2018

E - SPOTTER

TEAM 9

ADVANCED SOFTWARE ENGINEERING

5/7/2018

SPRING 2018

CS5551: ADVANCED SOFTWARE ENGINEERING

Department of Computer Science Electrical Engineering

University of Missouri-Kansas City

AUGMENTED REALITY IN EDUCATION

E –SPOTTER

PROJECT ID: 9

PROFESSOR NAME: DR.YUGUNG LEE

NAMES	CLASS ID
ATLURI VENKATA AKHILA KRISHNA	01
VENKATESH PONDURI	29
SUSHMANTH MAKKENNA	18
KIRAN RAO BOINAPALLY	03

PROJECT INFORMATION

VIDEO URL: https://youtu.be/Xqz9rQSQpFU
GITHUB URL: https://github.com/team-9-avid/TEAM_AVID
ZENHUB URL: https://github.com/team-9-avid/TEAM_AVID#reports?report=burndown&milestoneId=3085529

INDEX

INTRODUCTION

The basic idea of augmented reality is representing virtual objects on a real world image thus "augmenting" the real world image, which we currently see. AR technology could be very useful in various domains like medicine, automobile, plane industry and space Research, Education. The aim of our project is to implement such system in educational processes.

OBJECTIVE OF OUR PROJECT

The main aim of our project is to give accurate information about the books who are passionate in reading them just by scanning ISBN (International standard book number) which is present on every single book and to furnish the details like ISBN number, Author, title, rating and rating count of the book. We present these details in Augmented reality form by scanning cover page of the book.

DESIGN SPECIFICATIONS

The project focuses on the outcome such as author, name of the book, rating and rating count of the book, which is scanned by the user. Initially the book is kept in front the camera and the book is scanned by it. During the process of scanning, the alphabets on the book and ISBN code converted from image to text format using vuforia and Android OCR (Optional Character Recognition) libraries. The text information is fed to Google APIs and information is received from the API which consists of ISBN, author and also costumer reviews of the book. Thus, the details are displayed displayed in the form of augmented reality form.

SIGNIFICANCE

By using this application we can save a lot of time for searching a book and it is flexible to know the brief description of the book. Sometimes we don't have any idea about the details of the book, then we can use this application very flexibly. The main significance is its very reliable and time saving. Some people spend too much time to know the details of the book by surfing various websites, so to avoid that we can go with this application.

PROJECT WORK FLOW

PROJECT PROPOSAL

Our project proposal is to build an application using augmented reality in education. By using augmented reality we have to get some details of book in AR form just by scanning the cover page of book. For this we planned to build two application in which one application provides book data by scanning the barcode of the book and in second application to show those details in AR form.

INCREMENT 1

During the first increment, we have done wireframes, sequence diagrams and architectural diagram. Platform and environment setup was successfully done. The architectural diagram representing the flow of process in our project is being drawn.

Project Management:

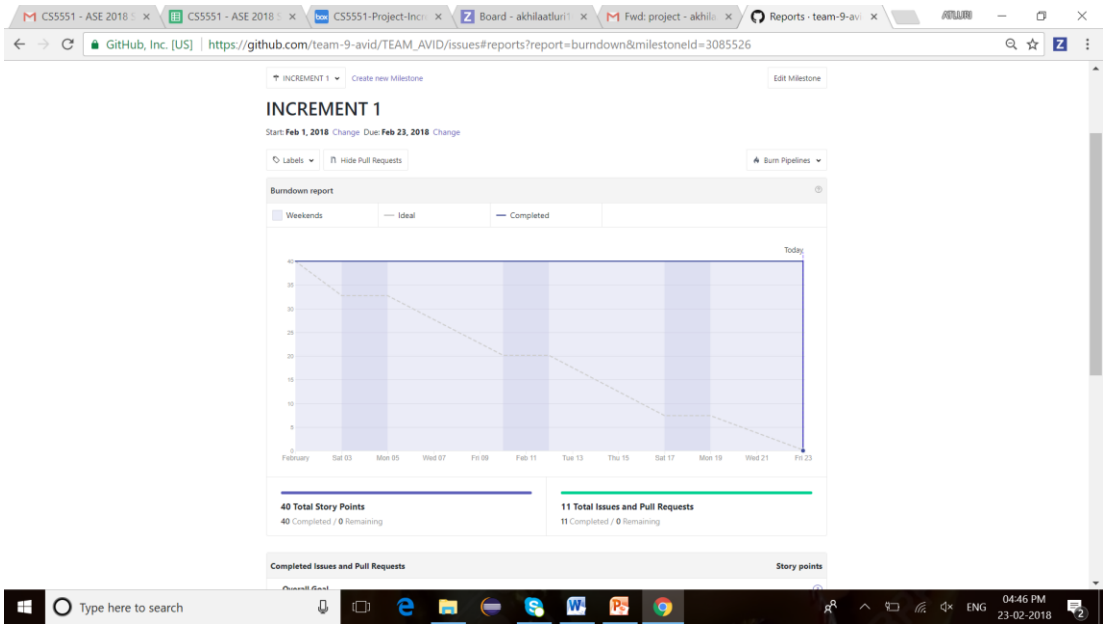
Here we are describing our project management in terms of first increment.

Implementation status report:

Description:

We have done with Architectural part and created wireframes. Platform and environment setup was successfully done. In the platform and environmental setup we are using AndroidStudio, Vuforia environment and Amazon AWS account setup for book details are being used. In the architectural part, we have drawn the architectural diagram representing the flow of process in our project that is scanning the ISBN number with front end camera, later the information is sent to API's and the data is parsed from OCR library API.

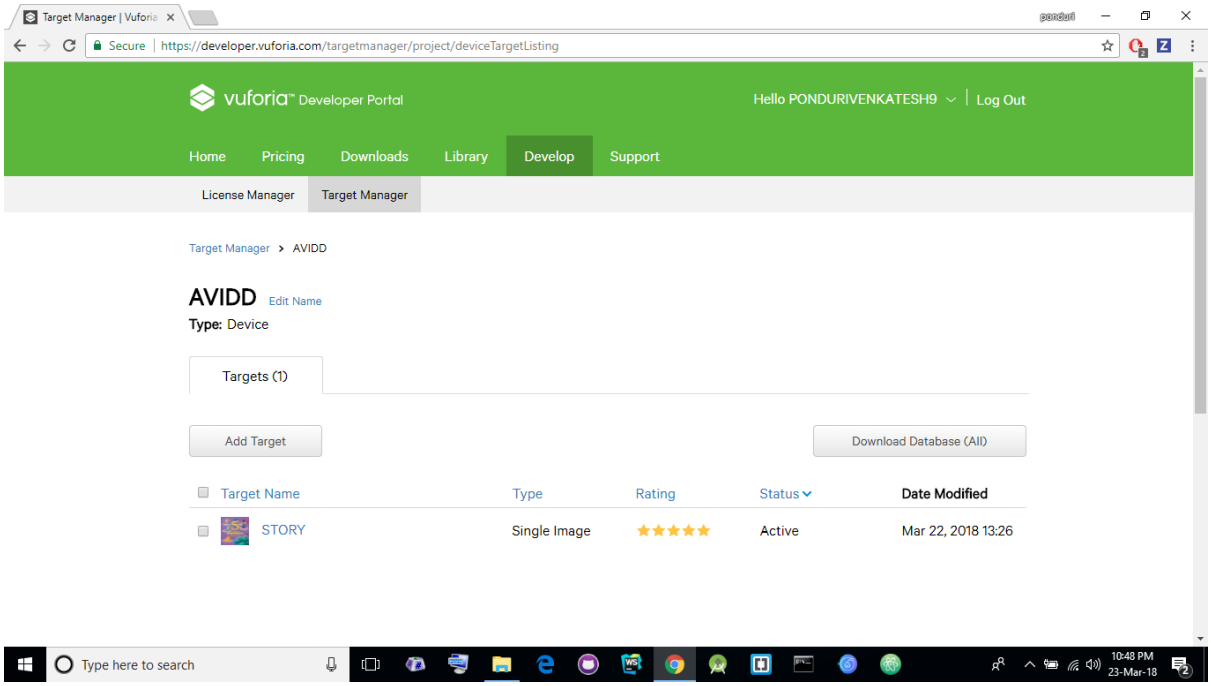
Increment 1 Burndown Report:



INCREMENT 2

Frontend camera android layout, a vuforia library setup, Google API setup were being done. Vuforia license key is generated. The following screenshot shows that the image target data base is created in the Vuforia.

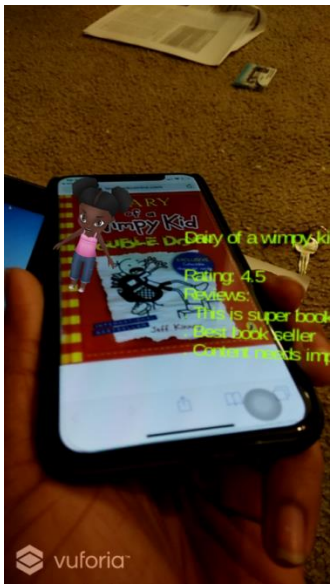
The following picture shows the creation of image database in vuforia developer portal. This data base is imported to unity platform where we have developed this project application.



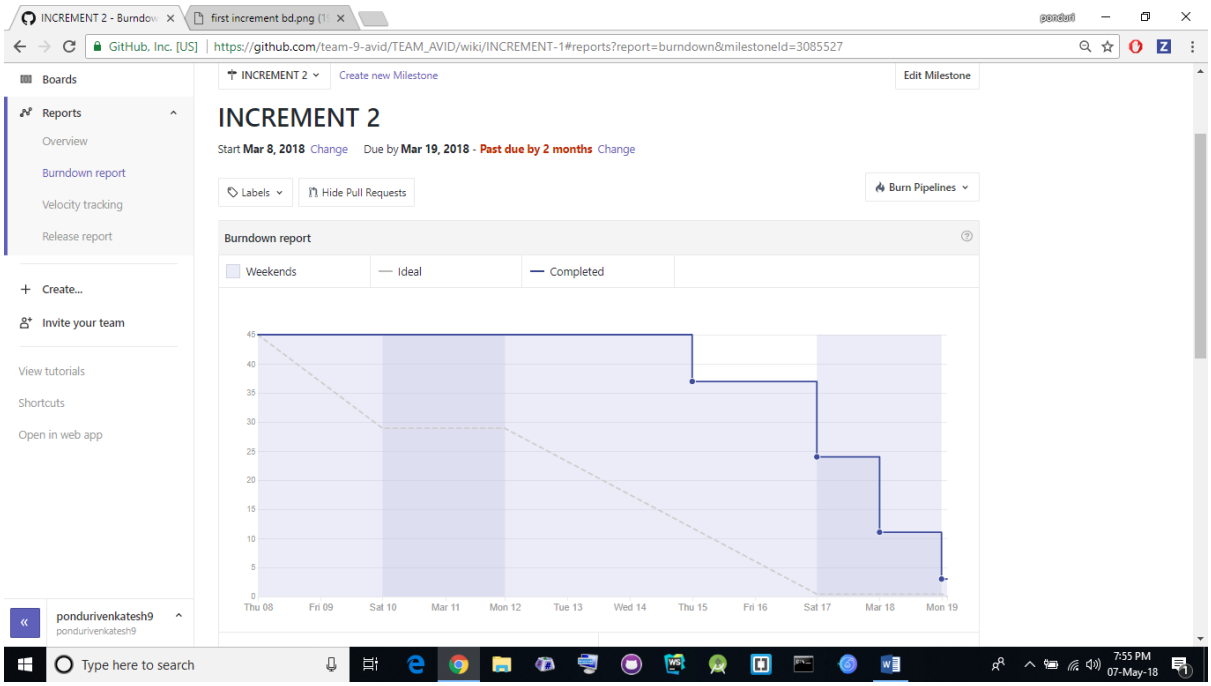
Use case: As a user, I should be able to sign In / sign Up in to the smart education app successfully so that I can search for any book and its basic information.

OUTPUTS

Augmented reality view



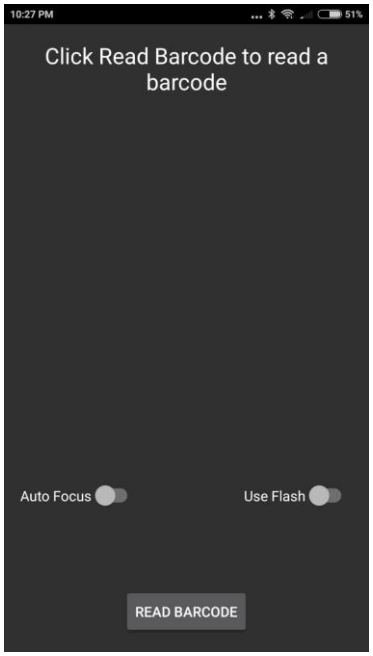
Increment 2 Burndown Report:



INCREMENT 3

We have developed an app to scan barcode with camera. When we open app we have some options like auto focus, flash light and scan barcode. When we switch on the auto focus the camera focus on the barcode and reads it. When flash light is switched on we get flash light while scanning the barcode. With setting these options we click on read barcode button to scan bar code. While scanning the barcode it will show the barcode number. When the camera detects the barcode and display the ISBN number just click on the screen then the details of the barcode are sent to server to get the details of the book. On clicking the screen we are directed to the page where the book details are displayed.

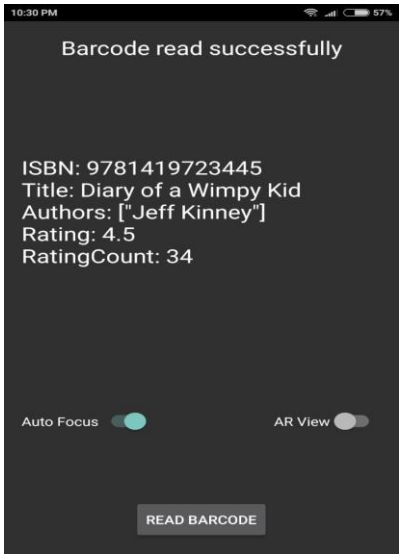
The screenshot shown below is the home page of our application where some random buttons are designed. By switching the auto focus the application automatically detects the barcode and displays the ISBN in a rectangular box. By switching the AR button we are directed to another application where these details are shown in AR view by scanning the cover page of the same book.



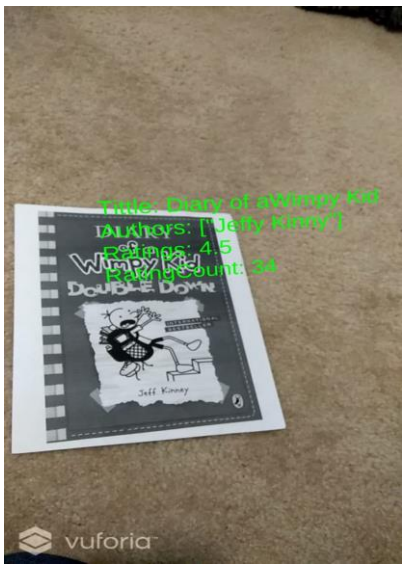
First, to know the details of book we scan the barcode of book where the google vision library setup detect the barcode and automatically a http request is sent to google API. From Google API The basic details and rating of the book are displayed in the application.

The following screenshot describes the detection of barcode in the form of ISBN number. When the screen displays the ISBN number by just clicking on the screen a http request will be sent to Google to retrieve the details of the book.

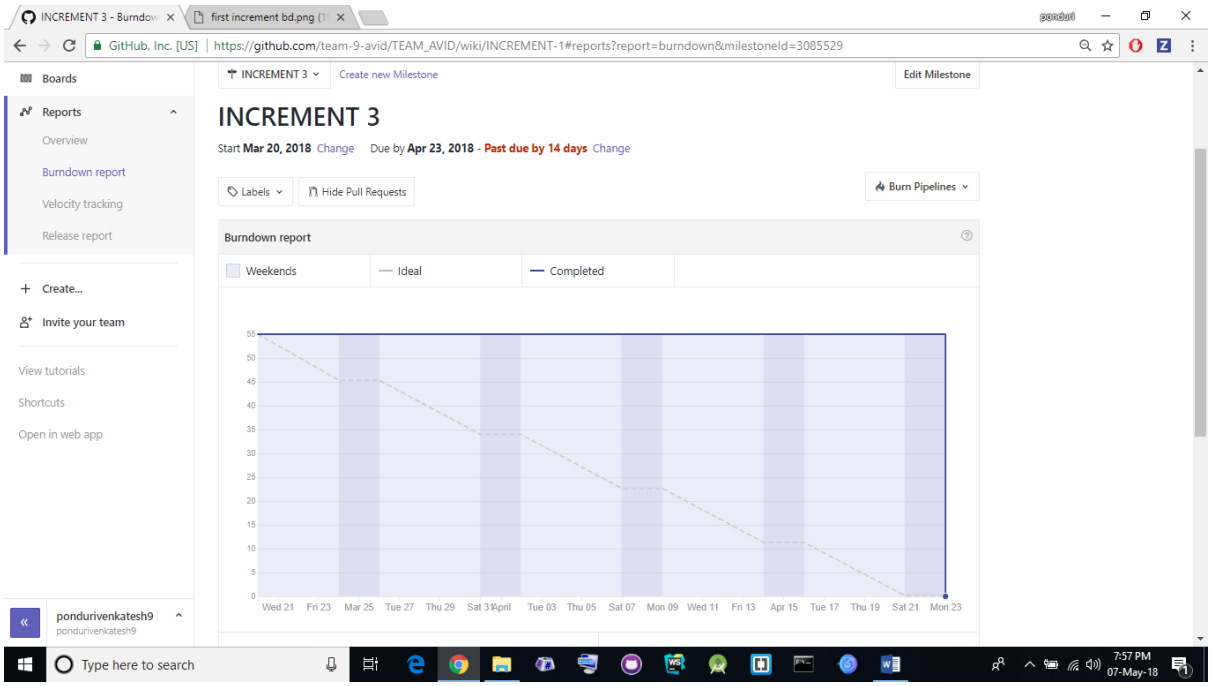
Finally, after clicking on the screen we are directed to home page but this time with some information. The information of book is displayed as shown below. This picture is sample output of a book whose ISBN number is 9781419723445 with name Diary of a Wimpy Kid. The author for this book is Jeff Kinney and rating given for this book is 4.5 with rating count of 34.



Now by switching the application we are directed to another application where we get same details in AR form. To get AR view the user should scan the cover page instead of barcode. Here AR camera detects the cover page and check in the database. When the same image is present in the database then this application displays the details or animations allotted to it in the Augmented Reality form.



Increment 3 Burndown Report:



TECHNOLOGY USED

While coming to technologies and platforms used in this project, we have used vuforia to create the project licence key and to create the images database. From Vuforia developers portal we created the database and download it.

Android studio is used to build application in which we get the book details by scanning the barcode. Using Android, we build our first application and we have used android partially in our second application Which will be explained under unity section.

Google cloud platform is used to detect the barcodes of any type. Google API is used to get the details of the book by scanning the barcode. We have set up Google vision library to detect the barcodes of book accurately.

Unity Platform is used to build Augmented Reality applications. Using this platform we have build our second phase application where we will be showing the book details in AR view. We have added some animations to limited books by using this unity platform. Here we import the images database and some animation on to the target images.

IMPLEMENTATION

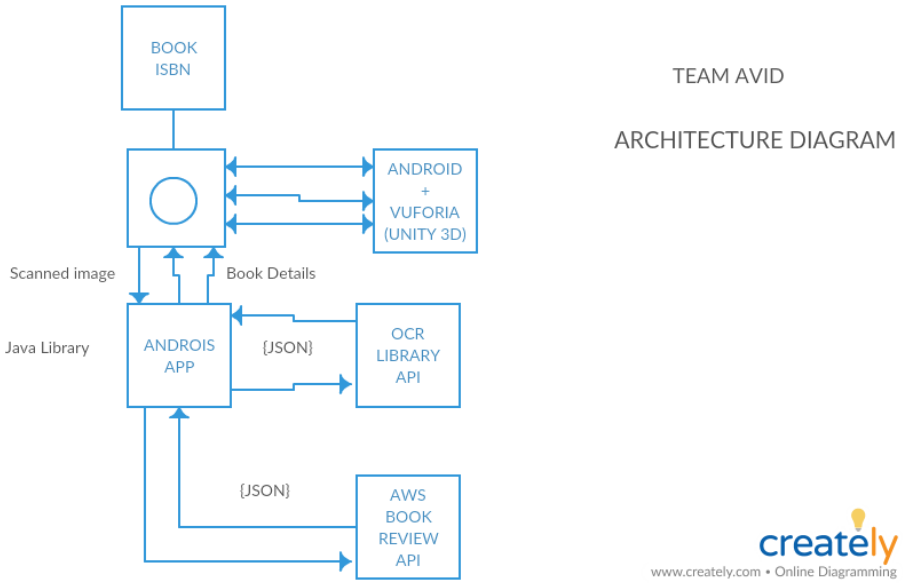
Implementation involves the a flow of few steps. Front screen to scan the image and it is advisable to scan with ISBN code which consists of some numbers and alphabets. Java code is developed for backend and is used for parsing the request, sending details to OCR API and the output will be the text present in the image. The book details are called from Google API using simple Java language.

SERVICES USED/API'S USED

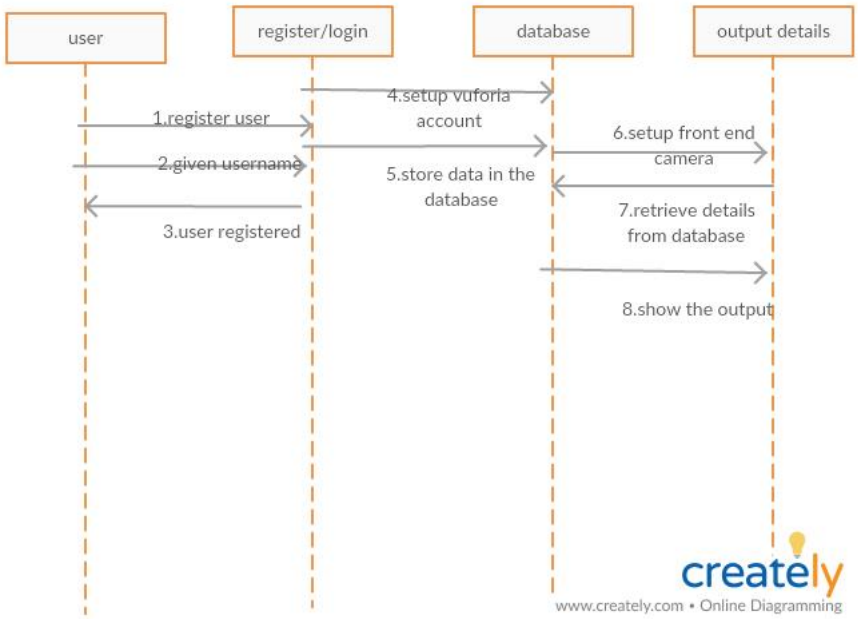
Google API and OCR library API are API's we have used in our project to get details of book and to send request to Google. Java and MYSQL are used to write code. Android studio is used to build application by writing Java code. JSON is used to parse the data. As mentioned above Unity is used to build application in AR prospective.

PICTORIAL REPRESENTATIONS

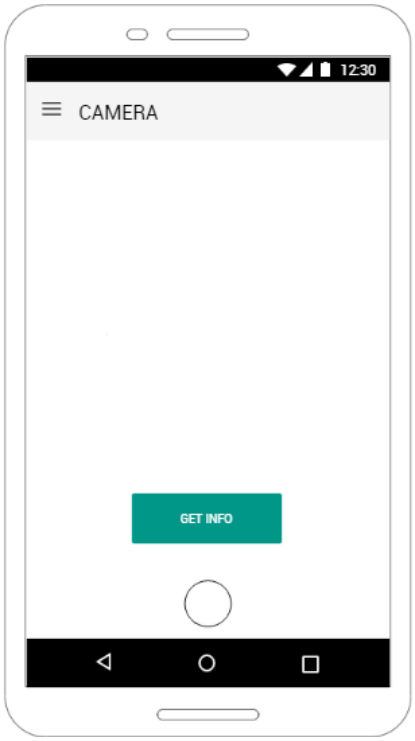
ARCHITECTURAL DIAGRAM

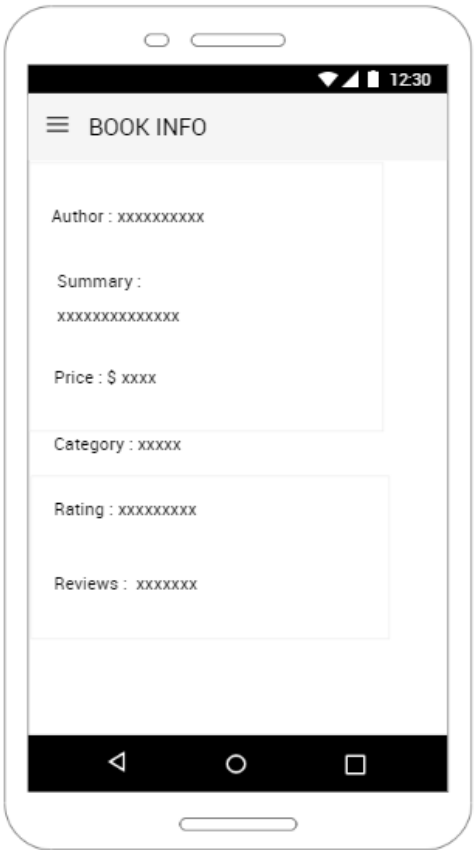


SEQUENCE DIAGRAM

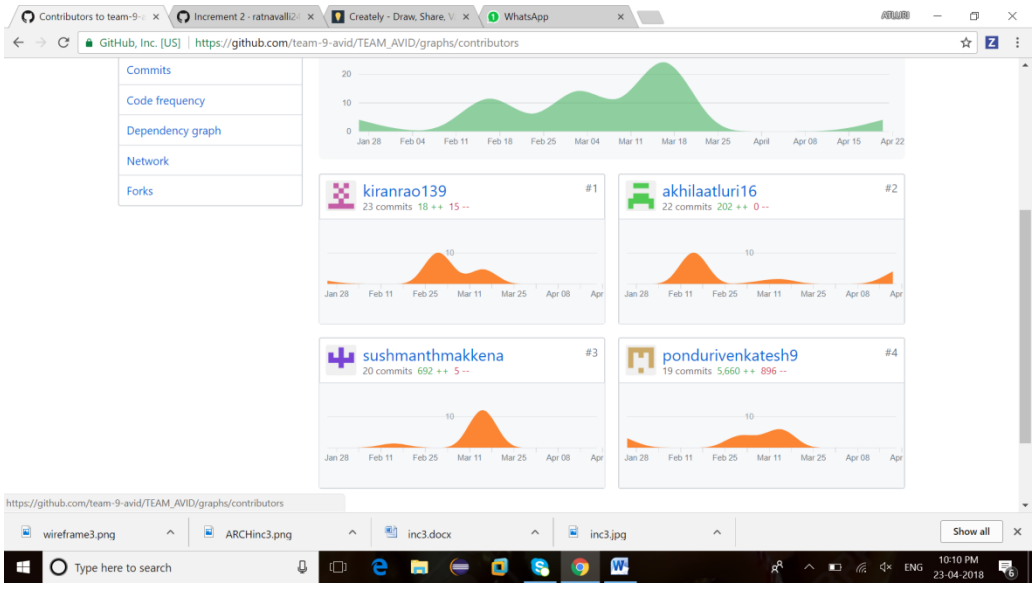


WIREFRAMES

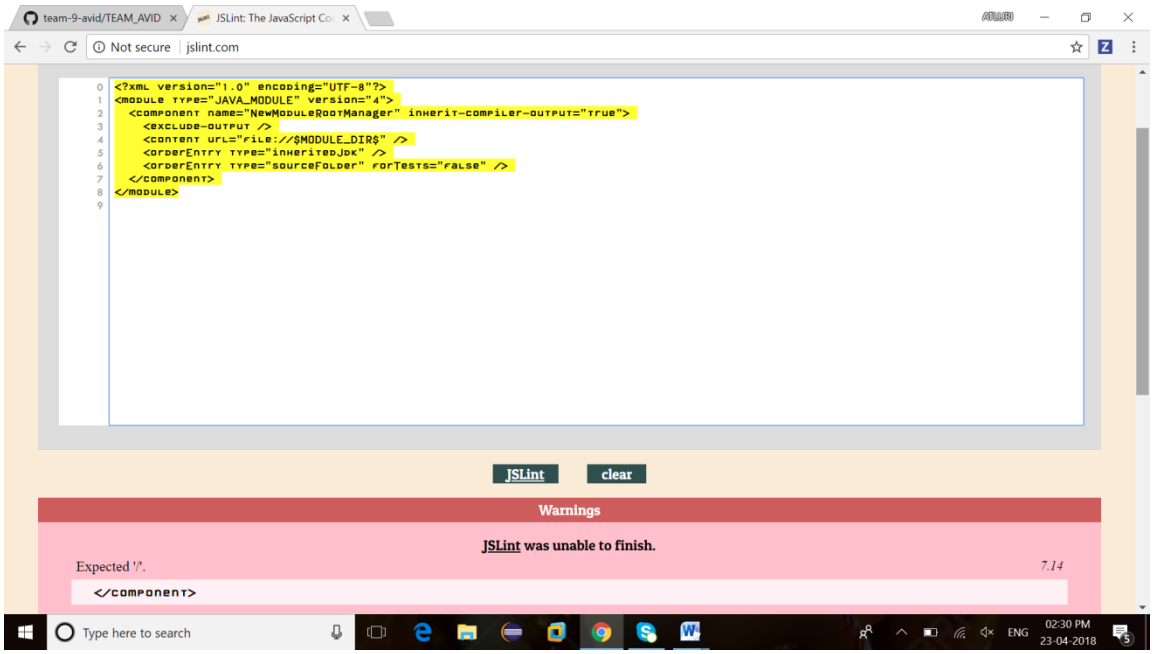


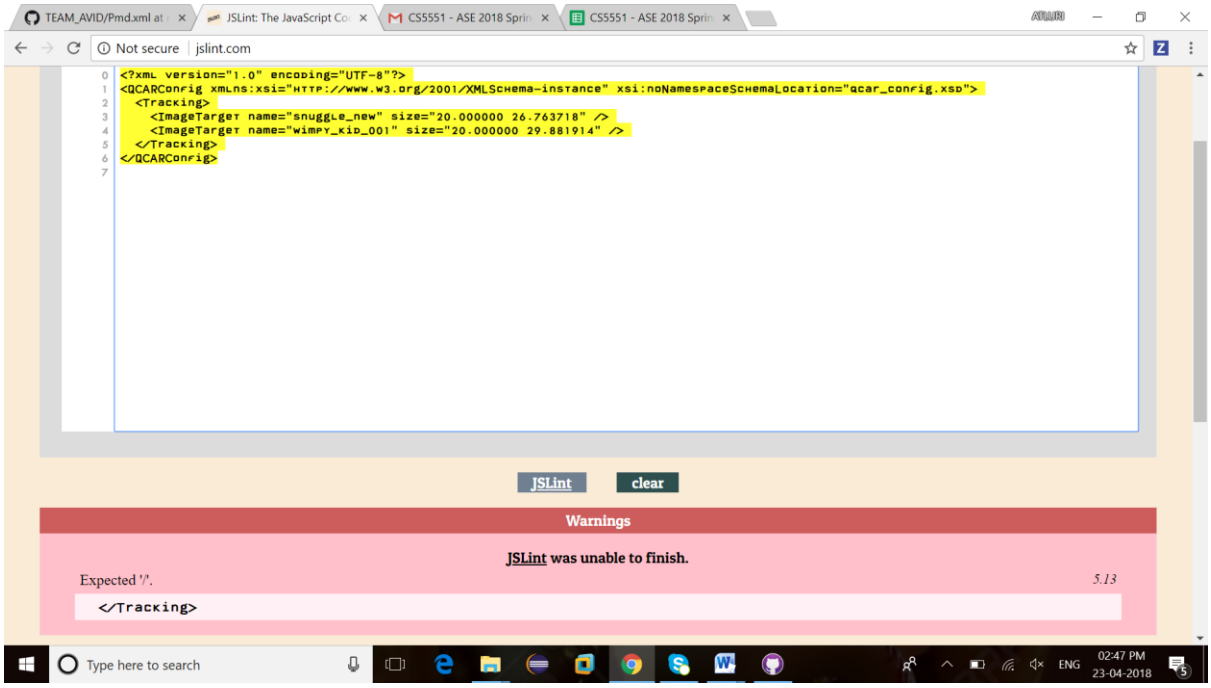


CONTRIBUTION CHART



TEST CASES


team-9-avid/TEAM_AVID
JSLint: The JavaScript Co
Not secure
jslint.com
<?xml version="1.0" encoding="UTF-8"?>
<module type="JAVA_MODULE" version="4">
<component name="NewModuleRootManager" inherit-compiler-output="true">
<exclude-output />
<content url="file://$MODULE_DIR$" />
<orderEntry type="inheritedJdk" />
<orderEntry type="sourceFolder" forTests="false" />
</component>
</module>
JSLint
clear
Warnings
JSLint was unable to finish.
Expected '/'.
7.14
</component>
Type here to search
ENG
02:30 PM
23-04-2018

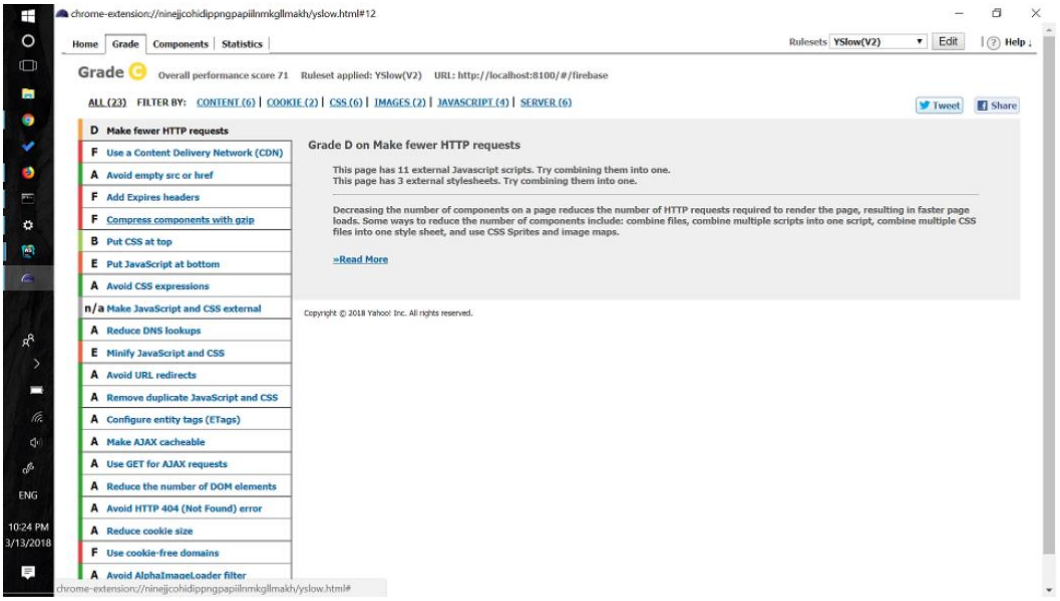

TEAM_AVID/Pmd.xml at
JSLint: The JavaScript Co
CS5551 - ASE 2018 Sprin
CS5551 - ASE 2018 Sprin
Not secure
jslint.com
<?xml version="1.0" encoding="UTF-8"?>
<QCARConfig xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="qcar_config.xsd">
<Tracking>
<ImageTarget name="snuggle_new" size="20.000000 26.763718" />
<ImageTarget name="wimpy_kib_001" size="20.000000 29.881914" />
</Tracking>
</QCARConfig>
JSLint
clear
Warnings
JSLint was unable to finish.
Expected '/'.
5.13
</Tracking>
Type here to search
ENG
02:47 PM
23-04-2018

PERFORMANCE TESTING

1. Installed the YSlow extension for chrome browser and started the application.

2. We can see the results, grades and statistics of the application from the Yslow.

Graded C in Login Page:



IMPLEMENTATION STATUS REPORT

WORK COMPLETED:

1.done with the vuforia library setup

2.Done with frontend camera setup

3.Getting the responses dynamically

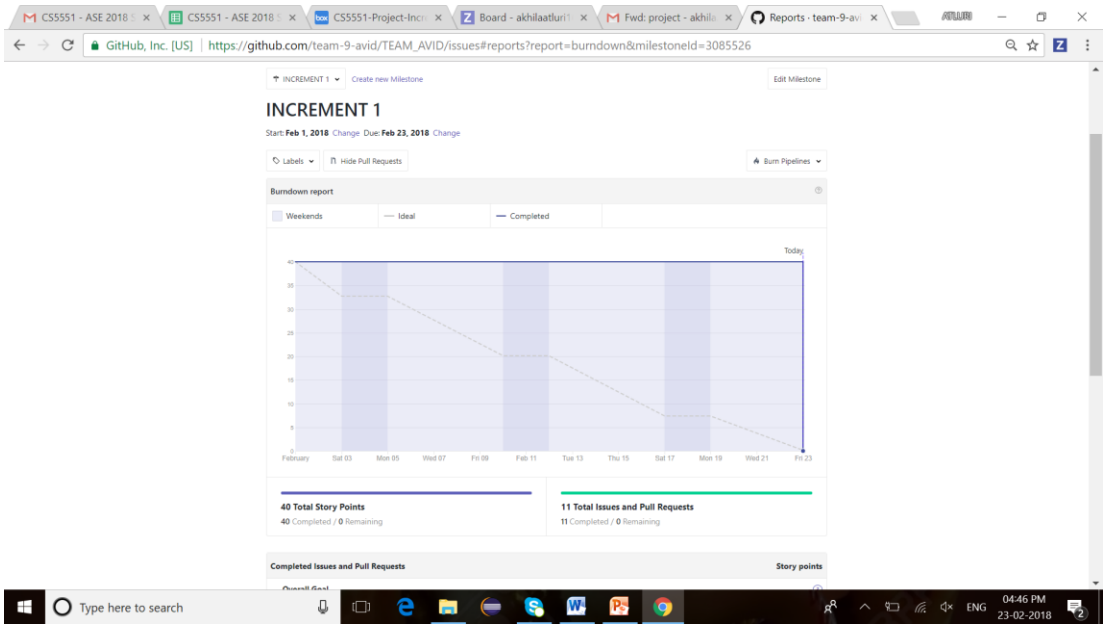
4.Augmented reality part is done

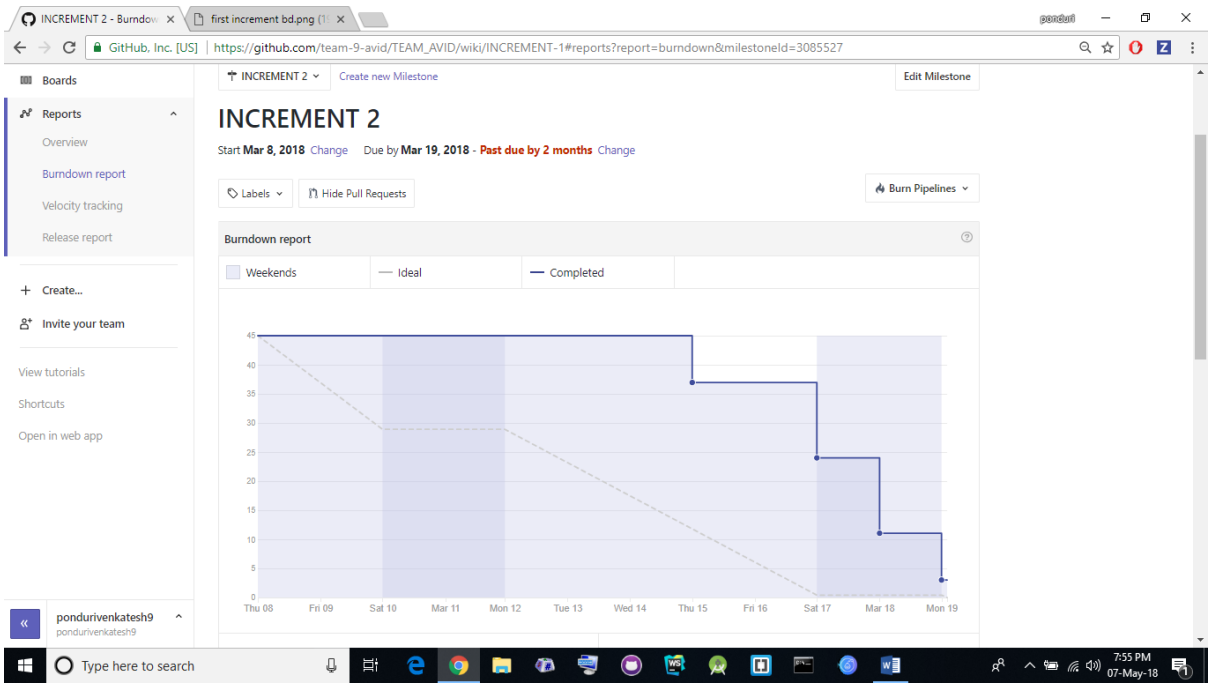
HOURS SPENT : 300 Hrs

Contributions made by each person:

SNO	NAME	CLASSID	TASK
1	Akhila Atluri	1	Coding related to get responses dynamically
2	Venkatesh Ponduri	28	Augmented reality part
3	Sushmanth Makkenna	18	Frontend camera setup
4	Kiran boinapally	3	Vuforia library setup

BURNDOWN CHART




INCREMENT 2 - Burndow
first increment bd.png (1
GitHub, Inc. [US] | https://github.com/team-9-avid/TEAM_AVID/wiki/INCREMENT-1#reports?report=burndown&milestoneId=3085527
Boards
Reports
Overview
Burndown report
Velocity tracking
Release report
Create...
Invite your team
View tutorials
Shortcuts
Open in web app
pondurivenkatesh9
INCREMENT 2
Create new Milestone
Edit Milestone
INCREMENT 2
Start Mar 8, 2018 Change Due by Mar 19, 2018 - Past due by 2 months Change
Labels
Hide Pull Requests
Burn Pipelines
Burndown report
Weekends
Ideal
Completed
45
40
35
30
25
20
15
10
5
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Thu 08
Fri 09
Sat 10
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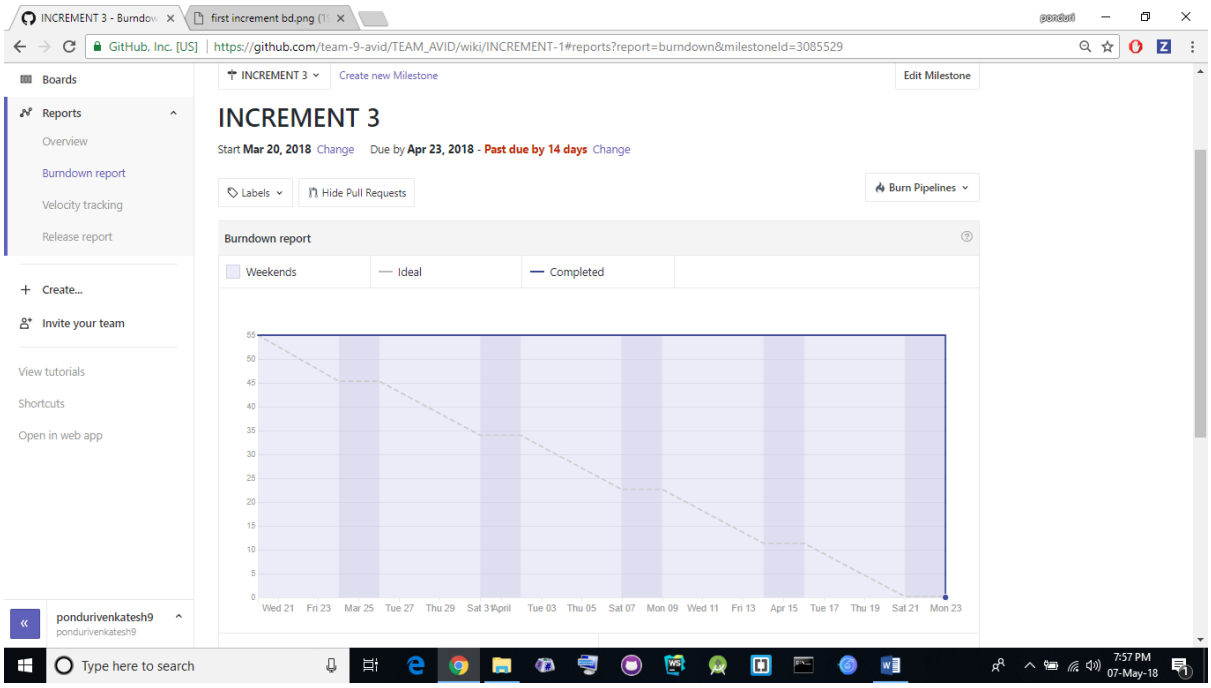
Mon 12
Tue 13
Wed 14
Thu 15
Fri 16
Sat 17
Mar 18
Mon 19
Type here to search
7:55 PM
07-May-18


INCREMENT 3 - Burndow
first increment bd.png (1
GitHub, Inc. [US] | https://github.com/team-9-avid/TEAM_AVID/wiki/INCREMENT-1#reports?report=burndown&milestoneId=3085529
Boards
Reports
Overview
Burndown report
Velocity tracking
Release report
Create...
Invite your team
View tutorials
Shortcuts
Open in web app
pondurivenkatesh9
INCREMENT 3
Create new Milestone
Edit Milestone
INCREMENT 3
Start Mar 20, 2018 Change Due by Apr 23, 2018 - Past due by 14 days Change
Labels
Hide Pull Requests
Burn Pipelines
Burndown report
Weekends
Ideal
Completed
55
50
45
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35
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25
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15
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5
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Wed 21
Fri 23
Mar 25
Tue 27
Thu 29
Sat 31
April
Tue 03
Thu 05
Sat 07
Mon 09
Wed 11
Fri 13
Apr 15
Tue 17
Thu 19
Sat 21
Mon 23
Type here to search
7:57 PM
07-May-18

RESPONSIBILITIES

Akhila Atluri: Android layout design and code contribution

Venkatesh Ponduri: backend setup

Kiran Rao Boinapally: camera setup and code contribution

Sushmanth Makkena : Front end camera setup and wireframes for new app.

ISSUES AND CONCERNS

1. Accuracy of image detection when scanning the book.

2. OCR image conversion accuracy might be bad at times.

3. Delay in getting response from Amazon can be present at times.

CONTRIBUTION CHART

CLASSID	NAME	CONTRIBUTION PERCENTAGE
1	AKHILA ATLURI	25%
28	VENKATESH PONDURI	25%
18	SUSHMANTH MAKKENNA	25%
3	KIRAN RAO BOINAPALLY	25%

FUTURE WORK

We can integrate features like getting comments for the book and recommendation to the book or similar books related to scanned book. Some good animations can be implemented on cover page in AR view in such a way that the animation itself describes the complete data of the book.

PROJECT DEPLOYMENT

USER MANNUAL

INTRODUCTION

This is to provide some information to user which helps him/her how to use the application. For using this project application the user have to follow the below steps.

APPLICATION INSTALLATION

To have full benefits of using this project the user have to install two applications. The links for downloading the applications are mentioned below.

SCAN application: (Multi Tracker)

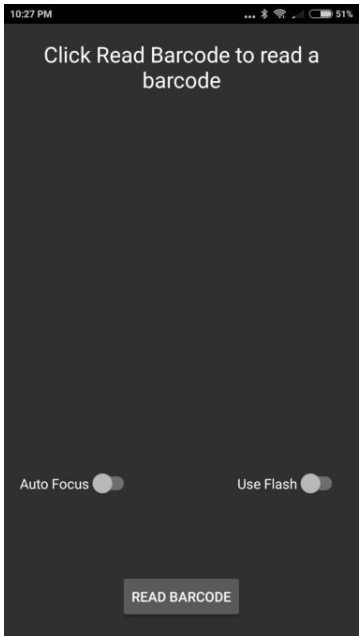
http://www.mediafire.com/file/xvq4qq006yddle0/MultiTrackerApp.apk

AR Application: (Book Review)

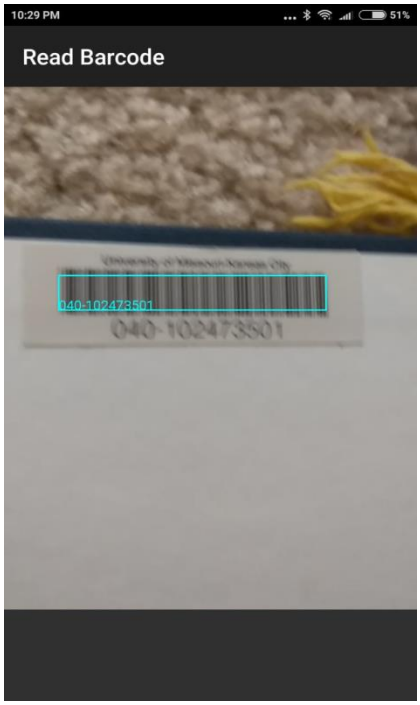
http://www.mediafire.com/file/kw5fhmc58ffmjqu/BookReview (1).apk

STEPS TO FOLLOW

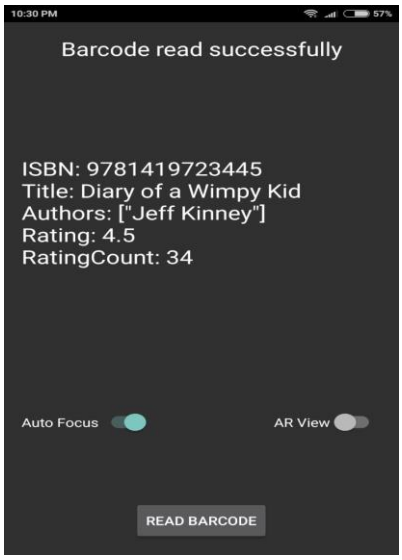
- After successfully installing the applications the user have to open Multi Tracker application first. By opening the app the user is directed to home page where there are three buttons as shown below.



- Now by switching the Auto Focus button and by clicking on the READ BARCODE button the user is directed to camera page where he/her has to scan barcode of a book (Prefer published books those have barcode). Scanning barcode is nothing but placing camera on barcode and allow the camera to detect the barcode. When the camera detects the barcode just click on the screen to get the basic details of book. Detecting the barcode will appear as shown below.

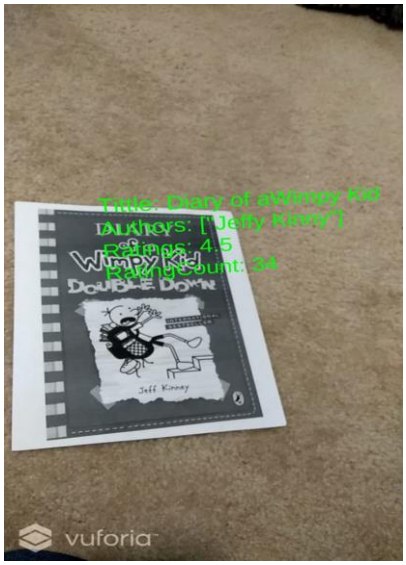


- By clicking on screen (shown above) the user is directed to a page where the user get the data of book like ISBN number, Author, Title of the book, Ratings and Rating count as shown below.



- Now by clicking on the AR view the user gets switched to another application that is our Book Review application where the user directly gets AR camera. Here the user have to scan the cover page of a book to get the details of the book in AR form. This AR view of details are restricted to some books. In future work we are going to implement AR view for any random book. As of now for AR view the user have to scan the provided books cover page. Cover pages to scan are provided in the below link.

  Cover pages to Scan: http://www.mediafire.com/?06fb0v1gvv4rb



BIBILIOGRAPHY

https://www.youtube.com/watch?v=xABltd3_Zio

https://developer.android.com/reference/packages.html

https://docs.aws.amazon.com/AWSECommerceService/latest/DG/EX_LookupbyISBN.html

https://library.vuforia.com/api

ACKNOWLEDGEMENT

The work has been completed under the guidance of Dr. Yugi Lee and TAs (Rohith Nagulapati, Sidrah Junaid, Nageswara Nandigam) in CS5551 Advanced Software Engineering, University of Missouri -Kansas City), Spring 2018.