

# Student ID card Barcode Recognition for Android Mobile Phone Specification



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## Contents

1. Vision.....	3
1.1 Project Introduction .....	3
1.2 Positioning.....	3
1.2.1 Problem Statement .....	3
1.2.2 Product Positioning Statement .....	3
1.3 Stakeholder .....	4
1.3.1 Description .....	4
1.3.2 Stakeholder Summary .....	4
1.4 User Environment .....	4
1.5 Product Overview.....	5
1.5.1 Product Perspective .....	5
1.5.2 Summary of Benefits.....	6
1.6 System Features .....	6
2. Supplementary Specification .....	7
2.1 Abstract.....	7
2.2 Functionality.....	7
2.3 Security.....	7
2.4 Usability.....	7
2.4.1 Human factor .....	7
2.5 Reliability.....	8
2.5.1 Recoverability.....	8
2.5.2 Performance .....	8
2.6 Supportability.....	8
2.6.1 Adaptability .....	8
2.6.2 Implementation Constraints .....	8
2.7 Interface .....	9
2.7.1 Hardware and Interfaces.....	9
2.7.2 Software Interfaces .....	9
2.8 Dummy Database.....	9
3. Use Case Diagram.....	10
4. Use Cases .....	11
4.1 Use Case 1.....	11
4.2 Use Case 2.....	11
4.3 Use Case 3.....	12
4.4 Use Case 4.....	12
5. Detailed Use Cases .....	13
5.1 Detailed Use Case 1.....	13
5.2 Detailed Use Case 2.....	13
5.3 Detailed Use Case 3.....	14
5.4 Detailed Use Case 4.....	14
Reference .....	15

# **1. Vision**

## **1.1 Project Introduction**

Student ID card Barcode Recognition for Android Mobile Phone is smart phone based barcode recognition. It is mainly designed for college staff use. By using this mobile phone based barcode recognition, staff can easily and quickly get the details of who holds the student ID card without any expensive specific device like laser scanner we used in library system. And as stepping into the Portable Age, we really need a more convenient and more portable method for barcode recognition – as barcodes are everywhere today.

## **1.2 Positioning**

### **1.2.1 Problem Statement**

Traditional student ID card barcode recognition, as we know, needs specific devices (such as scanner and computer) that are usually desktop system based. And if we want to do a checking or get the details of student ID card, we have to go to the library or anywhere have the device. It's not portable. A more convenient method should be developed. This affects college staff, student ID card holders and the college.

### **1.2.2 Product Positioning Statement**

Android Mobile Phone Student ID card Barcode Recognition is the one that could be used anywhere and anytime you need. The recognition is mainly for the college staff to do a quick validation checking of student ID card and getting details of it.

## 1.3 Stakeholder

### 1.3.1 Description

Name	Responsibility
Image Sensor	Get the barcode image and transform image signal into analog signal
A/D Converter	Transform analog signal into digital signal
Digital Signal Processor	Process the digital signal
Decoder	Including image pre-process(gray-scale, median filter, thresholding, image trimming and binarization) and decode barcodes into readable information to end user.
Server Manager	Manage the server and the database on the server which includes student data
Software User	Scan student ID card barcode area, get student ID card holder information.

Table 1: stakeholder description

### 1.3.2 Stakeholder Summary

In actual use of the whole process, software user scans the barcode; Image sensor gets the barcode image and transforms it to corresponding analog signal; By A/D Converter, the analog signal has been transformed to corresponding digital signal; then the digital signal is processed by Digital Signal Processor and after this it is delivered to Decoder; gets the final readable code.

## 1.4 User Environment

Software users are able to use this recognition on Android platform based Smart Mobiles which support Wifi and have Webcam.

# 1.5 Product Overview

## 1.5.1 Product Perspective

The mobile student ID card barcode recognition will usually be used in the college wireless network support area, or it cannot transfer the decoded content of barcode to college server. It will provide services to users as indicated below.

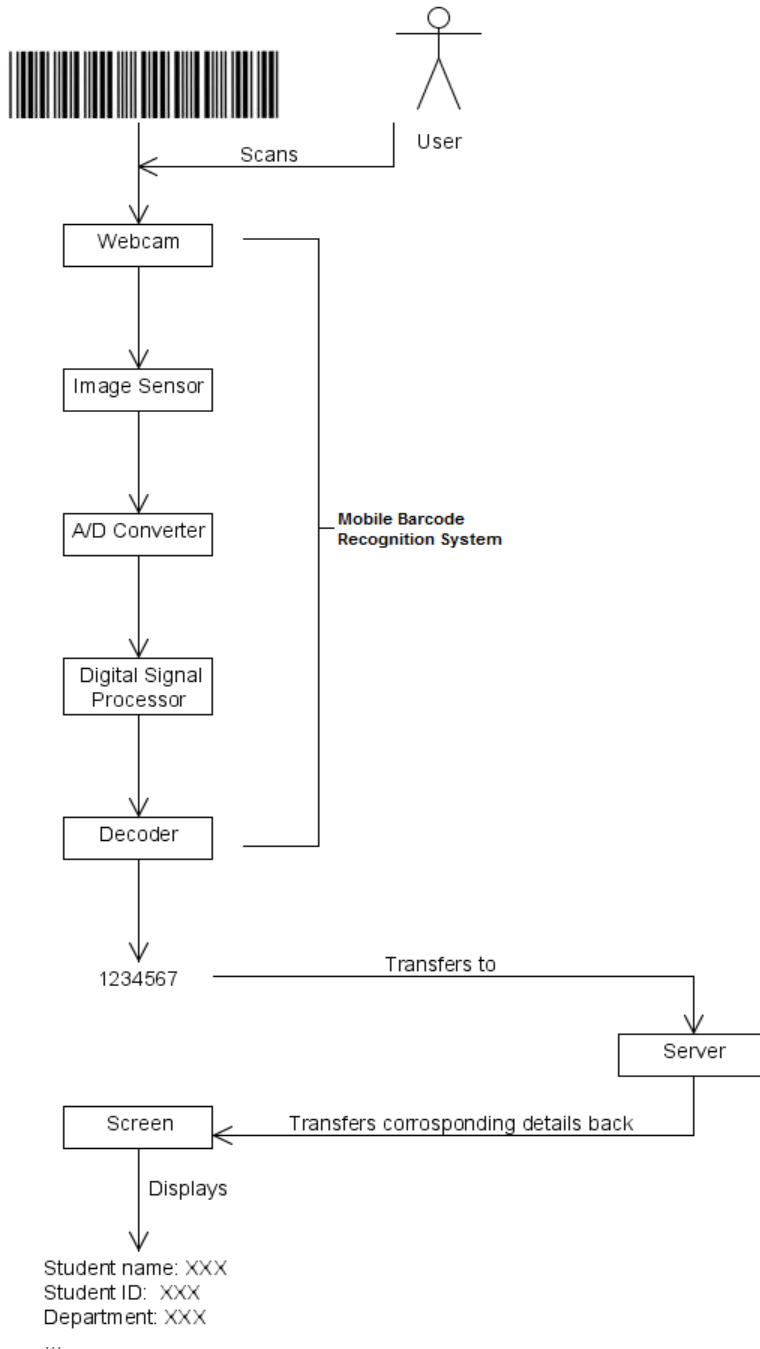


Figure 1: product perspective

## 1.5.2 Summary of Benefits

Supporting Feature	Stakeholder Benefit
Potable, the software can be used anywhere and anytime with the network supports	Convenient and quick checking
No extra device needed, such as external laser scanner. (simply a Gphone)	Reduced the cost
Dynamic scan, rather than taking picture every time as tradition mobile recognitions do	Simplifies decoding algorism and fast process speed
Friendly user interface	Friendly to user
Password-protected during transferring data to server, when transferring the decoded barcode to server, valid user name and password is requested	Provide more security support to the whole system including the server

Table 2: benefits summary

## 1.6 System Features

- Potable
- Simple device requirement
- Dynamic scan
- User interface friendly
- Password protect during transferring data to server

## **2. Supplementary Specification**

### **2.1 Abstract**

This document is the repository of all Student ID card Mobile Barcode Recognition requirements that are not captured in the use cases.

### **2.2 Functionality**

(Functionality mainly includes in use cases)

### **2.3 Security**

It requires authentication while connect to Server. Password protected, when transferring the decoded barcode to server, valid user name and password is required in order to log in.

### **2.4 Usability**

#### **2.4.1 Human factor**

- An easy-to-use user interface will be able to provide to all users. Therefore:
  1. Users are able to use the software without any complex guidance
  2. No more than 5 steps to get the details of student ID card holder. Actually a minimum of 3 steps is enough (scans -> transfers -> input valid user name and password, and then the result comes out). But considering the alternatives such as failure login because of invalid user name or password, we accept up to 5 steps to get result.
- High barcode recognition speed, as it's for quick checking and user's willing to get results without waiting so long.
- High recognition rate with clearly printed barcode.
- Well formed back details of card holder, as users can get the point very quickly.

## **2.5 Reliability**

### **2.5.1 Recoverability**

If the software failure to deal with recognizing barcode image or work too long on it, users are able to stop the current deal and restart a new one.

### **2.5.2 Performance**

As it's for quick checking, the barcode recognition process should not be working more than 20 seconds, transferring data to Server and getting details back should not be longer than 10 seconds. But it depends on the network condition mainly. Our goal is to ensure the process within the standard (20s and 10s) and minimum it.

## **2.6 Supportability**

### **2.6.1 Adaptability**

Different users with various mobiles based on Android platform should be able to use this software properly on their phone. But considering the screen size differs from types of phone, it really is a mass of work and it's no more than simply rewriting user interface for different screen size. Thus, it will be developed for HTC Dream (G1) or any mobile with the same screen size that based on Android platform only. But interfaces for other screen size will be available and could be expanded.

### **2.6.2 Implementation Constraints**

The Mobile Barcode Recognition will be developed use Java technologies solution and will be able to run Android platform based mobiles which is embedded Java Virtual Machine.



## 2.7 Interface

### 2.7.1 Hardware and Interfaces

- Android platform based mobile with Webcam and Wifi support
- Server which stores details of student ID card holders
- Networking

### 2.7.2 Software Interfaces

- Application Framework in Android
- ...

## 2.8 Dummy Database

As having no permission to access the real Carlow IT student's database, building a dummy one based on Web server is necessary.

Useful information is found on Carlow IT Website. And depending on student application form (2009-2010), Carlow IT, a database structure will be built like: [1]

Field	Data Type
StudentID	Varchar(10)
Surname	Varchar(20)
Firstname	Varchar(20)
Gender	Varchar(6)
HomeAddress	Varchar(50)
DateOfBirth	Date
Tel.No.	Varchar(20)
MobileNo.	Varchar(20)
Email	Varchar(30)
Course	Varchar(30)
CourseCode	Varchar(10)
EmploymentRecord	Varchar(50)

Table 3: student's database structure

Sample data will be put into database on Server before system presentation.

More details about database and web server design will see in later document (Design Manual).

### 3. Use Case Diagram

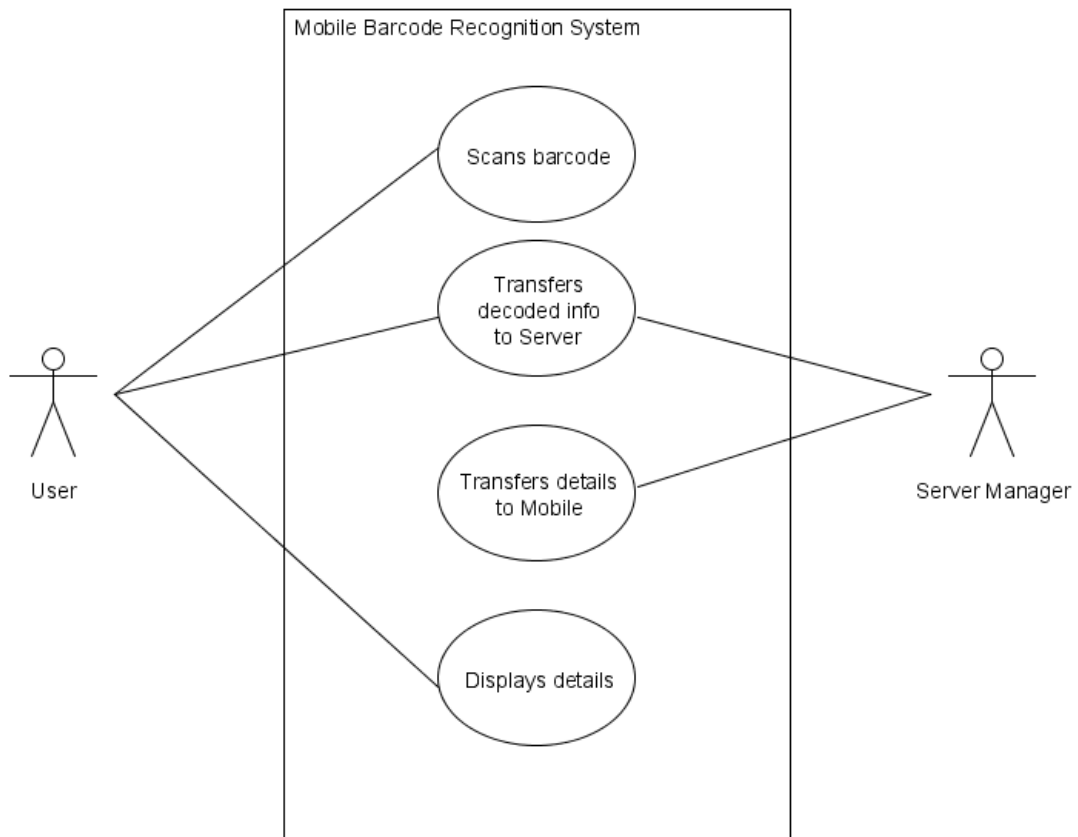


Figure 2: use case diagram

## 4. Use Cases

### 4.1 Use Case 1

**Use Case:** Scans barcode

**Actors:** User

**Description:** User runs the Mobile Barcode Recognition program on the Android mobile, scans the barcode area of student ID card. The program takes charge of the scanned images, analysis and decodes the image of barcode. And when worked out, it displays the result onto the screen. User gets the result of decoded barcode info and stops scanning.

**Alternative:** While the barcode cannot be recognized, User needs to rescan it with moving the webcam a little bit for revise deflections.

### 4.2 Use Case 2

**Use Case:** Transfers decoded info to Server

**Actors:** User, Server manager

**Description:** User presses transfer button to transfer decoded barcode info to the Server via wireless network. User is asked for login name and password to log in. User inputs his valid login name and password and logs in to the Server. After a success login, System transfers to barcode info to Server.

**Alternative:** While an invalid login name and password has been input, User has up to 3 times to retry it.

### 4.3 Use Case 3

**Use Case:** Transfers details to Mobile

**Actor:** Server manager

**Description:** Server manager looks up Database for corresponding details of the decoded barcode info of the student card holder. When working out the corresponding details, Server manager transfers it to Mobile Barcode Recognition System on the request mobile.

### 4.4 Use Case 4

**Use Case:** Displays details

**Actor:** User

**Description:** System gets the details, and displays it onto the screen.

## 5. Detailed Use Cases

### 5.1 Detailed Use Case 1

**Use Case:** Scans barcode

**Actors:** User

**Description:** (see use case 1)

**Main Success Scenario:**

1. User runs Mobile Barcode Recognition System and scans barcode area.
2. System analysis the image and work out it
3. System displays the result onto the screen.

**Alternatives:**

- 1.1 If the barcode image cannot be recognized by System, User needs to re-scan the barcode area.

### 5.2 Detailed Use Case 2

**Use Case:** Transfers decoded info to Server

**Actors:** User, Server manager

**Description:** (see use case 2)

**Main Success Scenario:**

1. User presses transfer button (on the screen)
2. System connects to Server
3. Server send a request for valid login name and password to System
4. System shows the request from Server on the screen
5. User inputs login name and password
6. System transfers the decoded barcode info to Server

**Alternatives:**

- 5.1 If an invalid login name or password has been input, User has up to 3 times to retry it or the Server will ban this transferring.

## 5.3 Detailed Use Case 3

**Use Case:** Transfers details to Mobile

**Actor:** Server manager

**Description:** (see use case 3)

**Main Success Scenario:**

1. Server works out the corresponding details of the barcode image info
2. Server manager transfers the details to Mobile Barcode Recognition System

## 5.4 Detailed Use Case 4

**Use Case:** Displays details

**Actor:** User

**Description:** (see use case 4)

**Main Success Scenario:**

1. System gets the details from Server
2. System displays the details onto the screen

## Reference

1. "ADVANCED ENTRY APPLICATION FORM", *Institute of Technology Carlow*, 2009,  
Web:<http://web.itcarlow.ie/downloads/ONLINE%20ADVANCED%20ENTRY%20APPLICATION%20FORM%20230409.pdf>