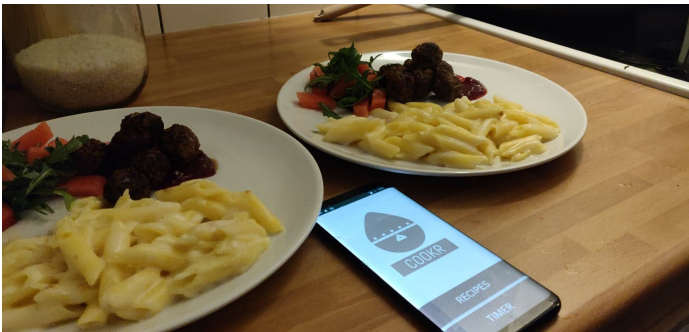




LUND UNIVERSITY

COMPUTER SCIENCE AND ENGINEERING  
PROJECT REPORT  
MAMN01

COOKR: THE HANDSFREE COOKING APPLICATION  
UPPR INNOVATIONS



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*STUDENT NAMES :*

JESPER BERG

SOFI FLINK

SIMON HYTTFORS

ASTRID JANSSON

ELIAS RUDBERG

*MENTOR :*

ANDY TANG

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## Division of Work

Due to different schedules and responsibilities the decision was made not to divide different parts of the projects between the group members. Instead every member of the group tried to contribute when possible and documentation and version control was made in order for the next work session of group members to be able to continue the work. As such all group members have been contributing to all parts of the project from documentation to application development and report writing. These tables are descriptive for main contribution to project.

## Theory & Documentation

Table describes main contribution to writing of the report, research and documentation.

|                |  |
|----------------|--|
| Jesper Berg    | Process and general proofreading   |
| Sofi Flink     | App layout design, app visual research, formatting report<br>Table of Contents, Title page, Division of Work, Abstract<br>Theory and Related Work: Visual Design - Button Design |
| Simon Hyttfors | Documentation mentor meeting and Method  |
| Astrid Jansson | Interaction Design, adding and refracing on a few of the chapters  |
| Elias Rudberg  | Title Page, Introduction, Color scheme   |

## Application Development

Table describes main contribution to the development of application COOKR.

|                |   |
|----------------|---|
| Jesper Berg    | Proximity sensor                                |
| Sofi Flink     | App version 0.1, App layout design, Orientation |
| Simon Hyttfors | -   |
| Astrid Jansson | Timer   |
| Elias Rudberg  | App version 0.1, documentation                  |

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## **Abstract**

Technical innovation gives rise to new interesting ways to interact with the products. The projects main goal was to produce a new application for the phone where the user can interact with the phone in innovative ways. Using different design idea generating activities such as brain storming, body storming, affinity diagrams and more the application COOKR was created. The idea of a cooking application was the result of brain storming and then using an affinity diagram, a table with the ideas rated was produced and COOKR was selected, where the name also was generated from brainstorming. Bodystorming and a sensor tree helped with understanding what functionality was necessary for the application such as a sensitive sensor for reading any type of interaction with the proximity sensor in order to minimize the risk of dropping food or objects on the phone. It was also necessary to implement appropriate feedback for when the phone acknowledges interaction with the user since it is easy to accidentally interact with the proximity sensor when reaching for ingredients in the kitchen. The final stages of the application made it possible for some initial user testing, the users where asked to either write a "love letter" or a "break-up letter" in order to describe what they like or what they don't like about the application. This helped correcting some faults in COOKR while keeping or strengthening the good parts in it's final stages for the best user experience while still meeting the criteria for the project.

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# 1 Introduction

This app has been the project of the course MAMN01 - Advanced Interaction Design. The goal was to create an app that implements and uses the sensors that most phone have incorporated into their hardware. After a few meetings and workshops we finally landed on creating a timer that could be used while cooking without having to touch the phone. This report will give some insight into the process of developing the app and eventually show the final result.

## 2 Theory and Related Work

A lot of the design decisions were made after carefully selecting and reading articles. These articles were the basis for all activities and decisions made during the design process.

### 2.1 Logo Design

An important factor for customer satisfaction and impression of a product is the logo design (C. Whan Park and Andreas B. Eisingerich and Gratiana Pol and Jason Whan Park 2013) which has a powerful impact on users. A circular shape can evoke associations including a perception of caring, warmth, sensitivity and comfort, while an angular shape can evoke feelings of durability and sturdiness (Psychological Science 2016).

### 2.2 Visual Design

In order to generate a good user experience visual design is crucial. Therefore some research time was spent on validating good visual design for the application COOKR.

#### 2.2.1 Button Design

As mentioned in the document HaptiMap (Magnusson, Rasmus-Gröhn, and Deaner 2012) one simple way to create a button for everyone was implementing a big button that does not require full visual disclosure of the application on the phone. Even if the application was ill-suited for users with poor vision you seldom have full attention

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on the application while cooking food and as such it makes perfect sense that big buttons required less attention from the user and created a better user experience.

This was further confirmed with Fitt's law (Interaction Design Foundation Instructor 2019) and the use of magic pixels (Soegaard 2018) which means that bigger buttons created a better user experience since it took less time to orientate on the screen and therefore less effort from the user. Also, an application which has its focus on aiding time dependent activities will need to be easy to interact with or the user will rather not have the application as a cooking aid.

It is not as easy as in enlarging the buttons to full size on the screen and expect the application to generate a good user experience. According to freelancing user interface designer Karafillis (Karafillis 2012) following Fitt's law doesn't necessarily imply good design. Good design is intuitive, and is implemented as to minimize user error.

Grouping some design objects together is intuitive if they for example belong to the same category for functionality. A smaller button can be good design when you want to avoid the user to accidentally keep pressing the button for example resetting the timer in COOKR. It is also more difficult for the user to orientate if all buttons signify (Norman 2013) equal amount of importance.

In similar fashion white spaces are proved to be important for intuitive design. An article from Interaction Design Foundation (Soegaard 2019) describes the use of white spaces important for, as mentioned, grouping together similar functions and also dividing them.

### **2.2.2 Color Scheme**

In an article posted in the Journal of Consumer Psychology, Xiaoyan Deng and his fellow co-authors outlines three key findings that explains how consumers think about colors.

- First:

People tend to de-emphasize lightness and focus on hue and saturation.

- Second:

Given this shift in emphasis, people generally like to combine colors that are relatively close or is an exact match.

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- Third:

A small palette principle is supported such that the total number of colors used in the average design was smaller than would be expected under statistical independence.

Upon reading this we can come to the conclusion that it would be a good idea to have a color scheme with a small palette of light colors, where the hue and saturation is close to one another.

## **2.3 Feedback**

Importance of feedback, too much, too little. What type of feedback? Sound? Vibration? When to use what type of feedback.

## **2.4 Interaction Design**

One of the projects focuses have been to implement clever interaction design between the user and the product. As such research was conducted giving insight to what type of interaction design can be considered good, in what circumstances. An important part of this has been realizing when designs are not interpreted as intended and to minimize that risk.

### **2.4.1 Gesture Interaction**

Gesture is one of the interactions we have aimed to use as the user in the intended context would benefit from the possibility of communicating with the app without having to touch the phone. Gestures however, is a step backwards when it comes to usability according to (Norman). It can be easy to forget how to use it and might not always be intuitive even if it is the goal during design, as gestures can contain different intuitive meaning depending on what part of the world someone is from. Furthermore, it is hard to present signifiers to a user of what is possible to do. Adding a tutorial might be relevant to help the user understand how it works. It can be important to differentiate between gestures that are built upon gestures of direct manipulation and those that of a more intuitive nature. Results from a study of human preferences shows that users can distinguish easily between acceptance and refusing, that for some gestures bi manual acting is present and that users tend not to use manipulation gestures to rotate objects or for translation (R Aigner et al, 2012). The aim is for the gestures to be relevant for the context rather than

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be easy to guess for a beginner. This show that memorability and relevance is of importance. Intuitively can then be achieved in the context rather than based on signifiers.

### **2.4.2 Voice Interaction**

Voice is another way of interaction that usually require background knowledge of the functions and commands that can be used. This makes it important that the user is given appropriate feedback of what input the application has received. To much feedback can be as frustrating as to little. Feedback should be as short as possible, while conveying enough information to the user. Voice interaction can be time consuming. This is on of the problems a voice interaction designer have to tackle. As of this communication should be as short at possible from a design point of view. Short sounds can be used for repetitive feedback to mark that the input from the user has been received. Conveying meaning by sound is an alternative to for example repeating the users input. By using short sound and keeping the sentences short and concise negative and frustrating experiences can be prevented.

## **2.5 Functionality**

When creating an application it is easy to become too ambitious, wanting to create the perfect application with all the different functions available for the user. A study from Columbia University showed how too many options and possibilities for the user can actually prove to be fatal for the user experience (Iyengar SS1 and Lepper MR. 2000). It seems like satisfaction from users are higher when their choices are somewhat limited or else they will become discouraged to use the product.

Aside from the dilemma of choice, users seem to prefer a good experience over strict buying of products and goods (Hassenzahl 2013). By having produced an application that gives the user a nice experience to remember, the satisfaction would be show to be greater.

Aside from regular functionality of the application research for performance was done as well. Google and Bing made a lot of testing regarding delays in loading speed for web pages (Forrest 2009). Even if the article describes the user trends during delays it is still applicable to other applications since it still provides information regarding users frustration with delays. The trend proved that delays above 400 ms can be fatal for the user experience. Even if corrections where made the users never seemed to recover. As such performance of the application was an important focus.



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## **3 Method**

### **3.1 Brainstorming**

The idea of the app came from a brainstorming session wherein the group members used several story cards to put themselves in certain situations where an app could be used in assistance. One of the team members describes a scenario in which one was cooking food, having to use the timer, but not wanting to touch the phone with their dirty hands. Furthermore, different aspects of the idea was discussed, weighing advantages and disadvantages.

### **3.2 Interaction tree**

When laying out the basic interface and interaction components needed in the app, an interaction tree was sketched, in which several components were divided into smaller modules and different types of feedback features. Four different interaction gestures were declared and these were further divided into which sensor would be needed for the feature and finally what type of feedback would be adequate.

This was done not only to simplify the work and later implementation, but also to evaluate the wanted features and decide if all of them were quite reasonable to implement.

### **3.3 Bodystorming**

To get a clear picture of strengths and weaknesses in the nature of the app, a bodystorming session was held between two of the team members. During the session the two members setup a authentic scene in which the app could be used, cooking and using their bare hands. This was done to visualize the eventual problems in an occasion where the app would be used.

### **3.4 Implementation**

For implementing the application, Android Studio was used along with several smartphones running Android used for testing. These were mainly the team members own phones but also a specimen handed out from the institution.

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## 4 Process

The process has been iterative and a lot of design decisions have been made using previously conducted research. Due to limited time and resources this was an excellent way of generating more data. In the later stages of the process more user testing had been deployed in order to adjust the user experience for the best user satisfaction.

### 4.1 Idea generation

The entire process started with a blessing in disguise. As one of the team members was unable to attend the first idea generating workshop this one did its own brainstorming and was presented to the team. One of the main ideas which came up was a modified cooking timer along with other alternatives.

This idea was then expanded upon during the workshop by the remaining team members. It was decided to keep the focus on cooking but to add a recipe library with step by step instructions in addition to the timer.

It was also decided the main form of interaction would be the proximity sensor as the controller for both the timer and recipe parts of the application. The real life connection to this decision was the simple fact that the cooks hands often are busy or dirty during the cooking process.

Other interaction ideas which came up during the first brainstorming and the workshop was the possibility to add time to the timer using the camera and finger gestures, as in holding up two fingers to add two minutes to the timer. Voice control, as another solution to the inability to use your hands, was also shortly discussed.

### 4.2 A concrete idea

As actual development approached it became time to come up with a concrete idea for the design and to fully decide which interactions should be part of the final product. During this stage a design groundwork was established containing crucial info such as the logo and color theme. These were based on previous studies and new ideas.

The interactions were also established in this stage. By using an interaction tree it became clear that the main focus would still be using the proximity sensor, but there was a need to add different ways to cycle through recipe steps. There were for

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example no way to go back without touching the screen. It was therefore decided to add a *flick* to go forwards or backwards in the steps depending on the the direction.

Voice control was also further discussed during this phase as ideas concerning this had been brought up. It was however decided against using this form of interaction as the discussions quickly fell into privacy and eavesdropping issues.

Using the camera to interpret hand signals was still something that would fit the application. Therefore some research was done into this topic. It became clear at this time there were many examples of this particular interaction online, but the code used was very advanced. Accordingly the team decided to keep the feature on the table but not have it prioritized. This means the feature would be done if time and interest existed in a later iteration of the application, instead of as a core mechanic.

### 4.3 First prototype

Once development had started it was fast until a simple prototype was finished. This version of the application featured a splash screen with two large buttons to go to either the timer or recipes.

It was possible to add hours, minutes and seconds to the timers using, and it could be started using both the proximity sensor and a button. Once the timer ran out, a vibration would be sent. It was decided a sound would be played as well, but was not implemented at this stage.

The recipe section was less developed, as it simply had a list of possible recipes. There was also a possibility to recognize the proximity sensor in anticipation of the step-by-step instructions.

Goals for this iteration and next were established to be the implementation of all the core and the most necessary features. Therefore there were no further development of the camera or flick feature. A list was however created to establish what was defined as what.

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