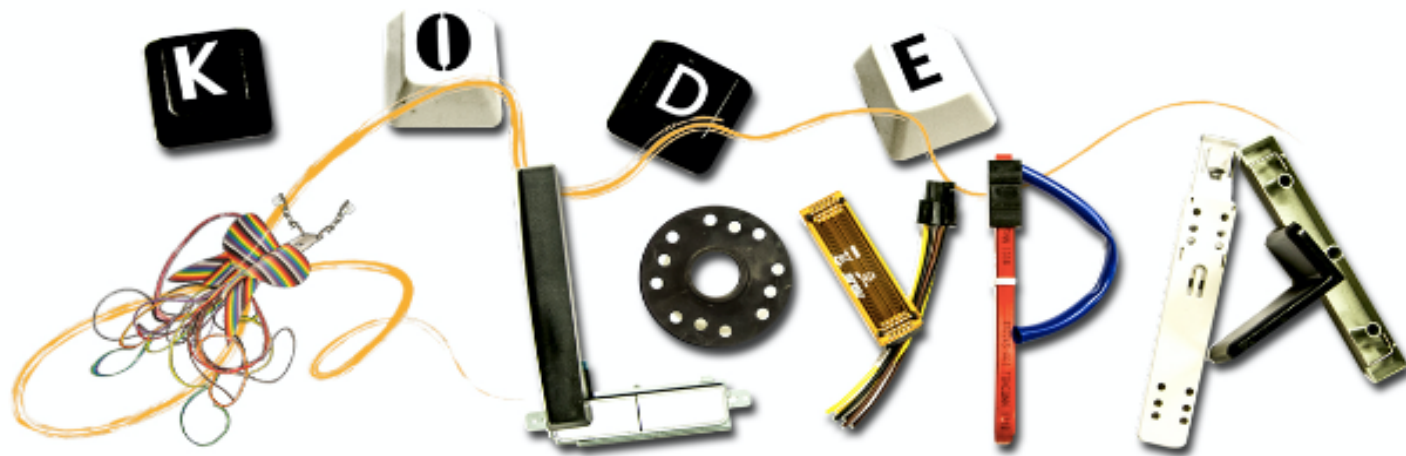**NTNU – Trondheim**
Norwegian University of
Science and Technology

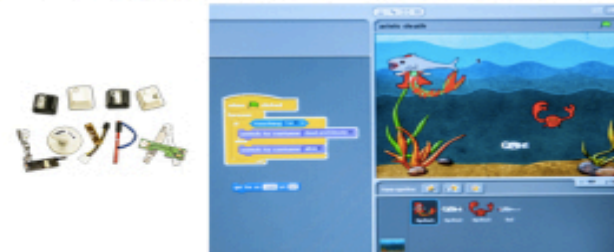# *Investigating children's experience in coding workshops*

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KODE LØYPA

et prosjekt for å få 15-åringer interessert i programmering og data

- http://www.ntnu.no/skolelab/kodeloypa

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Workshops

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Tools used: Scratch and Arduino
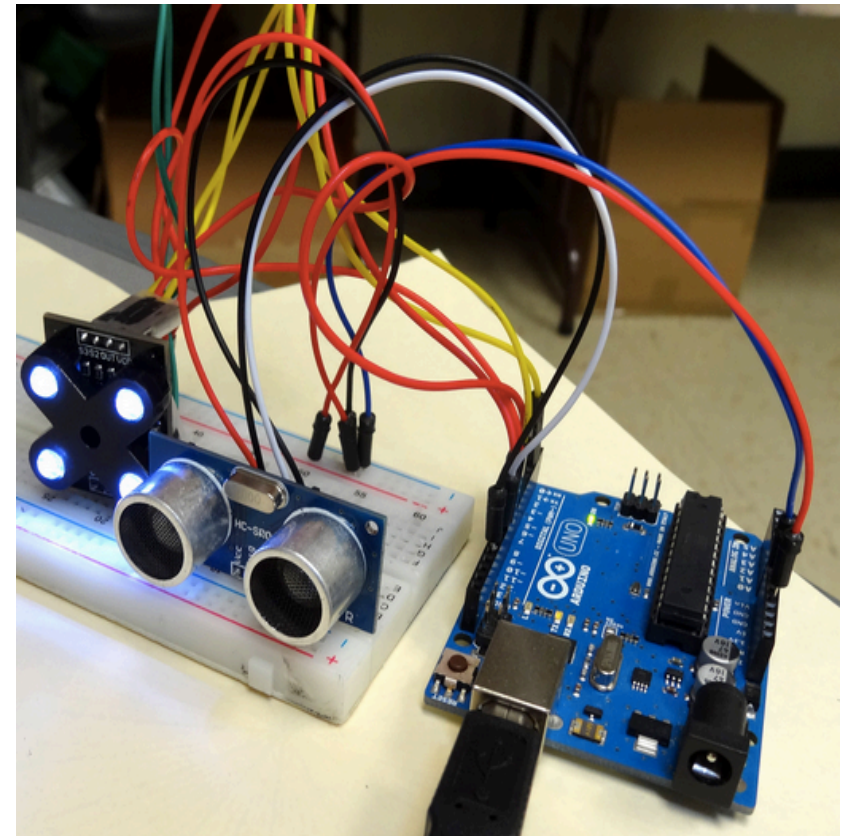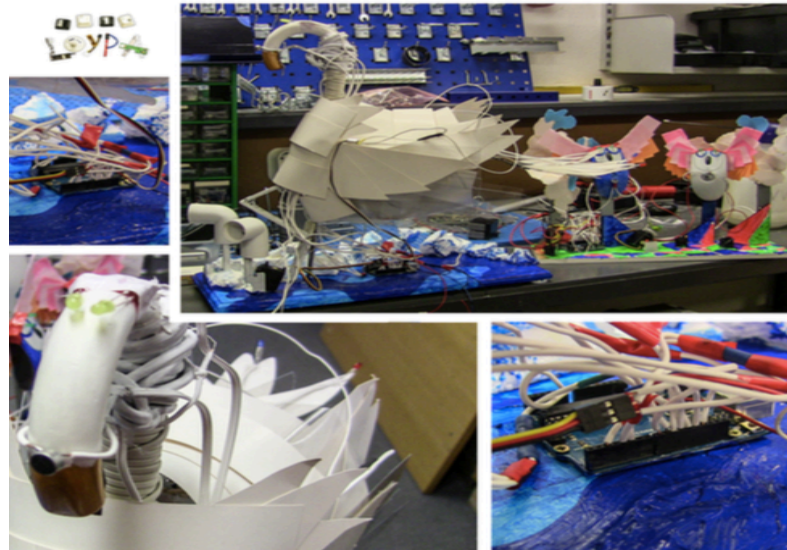
Digital art-Robots

Interaction with the digital art-robots
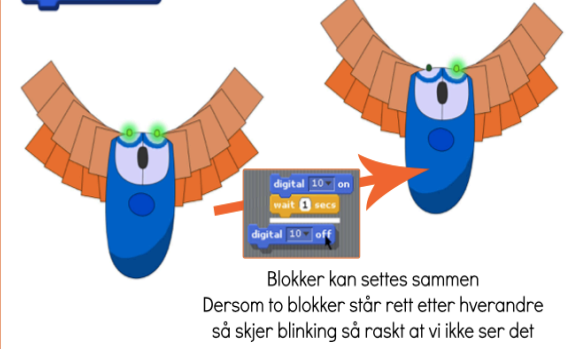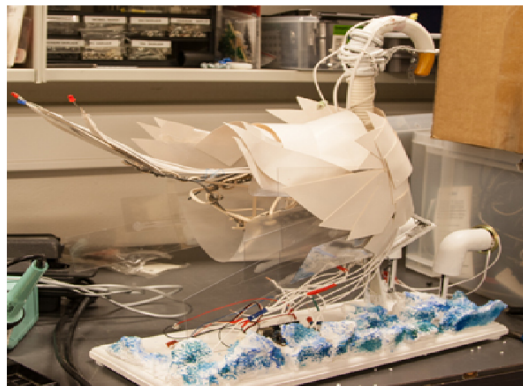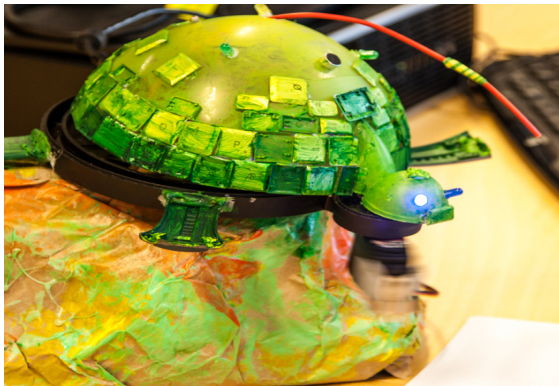
Creation of Games

Figurer

For å slette katten, høyreklikk på den i det gråe området, og velg "delete". For å få en ny figur, klikk på ⬚. Dere kan også tegne deres egen figur, med å trykke på ⬚. Pass på å ikke bruke for mye tid på det.

Figurer i Scratch har flere kostymer. Et kostyme er et utseende til en figur. Dere kan bytte mellom dem ved å bruke `next costume` eller `switch to costume costume2`.

En animasjon mellom de tre første kostymene til en figur kan for eksempel se slik ut:

```
if < costume # = 3 >
    switch to costume costume1
else
    next costume
```

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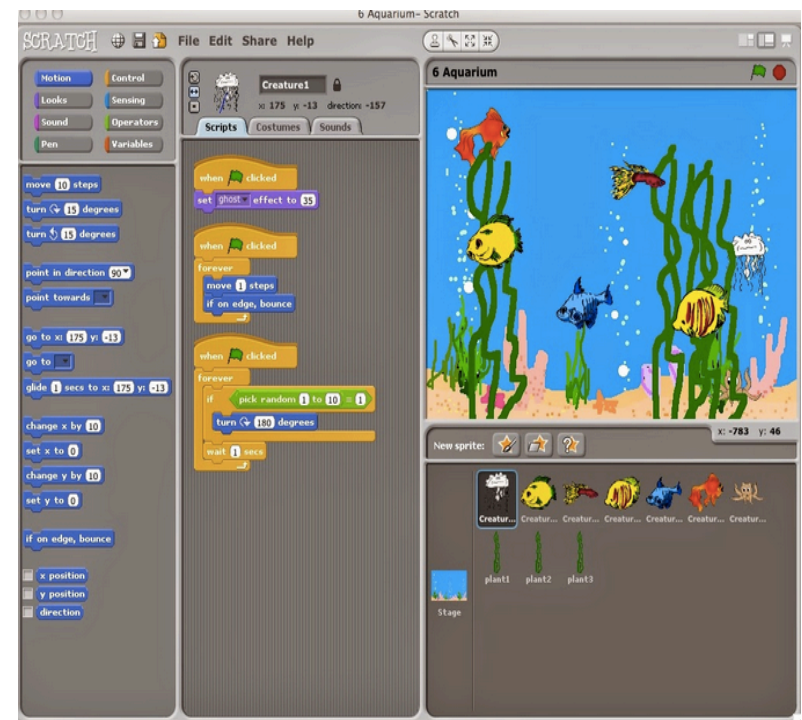
Design and execution of a coding workshop for girls Autumn 2017

Children's art and coding workshop
Out of school activity in a local library

Age of the participants: 12-15 years old
Girls, no previous knowledge of coding required

Duration: Two days

1rst day 9:30-14:00 (4 ½ hours)
Introduction to coding (warm up exercises)
Creation of characters, storyboard

2nd day 10:00-15:00 (5 hours)
coding activity creating their game with Scratch from their own stories

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Eye tracking studies in Kodeløypa October 2016

Experiment - Instruments

- Pre and post knowledge acquisition tests

What does the following code do?

when [flag] clicked
go to x: 46 y: 7

a. Increases the score
b. The figure does not move at all
c. The figure reacts only when you press a key
d. Sets the starting position of the figure

What does the following code do?

if x position > 200
set x to -200
wait 0.1 secs

a. Figure moves up for 0.1 seconds
b. Checks the height of the figure
c. When figure is at the far right, goes to the far left, then waits 0.1 sec
d. When figure is at the far left, goes to the far right, then waits 0.1 sec

- Mobile eye-trackers
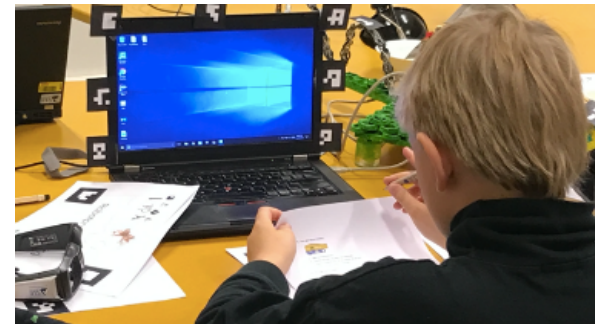
- Post - Attitudinal questionnaire

		I do not learn new things
I learn new things		
I want to use it again		I do not want to use it again
Exciting		Dull

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Motivation and Research Questions

Use objective mechanisms (eye-tracking) to illuminate children's understanding, knowledge gain and attitudes

- What are the differences between kids' and teens' gaze during coding?
- How is children's gaze associated with their learning gain during coding?
- *What is the relation between children's attitudes and gaze in coding tasks?*

* Papavlasopoulou, Sharma, Giannakos, Jaccheri, "Using Eye-tracking to unveil differences between kids and teens in coding activities", Proceedings of the IDC 2017 , pp. 171–181.

* Papavlasopoulou, Sharma, Giannakos. "How Do You Feel about Learning to Code? Investigating the Effect of Children's Attitudes towards Coding Using Eye-Tracking" International Journal of Child-Computer Interaction (2018).

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Main results

- Kids focused on the appearance of the characters

- Teens had structured coding behaviour

- Teen teams had better collaboration and higher learning gain

- Children who indicated better management of cognitive load, expressed higher scores in their attitudes.

- Take the motivational and cognitive effects equally into consideration

- New means to understand how children learn coding.
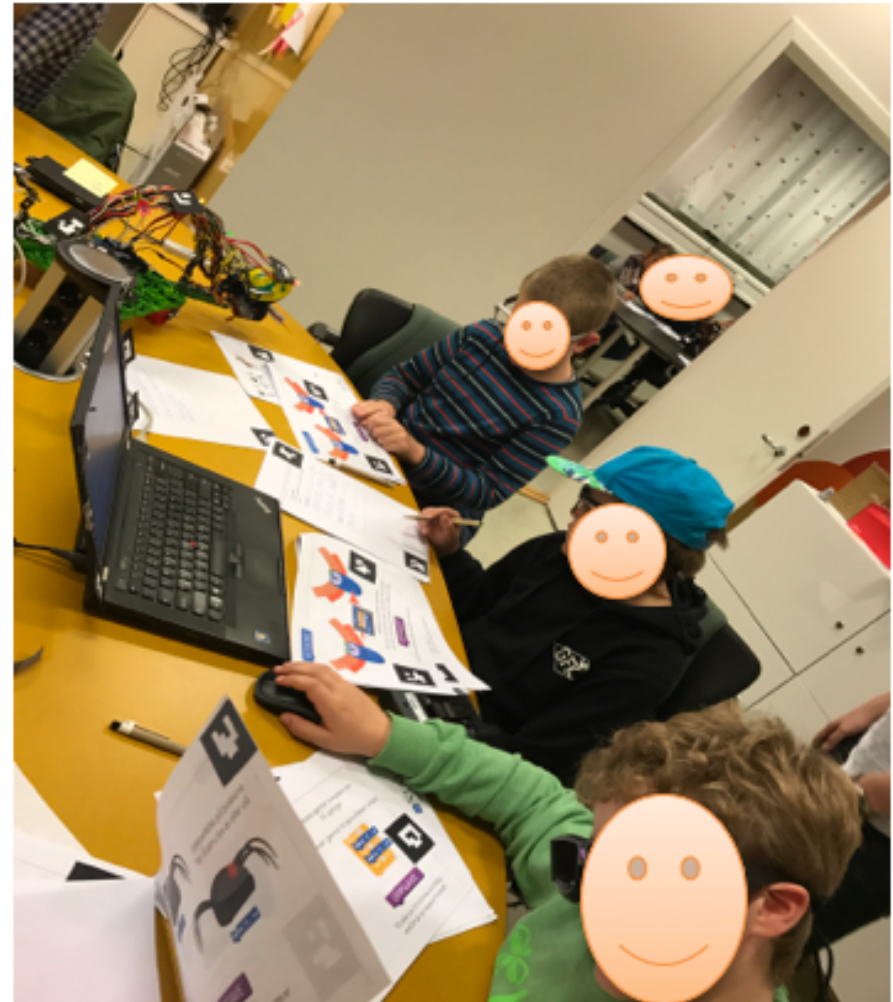
Studies in Autumn 2017

- 12-16 years old students
- 105 participants
- Data collection
  - Post - workshop questionnaire
  - Games in Scratch (final and in-progress versions)
  - Interviews
  - Videos, screen recordings
  - Structured observations

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