LockDoll:
Providing Ambient Feedback of Smartphone Usage within Social Interaction

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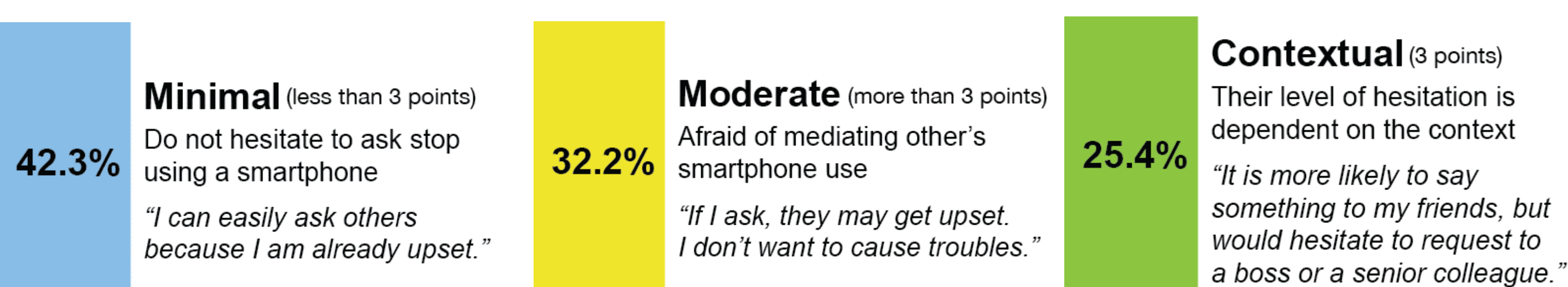
Background

Even though prior studies showed the need to limit smartphone use in order to increase the quality of social interactions in group activities, people feel uncomfortable when asking and responding others not to use their smartphones.
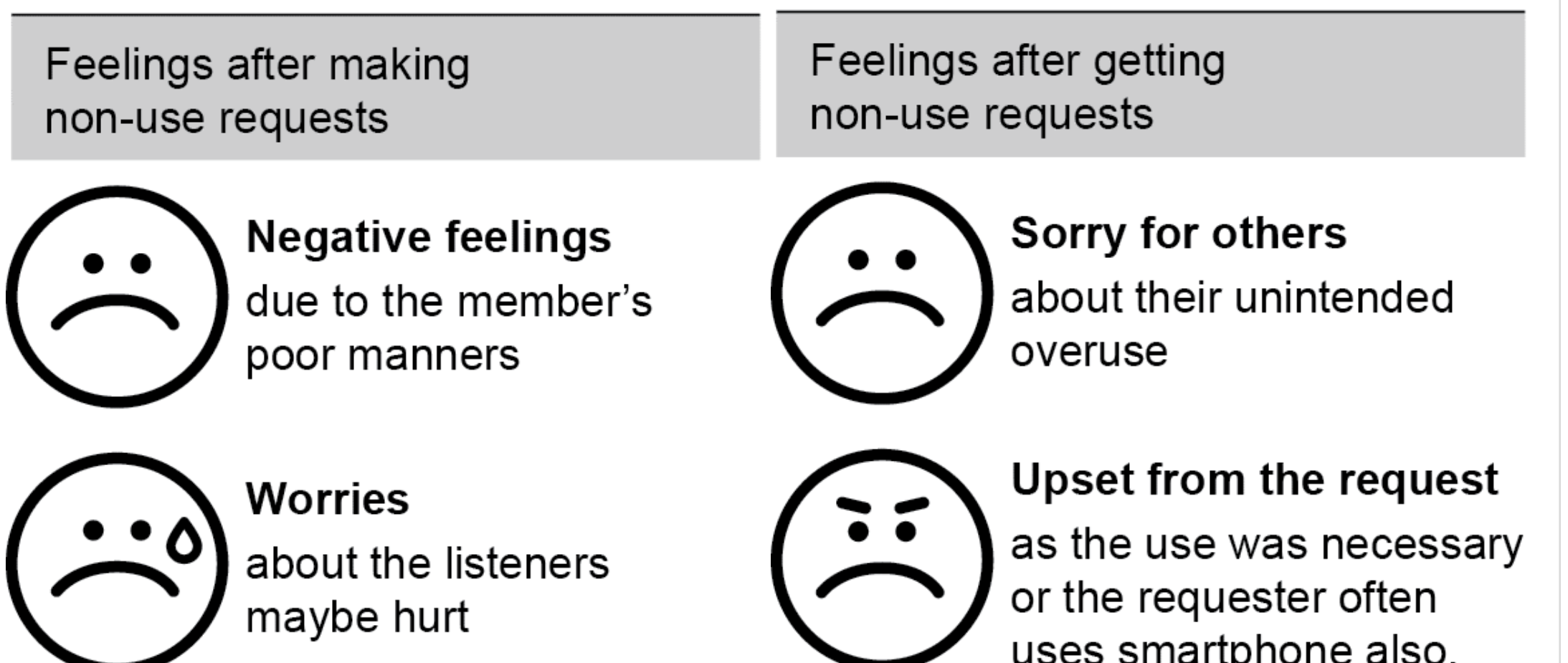
Research Objectives

— Improve group awareness of mobile device usage while enabling social engagement to continue uninterrupted.
— Alert the group with feedback such as lights and actions in a calm and non–invasive manner.

Preliminary Studies Online Survey (N=59)

Q. How much hesitancy did you feel in asking someone not to use smartphones? (5 points Likert scale)

42.3%
Minimal (less than 3 points)
Do not hesitate to ask stop using a smartphone
"I can easily ask others because I am already upset."

32.2%
Moderate (more than 3 points)
Afraid of mediating other's smartphone use
"If I ask, they may get upset. I don't want to cause troubles."

25.4%
Contextual (3 points)
Their level of hesitation is dependent on the context
"It is more likely to say something to my friends, but would hesitate to request to a boss or a senior colleague."

Q. How did you feel after making and getting non–use requests? (open–ended)

Feelings after making non-use requests	Feelings after getting non-use requests
Negative feelings due to the member's poor manners	**Sorry for others** about their unintended overuse
Worries about the listeners maybe hurt	**Upset from the request** as the use was necessary or the requester often uses smartphone also.

LockDoll Design Ambient Information System Design — in the form of a smart pet

Design Approach Tangible artifacts in *Symbolic Sculptural Display*

— Gives high aesthetic emphasis
— Mimics the image of a cat to gently persuade user behavior
— Provide ambient awareness on group members' usage in order to encourage their limiting behaviors

Working Prototype

Appearance
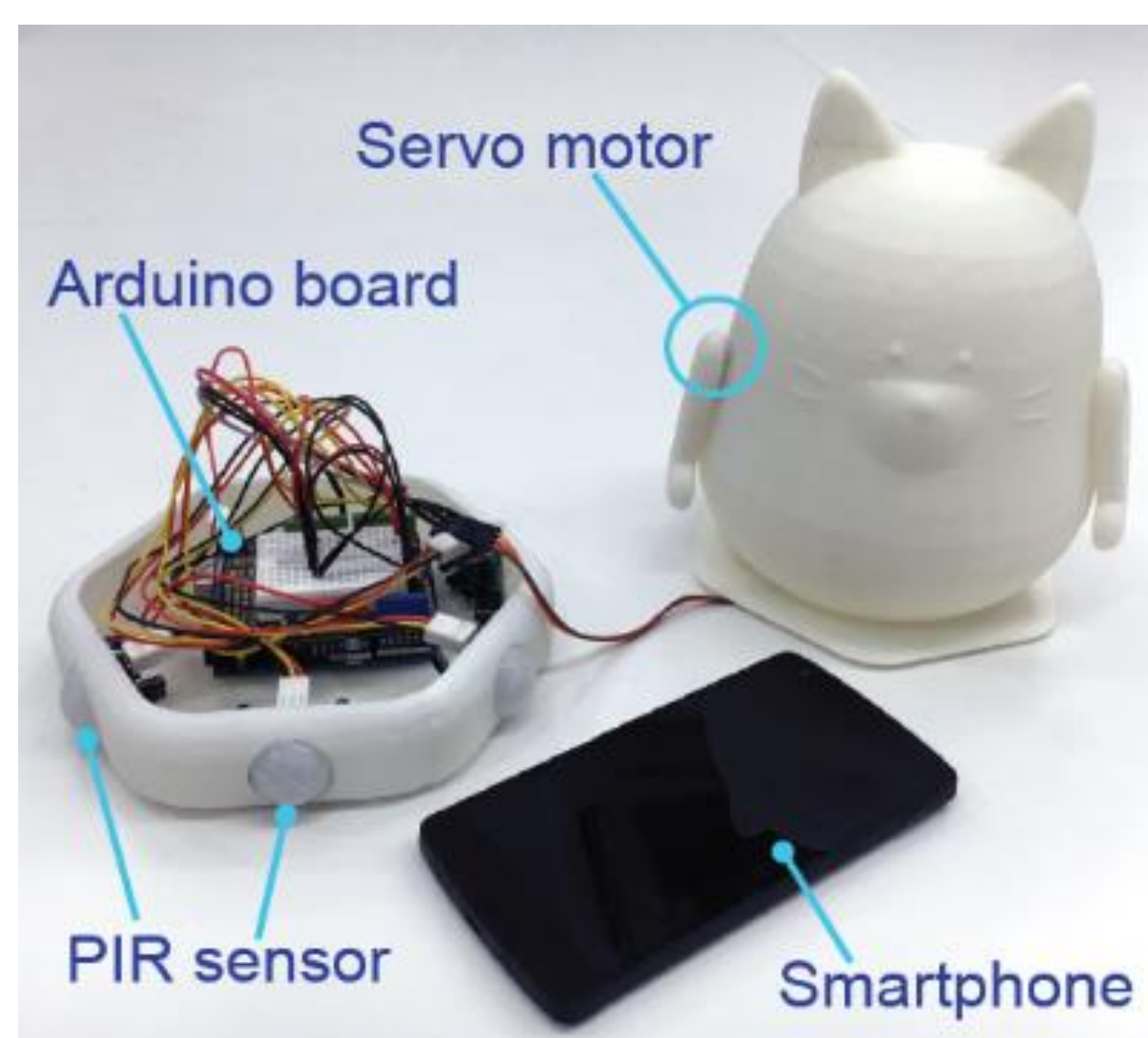*3D printer with ABS*

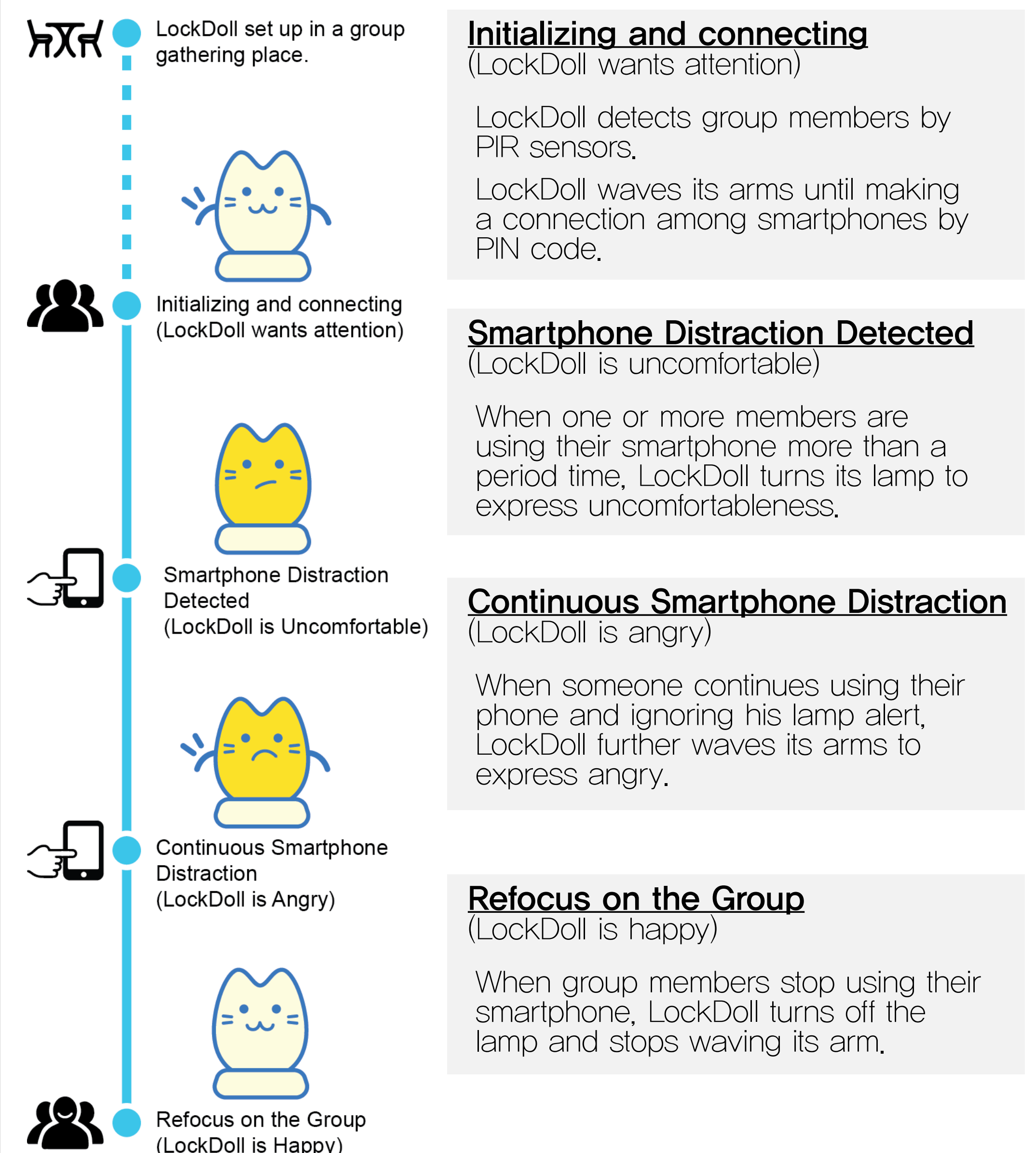LockDoll presentation
LED lamp, Servo motor

Group detection
PIR sensors

Control
Arduino, Smartphone

Servo motor
Arduino board
PIR sensor
Smartphone

Usage Scenario

LockDoll set up in a group gathering place.

Initializing and connecting (LockDoll wants attention)

Initializing and connecting (LockDoll wants attention)
LockDoll detects group members by PIR sensors.
LockDoll waves its arms until making a connection among smartphones by PIN code.

Smartphone Distraction Detected (LockDoll is Uncomfortable)

Smartphone Distraction Detected (LockDoll is uncomfortable)
When one or more members are using their smartphone more than a period time, LockDoll turns its lamp to express uncomfortableness.

Continuous Smartphone Distraction (LockDoll is Angry)

Continuous Smartphone Distraction (LockDoll is angry)
When someone continues using their phone and ignoring his lamp alert, LockDoll further waves its arms to express angry.

Refocus on the Group (LockDoll is Happy)

Refocus on the Group (LockDoll is happy)
When group members stop using their smartphone, LockDoll turns off the lamp and stops waving its arm.

Pilot Study Interview results on usage experiences (N=7)

1. Group Awareness on Smartphone Use
Positive experience because LockDoll continuously reminded.
"I was just checking my Instagram and LockDoll started to act out after some time."

2. Attachment to LockDoll
Attractive enough to potentially increase the attachment of the users
"I felt that I had to soothe LockDoll as soon as possible once LockDoll felt uncomfortable."

3. Soft Intervention on Smartphone Usage
Decrease the burden of directly asking someone to stop their smartphone
"I was often upset during group activities due to others' smartphone use. However, it is difficult to ask others not to use their smartphone. I thank LockDoll because it does the job for me."

Future Work

1. Iterative prototyping process including further pilot tests

2. Concentration on detailed design issues
   — Fine–grained awareness on a group's smartphone usage
   — Additional physical interaction in order to increase the opportunity of attachments

3. Further user studies to understand how and why the users utilize this artifact in their daily lives