



Institute of
Business Administration
Karachi

Leadership and Ideas for Tomorrow

Final Year Project Report

Team E-Sketch



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Institute of Business Administration

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FINAL YEAR PROJECT

E-Sketch

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Introduction:

The project is an Android based mobile application that aims to speed up the process of mobile application development.

Traditionally, first step in designing GUI is to use a paper and pencil to draw rough sketches. These sketches are then converted into working prototypes or mock-ups. This process of converting sketches into prototypes is time consuming as the available tools are too advanced to understand easily and are usually not free. Even if the user is a frequent user, he still needs to design things from scratch. Also, these advanced prototyping tools are mainly available for PC use.

Our mobile application directly converts hand-drawn sketches into real GUI, and presents a working prototype. The user just need to take a snap of the sketch and the sketch will be converted to real GUI elements in just few clicks. It will also help to play around with link different GUI elemnts It will enable stakeholders to experience and test the basic functions of their mobile application before the actual development.

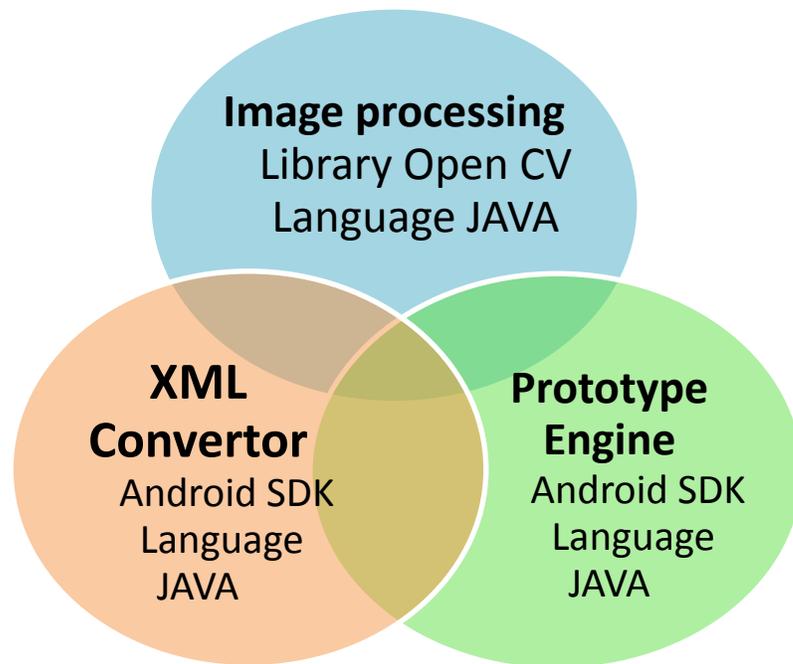
The application will be very user friendly and easy to learn and use. It will provide a quick solution for designing interactive mock-ups for Mobile applications. Also, the application will eliminate the redundancy of remodelling

the paper sketch designs from scratch in some wire framing tool. Instead, it would use the already drawn paper sketches and make them functional.

The application will assist the GUI designing and development process of mobile application. The application will generate an xml file consisting of GUI components drawn on sketch. This xml file can be easily imported in development environment (e.g. Eclipse, NetBeans etc). Once imported, the developer will get the GUI in programming environment and then can do further programming on it. Thus, the developer will not have to drag and drop the components again.

High Level Design:

E-Sketch is useful mobile app, which will convert your hand drawn wireframes to formal GUI. This idea has been proposed collectively by group after going through a thorough research. While doing the research we came to know several other applications having similar features but most of them were desktop applications. Hence E-Sketch was a pioneer as a smart android application, some technical specifications for development process has also been finalized as shown below:



E-Sketch has been basically divided into three basic parts as per its functioning such that image processing, GUI processing and format conversion into xml. These parts are linked to each other and they have overlapping functions such that:

- File reading
- File creating
- Writing in to the file

So these common features hold these three unique parts strongly and incorporate it into a single android application. Some brief techniques used for development are briefly discussed below:

➤ **Image processing techniques:**

We explored different Image processing techniques for edge detection and Shape analysis. Few techniques and algorithms used are:

- Hough transform
- Contour detection

- Region based Segmentation
- Morphological tool (labeling)
- Line approximation

➤ *GUI processing techniques:*

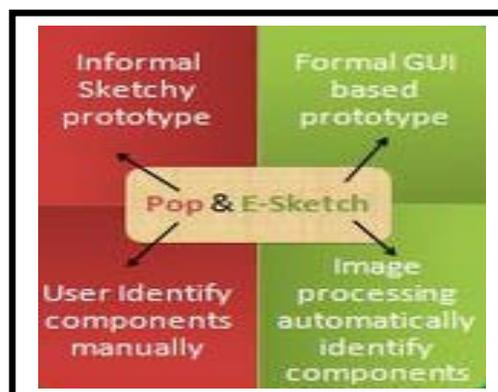
OpenCV is being configured to work with android on eclipse. More over some mobile specifications are also required such that at least Android 3.0 Honeycomb (API level 11). However, Phones with later versions like Android 4.3 Jelly Bean (API level 18) or ice-cream sandwich will be best .Some android libraries have been used to create GUI dynamically and techniques are applied to maintain the aspect ratio by scaling the image according to display size of mobile.

➤ *Format conversion (XML) techniques:*

Some android libraries and techniques have been utilized to create xml DOM document. Further this xml DOM document will process the incoming data and create xml code dynamically, which programmers can utilize for further development.

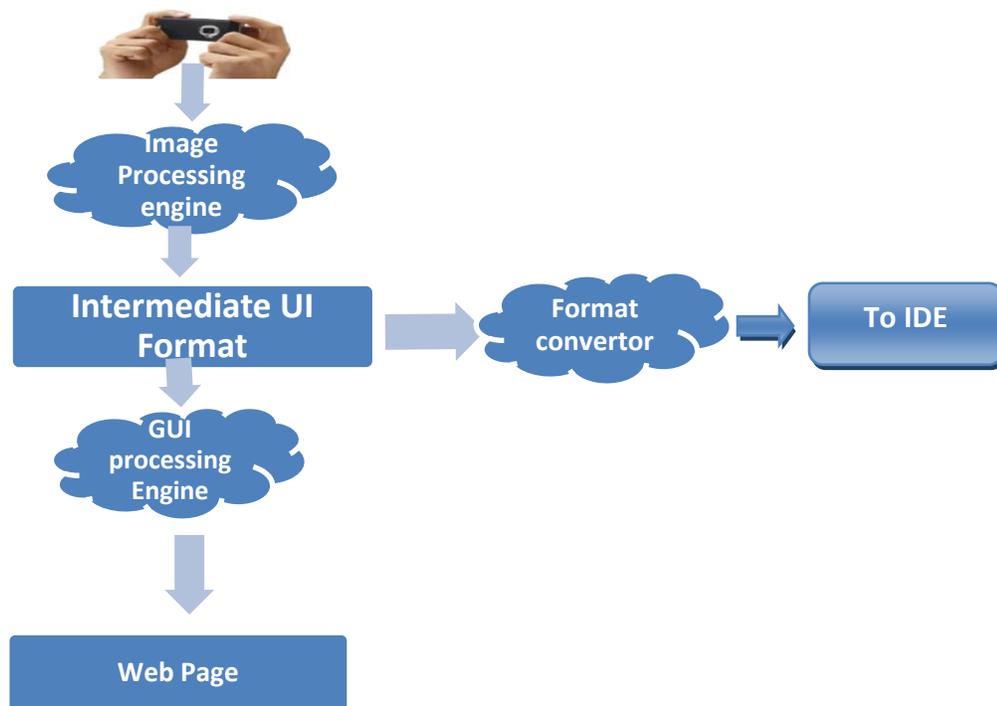
➤ *Relation with past projects:*

While going through a detailed research process we came across only single mobile prototyping “POP”. Somehow it has similar features as ours but it is not as smart as E-Sketch to see the difference have a look at comparison matrix give below:



Software / Hardware Design:

Ideas always start on paper, hence wireframe are drawn on paper .Our application will process these wireframes and create a formal GUI by image processing techniques and generate xml code dynamically .This application has been divided into three parts as per its functioning shown below in the flow chart:



➤ *Image processing engine:*

This engine utilizes image processing techniques and algorithms to filter the required data from images; consequently it generates a text file which is used in further for processing GUI and generating XML.

➤ *GUI processing engine:*

It reads the intermediate component, text file, and generates the GUI at run time by setting all components in a dynamic relative layout. More over each component width and height is scaled according to display screen size.

➤ *Format convertor (XML):*

The intermediate component is utilized here to filter the data required further XML file is generated on run time. The convertor will generate the xml file accurately and efficiently according to the data provided.

➤ *Errors and Limitations:*

As image processing is quite difficult to implement hence it has also created some limitation during the development and also for application. Initially we thought this application will work for all versions of android but at least Android 3.0 Honeycomb (API level 11) for our GUI processing part is required. However, Phones with later versions like Android 4.3 Jelly Bean (API level 18) or ice cream sandwich will be best

More over for sketching purpose user have to necessarily use white paper and have to draw appropriate sketches so that image processing could not be hindered.

Previously our GUI processing was not that efficient because it was unable to create the GUI properly according to given data. It always shows a discrepancy while generating the formal GUI but now as we have implemented some techniques which not only generate the GUI by scaling it according to display size of mobile and also maintains aspect ratio of image.

Results:

So far we have gone through several test and trial processes and it has been a successful application up till now. We are still working on its lay out to make it more user friendly and efficient .As we know the overall success not only lies in back end processing it also requires efficient user interaction.

➤ **Speed of execution:**

As in starting we have tested our project on embed emulators of eclipse there processing was quite slow. Later when we tested on real device processing has actually enhanced and speed of execution was quite fast. This app will process your GUI and XML code simultaneously with in few seconds. By latest additions it can also process multiple images simultaneously with in few minutes.

➤ **Usability:**

This app is designed considering the user requirements, it has user friendly lay out such that initially for choosing pictures it has a built in gallery form where user can easily choose pictures. More over its lay out is quite easy to learn because each button is labeled and placed appropriately .Further it has a unique feature like it creates xml code as per data provided which user can use further.

➤ **Accuracy:**

Accuracy is fundamental requirement for this app if it is not able to filter data from images accurately then consequently user cannot get accurate GUI and code. Thus very advance image processing and android techniques have been implemented to ensure accuracy.

Conclusions:

Over all this project has been successful as per our expectations .Our vision started off creating a mobile application which will create formal GUIs using rough

sketches ,more over xml part was initially optional because we thought image processing is difficult hence it will be time consuming. Later we were able to complete this part before so we were able to add the additional part to our project, format convertor image to xml .Up till now we have not only made it efficient in processing but also interactive for user while using. So far we can say that expected requirements of our vision have been achieved in such a short span of time. Still we can do more enhancements and make it can be more efficient by adding more features.

Appendix:

➤ *E-Sketch Screen shots and members*



Figure 1 Team members E-Sketch



Figure 1 E-Sketch First Screen

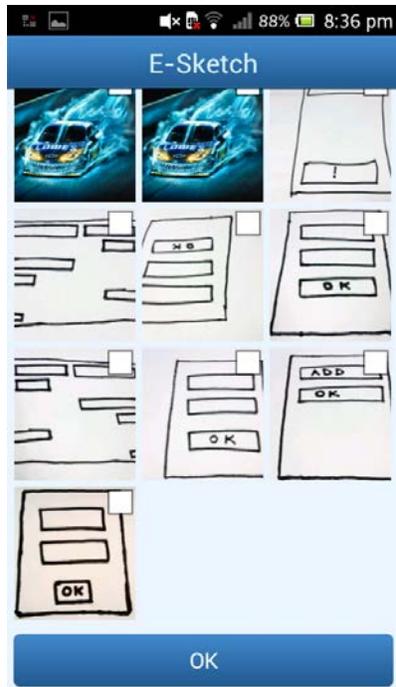


Figure 2 E-Sketch Picture Gallery

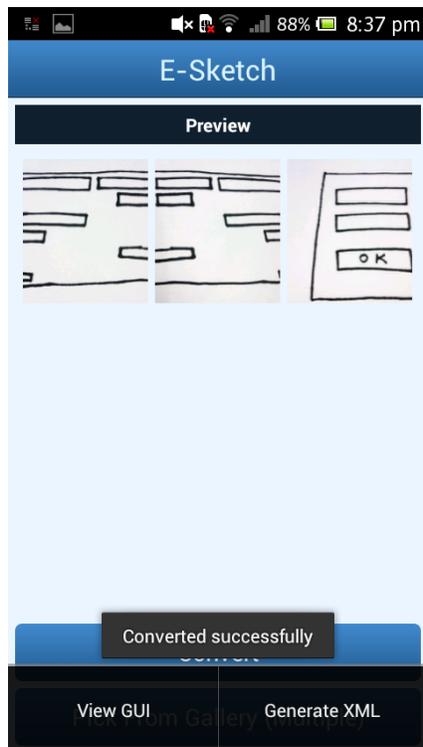


Figure 3 Third screen

➤ **Software/parts list**

1. Libraries:

- openCV,
- JAVA XML
- Android libraries

2. IDE:

- Eclipse

3. Programming Language:

- JAVA
- Xml

➤ **Schematic of your hardware**

Smart phone

OS:

- android 4.4.2 ,ice cream sandwich

➤ **Work distribution**

Sumaira Saeed

The duties included research and learning of image processing libraries. After learning, apply those techniques and algorithms using MATLAB to have an idea of work flow. The next step is to configure OpenCV4android in android development environment and start coding image processing engine on android platform using the techniques learned. After testing with basic MS Paint images, apply advanced filtrations to make it workable with real camera-captured images. Also help in integrating image processing engine with other engines.

Muniba Sikander

The duties included researching about how to create UI widgets in android at run time, how to work in android layouts and which one is the most dynamic, creating UI widgets

by reading intermediate format provided from the image processing engine and scaling their dimensions and coordinates to fit different screen sizes, creating link options to form interactive prototype and coding of preview button.

Samina Kanwal

The duties included designing of the format convertor (xml) for app, which needs a .txt coordinator file as an input and creates xml code as an output, working on documentation such that presentation preparation and report writing for different phases of progress. - Currently the duties are working on designing the front end, creating design feel and layout of app, also designing the logo for app which is part of layout design

➤ **Project timeline**

Monthly Calender

Oct	<ul style="list-style-type: none"> Research, Planning and Brainstorming Idea Finalizing, Discussions with supervisor Idea Refinement
Nov	<ul style="list-style-type: none"> Comparing and Contrasting with similar apps Creating the project comparison matrix. Finalizing app platform/tools/techniques/language/features Designing app flow Distribution of tasks between team members Downloading and Installing necessary soft wares and API's
Dec	<ul style="list-style-type: none"> Learning image processing libraries Initial Logic building of XML converter Exploring and learning different techniques to create XML converter Coding on android started for the prototyping engine. Exploring the canvas on android platform to make 2D GUI widgets. Image processing coding using Matlab on desktop
Jan	<ul style="list-style-type: none"> Configuring OpenCV4android and Android Development environment. Start coding of loading images on android platform using OpenCV library. Test the basic functions of image processing engine with sketches drawn in MsPaint Learning about layouts in android. Coding of creating layouts programmatically. Generating custom buttons using specific coordinates on run time.
Feb	<ul style="list-style-type: none"> Generating the intermediate format that will link all engines. Integrating prototyping engine with image processing engine Working with real photos of sketches and testing on emulator Applying image filtration techniques on Image processing engine and make it workable for camera-captured images. Creating multiple form widgets by reading coordinates from intermediate format Programmatically creating xml code into file Coding of file reading from SD card Coding of file writing on SD card
Mar	<ul style="list-style-type: none"> Completing converter. Browsing Pictures from SD card coding Working on layout adjustments in android Coding of scaling the GUI according to screen size.
Apr	<ul style="list-style-type: none"> Designing the app feel and look Integrating converter with other engines. 'Converter' button coding Making UI interactive Giving user options to interact with UI Adding 'label' in UI options. Handling multiple sketches.
May	<ul style="list-style-type: none"> Working on shared preferences so user can save his prototype 'Preview' button coding Adding 'picture' option in UI widgets. Finalizing app features.

References:

Supervisor: Abdul Wajid