion was inferred.

Accuracy of the emotion detected compared to the note of the researchers was on average 83,5%.

**The purpose of the pilot to provide a first-step proof of concept for the use a smart doll with children has been positively achieved.**

The pilot demonstrated a high level of engagement (emotion detected: surprise and happiness) of the children interacting with the smart doll, across all ages. In the short survey conducted after each test, 3 kids were extremely positive regarding the experience, 7 were positive and 2 out of 12 declared that they wouldn't have liked to have an interactive toy at home. Regardless of the verbalized opinion, the predominant detected emotion across all the experiences was happiness that is correlated with engagement. Two profiles show a prevalence of neutrality during the experience with peaks of happiness. In these cases, the neutrality followed by peaks of happiness represents a high level of attention resulting in an even higher punctual engagement of the child.

Among the 12 children recruited for the pilot and with an age range spanning from 4 to 10 years old, only the youngest (4 years old) has been unwilling to participate. This may suggest that a different setting is necessary to test the smart doll with very young children. In general, as for the children who took part into the pilot, age did not seem to influence the quality of the experience or the level of engagement, this may be linked mainly to the fact that children were prepared to take part in "a special game" where the doll was presented as a "magical" element. On the other hand, it was the researchers' perception that the moment the doll started speaking, children attention was monopolized by the doll and there was no need to ask the children to remain seated or to keep looking at it.

On average a minor loss of engagement was observed after about 3 minutes from the first question. The reason of this may be the questions were generic and not targeted for a specific age or gender. In a next iteration of the pilot, questions will be revised based on the aforementioned observations.

It is interesting to note that the there was no significant difference in emotion recognition accuracy across the whole panel, including the participant affected by autism. The panel was too small to draw any other quantitative or qualitative conclusion regarding the emotion profile of the child affected by mild autism. However, given the successful outcome of the pilot in terms of board stability, robustness of the used algorithms and children engagement, we think this pilot has set the foundation for the next step represented by the envisaged test on children affected by autism.

- End of document —

9. ANNEX I

EoT Smart Doll | Doll's questions

Phase 1: WARM-UP

- Hello my name is Chacky, what is your name?
- I am 2 years old, how old are you?
- I live in Lausanne and you?

Phase 2: CONVERSATION

1.   Do you like ice-cream?
2.   Do you like green vegetables?
3.   Who is your boyfriend / girlfriend?
4.   Do you prefer to take a bath or a shower?
5.   <Doll sings a kids song> Do you like this song?
6.   Are you afraid of the dark?
7.   Do you like spiders?
8.   What gift would you like for your birthday?
9.   Have you ever seen an injured bird?
10.   Why/When do you get angry?
11.   If you want something and Mom says no, what do you do?
12.   Is your Mom beautiful?

Phase 3: CLOSE

- Ok well, I liked being with you but I think now you need to leave. Did you like spending this time with me?
- I hope to see you again! Ciao!

10. ANNEX II

EoT Smart Doll | Doll's comments

	DOLL'S QUESTION - Triggered manually in order (1-12)	Group of child's possible REACTION		DOLL'S COMMENT - Triggered by reaction in previous column
1	Do you like ice-cream?	HAPPY / SURPRISED	1.1	I like it a lot! My favourite flavor is strawberry
		SAD / DISGUSTED / NEUTRAL	1.2	I don't like ice-cream, I like spinach!
		ANGER / FEAR	1.3	I have never tried ice-cream
2	Do you like green vegetables?	HAPPY / SURPRISED	2.1	Good answer!
		SAD / DISGUSTED / NEUTRAL	2.2	I understand
		ANGER / FEAR	2.3	I eat only candies
3A	Who is your boyfriend?	HAPPY / SURPRISED	3.1	I have 2 boyfriends, I like Michel because he is kind and Julian because he plays football
3B	Who is your girlfriend?	SAD / DISGUSTED / NEUTRAL	3.2	Oh, ok.
		ANGER / FEAR	3.3	I don't like boys, I only play with girls
4	Do you prefer to take a bath or a shower?	HAPPY / SURPRISED	4.1	Me too!
		SAD / DISGUSTED / NEUTRAL	4.2	I prefer the shower!
		ANGER / FEAR	4.3	My Mom says I should not touch water
5	\<sing a kids song\> Do you like this song?	HAPPY / SURPRISED	5.1	I love it
		SAD / DISGUSTED / NEUTRAL	5.2	My sister sang it to me
		ANGER / FEAR	5.3	Ok, cool
6	Are you afraid of the dark?	HAPPY / SURPRISED	6.1	Me too!
		SAD / DISGUSTED / NEUTRAL	6.2	I always sleep with the light on
		ANGER / FEAR	6.3	For my last birthday I received the biggest lamp in the world

7	Do you like spiders?	HAPPY / SURPRISED	7.1	I am not afraid!
		SAD / DISGUSTED / NEUTRAL	7.2	There are no spiders in Switzerland
		ANGER / FEAR	7.3	I talk to them every day!
8	What gift would you like for your birthday?	HAPPY / SURPRISED	8.1	Beautiful! Let's go on playing
		SAD / DISGUSTED / NEUTRAL	8.2	I don't know when my birthday is
		ANGER / FEAR	8.3	I like that, I want the same!
9	Have you ever seen an injured bird?	HAPPY / SURPRISED	9.1	I never saw one
		SAD / DISGUSTED / NEUTRAL	9.2	I did and he was crying
		ANGER / FEAR	9.3	I saw one and his Mummy cured him
10	Why/When do you get angry?	HAPPY / SURPRISED	10.1	That is fun!
		SAD / DISGUSTED / NEUTRAL	10.2	Ok, I understand
		ANGER / FEAR	10.3	I never get angry
11	If you want something and Mom says no, what do you do?	HAPPY / SURPRISED	11.1	That is clever!
		SAD / DISGUSTED / NEUTRAL	11.2	Oh, I never do that
		ANGER / FEAR	11.3	My Mom always says no
12	Is your Mom beautiful?	HAPPY / SURPRISED	12.1	I knew that!
		SAD / DISGUSTED / NEUTRAL	12.2	My Mom is not here, but my friends are very nice
		ANGER / FEAR	12.3	Ok well, I don't care

11. ANNEX III

EoT Smart Doll | Informed consent

Parental Permission for Child Participation in Research

Please read this consent agreement carefully before you decide to participate in the study

Project Title: Smart Doll
Investigator(s): NVISO, Eyes Of Things, Horizon2020

Introduction:
The purpose of this form is to provide you with information that will help you decide whether or not to let your child participate in the research study described below. Please read all of the information carefully and ask any questions you might have before deciding whether or not to give your permission for your child to take part in this study. If you decide to let your child be involved in this study, this form will be used to record your permission.

Purpose of the research study:
The study is one of the 4 demonstrators of the project "Eyes of things", part of the European Project Horizon 2020. Its purpose is to test the functionalities of a smart doll, designed to contribute to research and diagnose autism in children. The study will take place at NVISO's offices in Lausanne, during the months of June. The study contains the audio or video recording of your child's experience with the doll and the researchers.

What your child will do in the study:
Your child will be interacting with a "talking doll" for about 10-20 minutes. The doll will introduce herself and ask some generic questions to your child. The child will be required to sit in front of the doll to allow face detection and sentiment analysis by the camera placed in the doll's forehead.
The doll will respond to child's answers and detect the child's reactions to the comments.

A coordinator will be present in the room and guide your child throughout the experience. Another researcher will be present to manually record the emotions of the child.

Your child will be allowed to skip any question and to stop the survey at any time. You should inform your child of this in advance of the study.

The doll camera and an external camera will record your child throughout the whole experience. The emotions detected by the doll and by the researchers will be recorded through an IT system and personal notes. Recorded videos, images and backlog files will be stored in NVISO's servers and will be used for the solely purpose of this or similar researches conducted by NVISO. We also make sure that the collected information is protected from unauthorized access, loss, manipulation, falsification, destruction or unauthorized disclosure. We use industry standard technical and organizational security measures to protect your data against unauthorized disclosure or processing.

Only the research team will be able to access, view and listen to the recordings. The files may be transcribed by the researcher. Transcripts of your interview may be reproduced in whole or in part for use in presentations or written products that result from this study. Neither your child's name nor any other identifying information (such as voice or picture) will be used in presentations or in written products resulting from the study.

What you will do in the study:
 Parents are required to introduce the child to the researchers and leave the research room. You will be seated outside the room and your child will be able to reach you at any time they want. In this case the experience will be stopped and the recordings up to that point will be kept for research purposes. It is important that your child will not be informed that the doll he will find in the room is a "talking doll", because one of the study goals is to test how accurately the AI-based application can detect the sentiment of surprise. The child should be informed that she will be required to stay in the room with two researchers and that she will be asked some questions.

Time required:
The study will require approximately 1 hour of your time. For about 10-20 minutes your child will be required to be alone with the researchers and to interact with the talking doll.

Risks:
There are no anticipated risks in this study.

Benefits:
There are no direct benefits to you or your child for participating in this research study. The study may help us understand how artificial intelligence based face recognition technology can improve autism diagnosis and monitoring in children.

Confidentiality:
The information that (you and your child) give in the study will be handled confidentially. Your child's information and your information will be assigned a code number. The list connecting your child's name and your name to this code will be kept in a locked file. When the study is completed and the data have been analyzed, this list will be destroyed. Your child's name and your name will not be used in any report.

Voluntary participation:
Your child's participation and/or your participation in the study is completely voluntary.

Right to withdraw from the study:
You have the right to withdraw your child and yourself from the study at any time without penalty.

How to withdraw from the study:
If you and/or your child want to withdraw from the study, you must inform the researcher. There is no penalty for withdrawing. If you would like to withdraw after your materials have been submitted, please contact matteo.sorci@nviso.ch

Payment:
You will receive no payment for participating in the study.

If you have questions about the study, to obtain more information about the study, ask questions about the research procedures, express concerns about your participation, please contact:

Researcher's Name: **Matteo Sorci**

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matteo.sorci@nviso.ch

Agreement:

I agree to allow my child to participate in the research study described above.
I agree to participate in the research study described above.

PARENT / LEGAL GUARDIAN
Name _____
Surname _____

CHILD
Name _____
Surname _____
Date of birth _____
Place of birth _____
Nationality _____
First language _____

Parent/legal guardian signature: _____
Date: _____

You will receive a copy of this form for your records.