# Development of Products State Identification Application

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## Introduction

The term smart packaging is used for packaging that, in addition to its essential functions, also has other specific characteristics. Smart packaging systems are used in several branches of the economy, primarily in the food and pharmaceutical industries, in order to facilitate the use of the product, preserve its quality, as well as provide information about the current state of the product [1].

Intelligent packaging is characterized by the fact that it allows the consumer to monitor information about the production of the product directly. The packaging and consumer interaction is enabled through indicators and sensors that are built into the packaging itself [2].

## Methods

For creating design and interaction through an application, the program "Adobe XD 2019" was used in combination with programs such as "Adobe Photoshop 2017" and "Adobe Illustrator 2017" [3].

The idea is to create an application that will enable the end-user (buyer) easier and simpler shopping during the buying process. Scanning the smart packaging will provide more information about the product compared to the basic information that can be found on the conventional packaging. After scanning the product, the application will load a specific site with a complete product description, such as - name, price, product rating, product stock information, information on intolerance to certain additives such as gluten, lactose, soy, carrageenan, etc.). Also there are comments and previous experiences of users who have already tried the product. Basic information about the product and its specifics, product ingredients, instructions for use, date of manufacture or expiration date of the product, net quantity and freshness of the product are also included.

Application creation is based on the basic algorithm that contains four main sections: 1. Printed codes (Barcode, QR code) 2. Printed electronics and sensors – (RFID, NFC, Beacon, Sensor) 3. Smart indicators (TTI, Freshness, Gas indicators, Chromatic indicators); 4. Augmented Reality (Figure 1) [4].
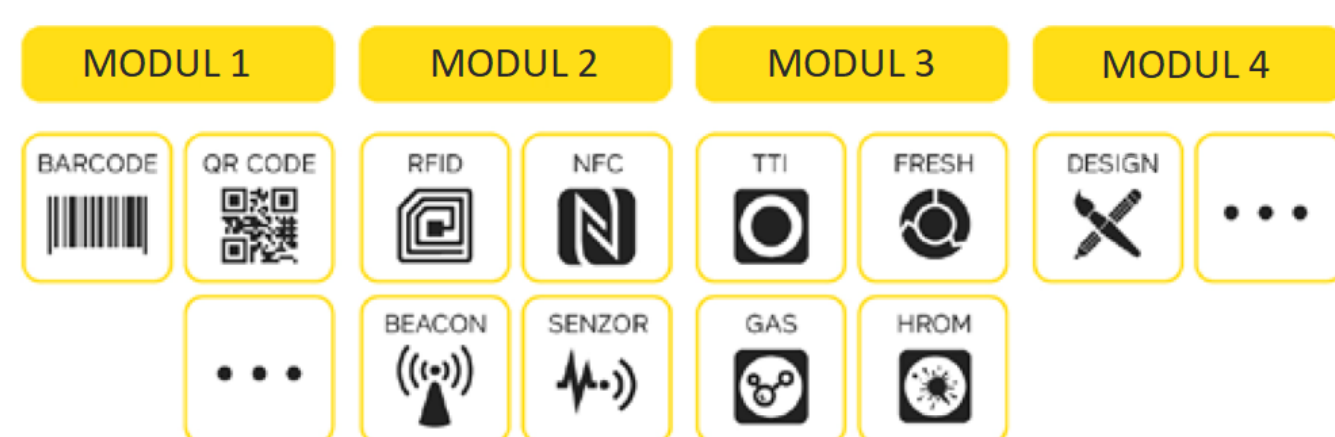


**Figure 1**

*Algorithm as a guide for application development*

## Results

After starting, the application is designed to load the home page and start the reading. As this application is used exclusively for scanning products, it is necessary to press the "scan" button, which takes us to page with four types of scanning.

Based on the four main types of smart packaging given in algorithm, there are four different types of scans.

The first button or the first type of scan is the printed code. The printed code consists of two types of codes, Bar code and QR code. When this button is pressed, the page is loaded, and we get a division where we can choose which type of scan we want. After selecting, the camera on the phone automatically starts where a predefined, transparent "frame" is placed over it, which narrows the range of the camera to one smaller square. It is necessary to find a barcode or QR code on the product and centre it in that box in order for the application to detect and scan it. When the camera finds the specific code, the application offers to "take a picture" option located at the bottom of the screen (Figure 2).
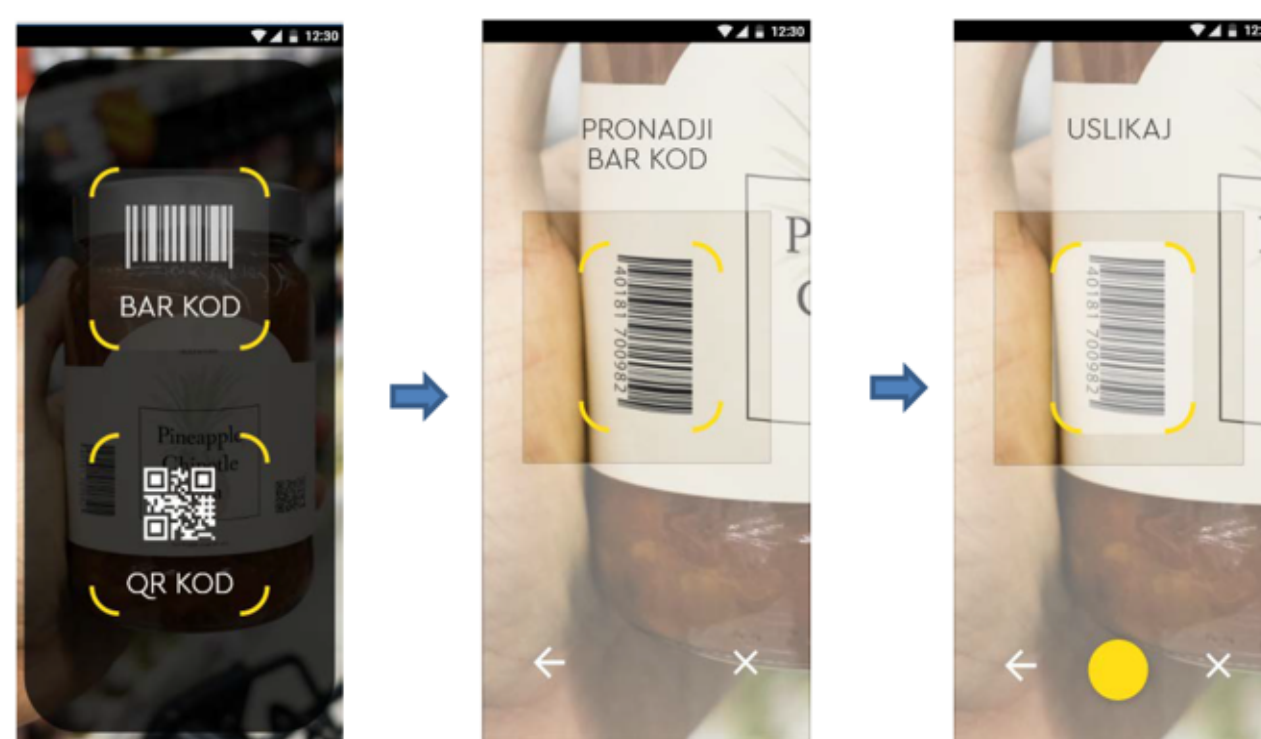


**Figure 2**

*Code selection and scanning*

The second type of scanning is related to printed electronics and sensors. By selecting this type, four buttons appear - 2 buttons for printed electronics and two buttons for sensors. By pressing the button, a short explanation appears to the user on how to place the phone in front of the product (packaging). The distance between the phone and the indicator on the packaging must not exceed 10 centimetres in order for the application to detect it and link to the given site related to the product (Figure 3).



**Figure 3**

*Finding correct distance between the phone and the indicator*

Smart indicators are the third type of devices placed on the packaging and ready to scan. The scanning principle is similar to indicator scanning. The application detects the indicator and offers the option to go to the main site with product details. Unlike the first three types, which are detected by indicators, the condition is detected on the packaging using smart (colour-changing chromatic) ink.

The fourth type is perhaps the most exciting in the visual sense because it uses augmented reality technology. Video and audio effects give the customer a superior feeling to which a particular product is experienced in real-time (Figure 4). These effects can be entertaining but also informative. When it comes to effects of an entertaining nature, these are usually effects that create a more complete and more precise image of the product, while informative effects are most often some novelties added to the product or some actions that are related to the product at that time. When the augmented reality button is pressed, after reading, the camera on the phone automatically turns on.
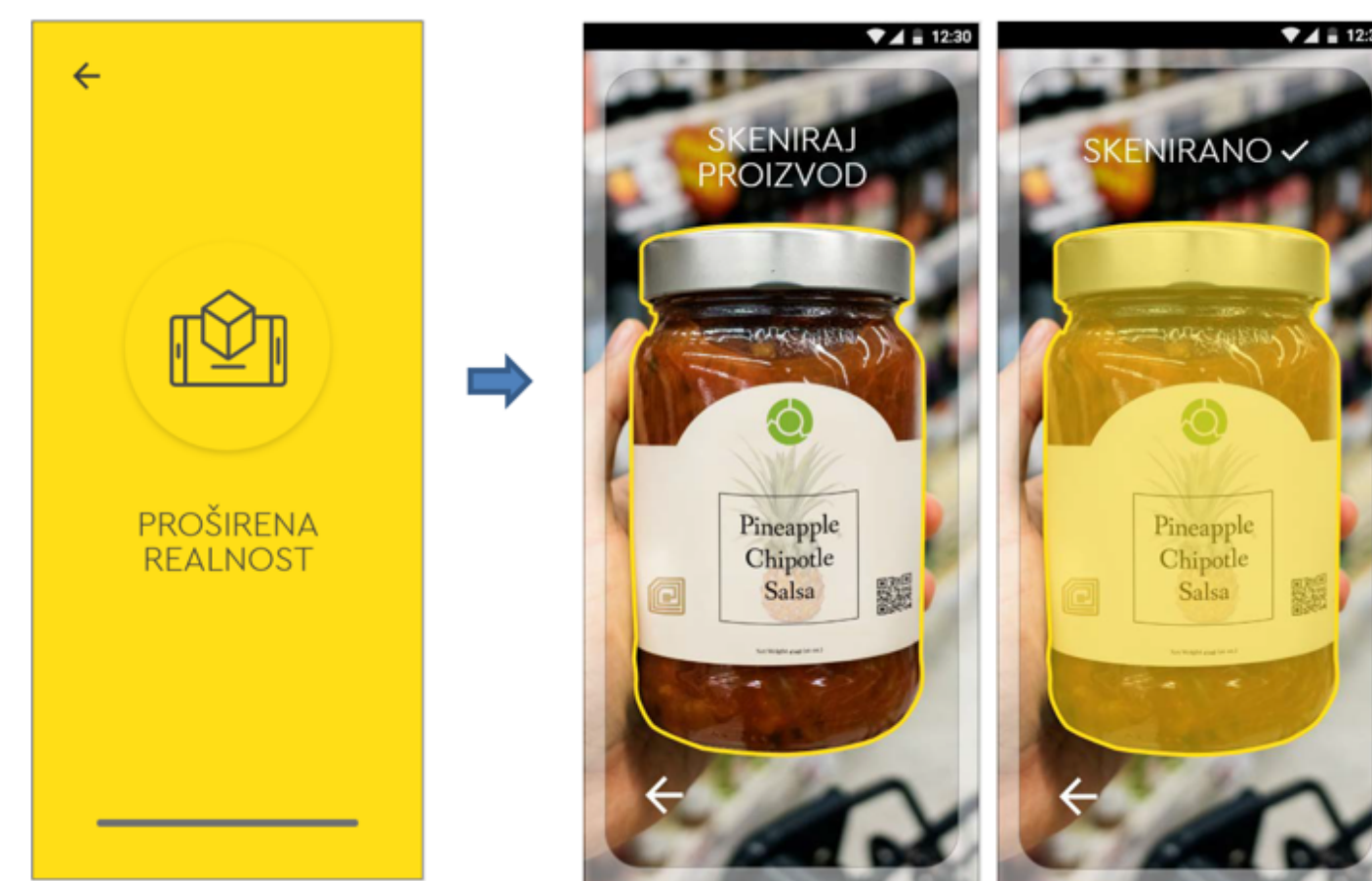


**Figure 4**

*Product scanning via Augmented Reality module*

## Discussion / Conclusion

Based on the market demand, there is a growing need of the user, in this case, the customer, for technologies that more easily and quickly lead the customer to the desired product or service. In addition to these benefits, the customer becomes dissatisfied with the necessary information we can find on the product, and thus smart packaging becomes a precedent in choosing the desired product. In combination with the newly created application, more detailed and extensive information is offered. As a new program by Adobe, Adobe XD is becoming a revolutionary "User Experience" program with advanced interaction with the UI designer, which facilitates the development of applications necessary for the "revival" of smart indicators on the packaging.

### REFERENCES

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