



MR. MUHAMMAD USAMA BUTT  
01-235142-053

# Vehicle Customization using AR

**Bachelor of Science in Information Technology**

Supervisor: Dr. Sumaira kausar

Department of Computer Science  
Bahria University, Islamabad  
Pakistan

May 25, 2018

# Contents

<b>Abstract</b>	<b>iv</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Introduction . . . . .	1
1.2 Overview . . . . .	1
1.3 Problem Description . . . . .	2
1.4 Objective . . . . .	2
1.5 Project Scope . . . . .	3
<b>2 Literature Review</b>	<b>4</b>
2.1 Related Work . . . . .	4
2.1.1 Nissan Infiniti . . . . .	4
2.1.2 BMW Individual 7 Series AR . . . . .	5
2.1.3 TOYOTA Augmented Reality . . . . .	7
2.2 Conclusion . . . . .	8
<b>3 Requirement Specifications</b>	<b>9</b>
3.1 Existing System . . . . .	9
3.2 Proposed System . . . . .	9
3.3 Requirement Specification . . . . .	9
3.3.1 Functional Requirements . . . . .	10
3.3.2 Non-Functional Requirements . . . . .	10
3.4 Use Cases . . . . .	10
3.4.1 Main Use Case . . . . .	10
3.4.2 Use Case 1 . . . . .	11
3.4.3 Use Case 2 . . . . .	11
3.4.4 Use Case 3 . . . . .	12
3.4.5 Use Case 4 . . . . .	12
3.5 Conclusion . . . . .	13
<b>4 Design</b>	<b>14</b>
4.1 System Architecture . . . . .	14
4.1.1 System Architecture Diagram . . . . .	14
4.2 Design Constraints . . . . .	15
4.3 Design Methodology . . . . .	15
4.4 System Sequence Diagram . . . . .	15
4.5 Flow Chart . . . . .	16

4.6	Activity Diagram . . . . .	17
4.7	Conclusion . . . . .	17
<b>5</b>	<b>System Implementation</b>	<b>18</b>
5.1	Tools and Technology Used . . . . .	18
5.2	Methodology . . . . .	18
5.2.1	Image Acquisition . . . . .	19
5.2.2	Model Development . . . . .	19
5.2.3	Augmentation . . . . .	20
5.2.4	Color changing . . . . .	20
5.2.5	Alteration . . . . .	21
5.2.6	Processing Logic/Algorithms . . . . .	22
<b>6</b>	<b>System Testing and Evaluation</b>	<b>23</b>
6.1	System Testing and Evaluation . . . . .	23
6.2	Performance Testing . . . . .	23
6.2.1	Load Testing . . . . .	23
6.2.2	Stress Testing . . . . .	23
6.2.3	Scalability Testing . . . . .	24
6.2.4	Configuration Testing . . . . .	24
6.2.5	Security Testing . . . . .	24
6.3	Acceptance Testing . . . . .	24
6.3.1	Installation Testing . . . . .	24
6.4	Test Cases . . . . .	24
6.4.1	Test Case no 1: Installation of Application . . . . .	24
6.4.2	Test Case No 2: Running the Application . . . . .	25
6.4.3	Test Case NO 3: Opening camera . . . . .	26
6.4.4	Test Case No 4: Scanning the Marker . . . . .	26
6.4.5	Test Case No 5: Augmentation of model . . . . .	27
6.4.6	Test Case No 6: Model Scaling . . . . .	27
6.4.7	Test Case No 7: Color Changing or parts variation checking . . . . .	28
6.4.8	Test Case No 8: Back to main menu . . . . .	28
6.4.9	Test Case No 9: Exiting the Application . . . . .	29
6.5	Conclusion . . . . .	29
<b>7</b>	<b>Conclusion</b>	<b>30</b>
7.1	Major Accomplishment . . . . .	30
7.2	Future Enhancements . . . . .	30
	<b>References</b>	<b>32</b>

# Abstract

We have seen that people who tend to apply modifications on their vehicles have to spend a lot of time thinking and imaging what would suit their car best, even after that long process they still get the result after spending money and time on the actual process. There is a high probability that the user could not be happy about the result. So there is a need of an application or software which provides a clear picture of end result to user. Application is the way which provides the facility to user of seeing the end result, so he gets his mind clear about what will he get. In our view the catalogs and imaging is less reliable as there are situations where customer requires different things and could not imagine each and every thing clearly. In this way we can operate and provide the facility to user in an efficient and organized form so they can save money, time and hard work.

The main purpose of the project is to build an application which can be used on mobile device. The application can be used on mobile device by scanning the image of car and it should augment the model and should allow exterior modifications of the car. The exterior body part selected should be displayed integrated on the augmented model so the user can see the clear result. This project will make the user work easy and is a building block for the businesses such as customization business, car ordering on show rooms can allow users with this facility.