Project: Consumer Awareness App

Final report

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1.0 Introduction

This report is a summary of the group effort of planning, designing and implementing a mobile application for consumer awareness. The project is part of the course INF5261 - Development of Mobile Information Systems, attended autumn 2012.

The term consumer awareness has existed for a long time, but it was first in 1962, encouraged by the US President John F. Kennedy, that an actual declaration about consumer rights was established (The American Presidency Project, n.d.). Consumer awareness is foremost a marketing term referring to the consumer's right to be aware of the products they purchase, but also an ethical conduct for those responsible of the production and distribution of the goods.

The report is structured in the following way: first we give a short description of our motivation for doing this project and our goal for the final application. We then present a review section, first giving an overview of similar products on the market that include consumers and product awareness. The review section closes with a discussion around existing literature on technologies that connects the physical and digital world: RFID, imaging and barcodes. Then follows an exhaustive description of the design process of planning, implementing and evaluating the application, which we believe is the most important part, and also an own section discussing and analysing the design process itself. The report closes with a summarizing conclusion.

1.1 Motivation

Information on regular products offered at most grocery stores are often insufficient and hard to read/understand. Today's groceries-buying consumers may have allergies, be vegan, environmentally interested, and because of that be in need of more profound information about the products they are about to buy. The purpose of this project is to provide them with that information. With the consumer awareness application at hand, we hope to give the consumer the additional information needed - to make it easier to be aware!

There is no doubt that such an application might be useful. But is there a need for it out there? Is the general population aware of the need of more consumer awareness? Anthony Bailey of the

University of Toledo wrote a paper (Bailey, 2005) on consumer's awareness and use of product review websites. These websites exist solely to inform consumers about products, both facts and opinions. One can safely say that taking the information stored on websites and make it more available to users through a mobile application is a step forward.

The paper also mentions that consumers who are aware of product review websites are very likely to use them, though many use them only for reassurance after they purchased a product. A mobile application will possibly shift these statistics more toward checking before purchase, due to the possibility to check a product right then and there when it's in front of you. The existence of this option will aid in reducing the effort of being aware, help consumers be more cost efficient by buying exactly what they want and not things they later will find out is not what they were looking for.

1.2 Goal

The pragmatic goal of this project is to implement a fully functional application for consumer awareness. It should be quick and easy to get the additional information needed about groceries, whether it's the product's origin, ingredients, nutritional facts and so on. The application should also make it easier to compare goods and make effort to give alternatives if a specific grocery is not in stock.

It is also a goal to inspire and encourage the *regular* consumers to be more aware about the products they purchase. Hopefully, the application will function as a useful tool on a daily basis, and become both the regular and the already aware consumer's new best friend. If time permits, the application should also be available in more than one language.

2.0 Review

In connection with the development of the consumer awareness application, it was beneficial to look at existing applications already developed for this kind of purpose. We have also reviewed literature about relevant topics on how to connect the consumer with their products.

2.1 Existing applications

2.1.1 Hormonsjekk

Hormonsjekk[1] is a norwegian mobile application (Figure 1) for iPhone by Forbrukerrådet (The Consumer Agency), which allows for users to scan products for hormone disturbing content. The scanning of products are done through the smartphone camera, which detects the product's barcode and thereby enables the application to analyze and distribute the product's information. When the scanning is done, the application gives the user an overview of potentially dangerous hormones it contains, or declares it as safe if it does not contain any of them. It is also possible to search for products or look up products through categories.

Figure 1: Hormonsjekk

The application is similar to our project in the way that it also aims for consumer awareness. By always being at hand when you need it, the consumer can input a product by the barcode scanner and the consumer will get feedback about the product. While Hormonsjekk is aiming to inform the consumer about harmful chemicals in cosmetic products, our aim is to empower the consumers with information about more than just cosmetics. We are very much inspired by the graphical design and barcode scanner from the application.

[1] https://itunes.apple.com/no/app/forbrukerradet-hormonsjekk/id474438012?mt=8

2.1.2 CodeCheck

CodeCheck[2] is a German application for Android and iPhone. This application (Figure 2) does more or less just the same as what we wanted to make out of our application. With a fast speed barcode scanner, or the search/browse function, the consumer could input a product and retrieve nutrition data, chemical composition and cautionary labels about the ingredients. What this application lacked in our point of view, besides being in the wrong language, was the possibility for users to create a profile with filters and presenting whether or not the product ingredients were consistent or not with the profile. Also it didn't give the user alternative products. The barcode scanner we chose for our application was based on the one used in this application (CodeCheck, 2012).

Figure 2: CodeCheck

2.2 Literature review

The consumer awareness application suggests a connection between the mobile terminal, which in this case is the smartphone, and the immediate environment, which are the grocery stores. The following therefore projects a review of different kinds of ways to enable this type of connection. An interesting aspect of looking into these, is which types of interactions that are afforded through the different ways of data transferring. We believe this reveals itself through looking at the strengths and weaknesses each of them would serve an interactive product, like Sharp, Rogers & Preece (2007) suggest. We believe this also helps us along the way in ensuring the application's usability, as to provide the users with an enjoyable, effective and easy to learn

[2] http://www.codecheck.info/

application (itil). Based on the above, we formulated one of our general research questions: how do we *detect* an object?

2.2.1 RFID

The article from Lee & Kim (2006) takes on the topic of RFID and privacy concerns this technology brings along with it. A popular technology in itself, RFID will most likely be spread more and more throughout society as time goes on, so the concerns are valid. RFID's ability to be read without line-of-sight and difficulty in efficiently limiting who can read them is where the main focus of concern lies. The mobile RFID readers further complicates this with their increasing availability. The article reaches the conclusion the technology is a promising uprising technology, but the introduction of mobile readers needs to be taken into account when developing technical solutions and legislations to protect personal privacy.

This paper compares mobile interaction technologies, specifically, RFID and visual tags. They do a study presenting users to these two different technologies with no instructions on how they are used. They found to their surprise that users found RFID more intuitive and familiar than visual tags, due to it's similarity to security disks on clothes etc. However, all in all, users had trouble understanding that RFID and visual tags merely refer to information stored elsewhere, and do not store the information themselves.

2.2.2 Digital imaging

The article by Setiabudi & Tjahyana (2011) takes a look on developing applications for In-Store shopping. They take a look on what is required for an application that is to be used in a store and during the multitasking that shopping tends to be. They are useful for us since our application is also meant to be used in stores, and can draft a great deal of inspiration from the examples these two articles bring up.

2.2.3 Barcode

The papers by Gao, Prakash & Jagatesan (2007) and Kato & Tan (2005) look on the topic of barcodes, both 1D and 2D. 1D barcodes have been around for a long time, but recently 2D

barcodes, like the QR-code, has been rising in popularity. The increased capabilities of 2D barcodes over 1D barcodes and the increase in amount of smartphones and their use have made a trend of applications making use of these technologies for a variety of uses. They take a look on the limitations and capabilities of different kinds of 2D barcodes, trying to find a good standard. In the case of developing mobile applications for barcodes, they also state useful development principles for their examples that we can take into consideration for our own project.

2.2.4 Acoustic Barcode

A new kind of barcode, called an acoustic barcode, has recently surfaced. This is a tactile barcode that produces a sound when scraped, either with a fingernail, the reading device, etc. The sound produced is decoded into an ID that refers to the information. (Harrison et al., 2012)

3.0 The design process

1. Stating needs → previous proof of concept
2. Creating mockups
3. Brainstorming needs based on features from mockups and other solutions
4. Organizing features/needs
5. Development phase

We decided the feature list based on our own ideas and needs. Since we did not involve the users and we consider ourselves as expert users, we have approached this process as a genius design[3] method. We established an interactive prototype of the application based the needs-to-have from the feature list (see Attachment 1). But in this way, the users are actually able to get a "feel" of the application and also discover the possibilities that such an interaction with the environment can enable.

[3] *Genius* design is broadly understood as one visionary person with a point of view that conceives an idea so innovative it would be impossible to obtain it by asking users what they want. http://www.artefactgroup.com/#/content/genius-vs-participatory-design-a-debate-worth-having

3.1 Identifying needs and establishing requirements

The first step of a design process is usually to identify the needs of the users and to establish a set of requirements based on these (Sharp, Rogers & Preece, 2007:17). We intend to do the user-based needs analysis after having the users engage with the high-fidelity prototype. After doing the test session, we want to hand out a questionnaire to the users, asking them about the general feel of the application, the user interface, but foremost what types of functionalities they envision being in need of. We also intend to observe and talk to them while interacting and trying out the application, either just playing with it or doing performance tasks.

Having done this, we intend to analyze and reflect on the gathered material from the evaluation, and further develop a new "user-based" set of *actual* needs and requirements accordingly. This will give us fruitful information and a solid basis to further develop the application on the premises of the users. The "must have"-needs initially established by the group are: (1) scan barcode, (2) filters, (3) product information, (4) personal profile. (Attachment 1)

3.2 Design, prototyping and construction

3.2.1 The front-end

For an easy approach to coding the application into multiple platforms, i.e. Android, iPhone, we chose to write the application in familiar and standardized HTML5 and javascript, with various wrappers that compiles HTML5 and javascript to native code. In this case we chose Titanium as a wrapper. Underneath are images of various mockup-designs, both high -and low fidelity:

Figure 3: Front-End High-Fidelity Prototype

3.2.2 The back-end

This project is implemented with Neo4j[4] as a database and also json method for retrieving data in the fastest way. Following is a description of the neo4j graph database.

Neo4j is a high-performance, NOSQL graph database[4] with all the features of a mature and robust database. The programmer works with an object-oriented, flexible network structure rather than with strict and static tables and a fully transactional, enterprise-strength database. It is storing data

[4] http://www.neo4j.org

[4] http://nosql-database.org/

in the nodes and relationships of a graph. The most generic of data structures, a graph elegantly represents any kind of data, preserving the natural structure of the domain. For many applications, Neo4j offers performance improvements on the order of 1000x or more compared to relational DBs.

Features:

- An intuitive graph-oriented model for data representation
- A disk-based, native storage manager completely optimized for storing graph structures for maximum performance and scalability
- Massive scalability. Neo4j can handle graphs of several billion nodes/relationships/properties on a single machine and can scale out across multiple machines
- A powerful traversal framework for high-speed traversals in the node space
- Can be deployed as a full server or a very slim database with a small footprint (~750k jar)
- A simple and convenient object-oriented API

How is it working?

"A Graph –records data in–> Nodes –which have–> Properties." The simplest possible graph is a single Node, a record that has named values referred to as Properties as shown in Figure 4 [Picture from http://www.neo4j.com.]. A Node could start with a single Property and grow to a few million, though that can get a little awkward. At some point it makes sense to distribute the data into multiple nodes, organized with explicit Relationships. "Nodes –are organized by–> Relationships — which also have–> Properties." Relationships organize Nodes into arbitrary structures, allowing a Graph to resemble a List, a Tree, a Map, or a compound Entity – any of which can be combined into yet more complex, richly interconnected structures

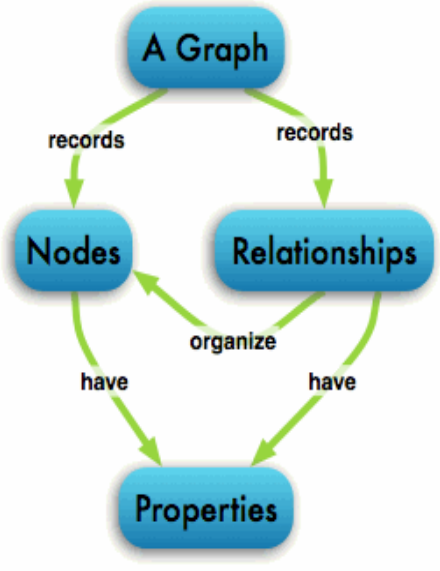

Figure 4: Graph Database

4.0 Discussion

For our design process, we decided upon a rotation plan to allow us all to fully focus on different parts of the project, yet still experience every part, to get the best possible learning experience out of the project. Therefore, through different stages we will cycle through who works on research, developing, designing, etc.

We've set up the project so that at some point we all will be introduced to technologies that are new to us, to aid in making it an exciting project for us, as well as having a look at every possible technology that might be of use in an application like the one we are aiming to create. We have through this process ended up with an application making use of HTML5, Javascript, CSS and JQuery for the front-end, and Neo4J for the back-end.

In the design area, mock-ups have been made and discussed, but due to the focus on feasibility the additional functionalities that user's might want have not yet been considered, and therefore the design has not yet been locked down and is still up for debate.

For evaluation, we will take the feedback from the users and categorized and prioritized their stated needs and suggested improvements.

5.0 Future Work

For future work we intend to provide some other features which are mentioned in Attachment 1 which we have labeled as "nice to have" such as cloud profile, browsing, map and use of RFID for scanning products instead of barcode scanner. This is possible only when the producers provide RFID tags for all products and the security of RFID networks is improved. Acoustic barcode is a different technology as we noticed before, which is possible to use in the project due to the implementation with producers likewise RFID. Another feature that we intend to use artificial intelligence for alternative products. It means the application tracks the daily scanned products by the user and compares these products with the filters, which the user chose in the profile. Afterwards, the application finds the products, which share the same nutrition values and

matches with the filters. After finishing the first version of the application, we will conduct a usability test with users to get feedback from them in order to improve the application.

6.0 Conclusion

As we are now close to the end of the project, we have achieved a good foundation in the front-end area of the application. Development is still in progress, but a progress plan is made and the primary features are functional.

As for our choice of product detection, by sifting through different articles on technology, we ended up with barcodes and barcode-scanning. There are security issues with RFID and since RFID is not widespread enough, we've decided not to include this feature in the current prototype.

So, at the end of all of this, we are left with an experience of trying out new things, having learned new tools, and a form of cooperation that for some of us was new, but motivating and exciting. We have a functional prototype and we are looking forward to continue developing and finishing the application.

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Attachment 1