Department of Computing Goldsmiths, University of London

Augmented Reality Navigation System for Commercial Spaces

Report

by

Arif Kharoti, Nicholas Orford-Williams, Hardik Ramesh, Gabriel Sampaio Da Silva Diogo, Hamza Sheikh, Jonathan Tang

Software Projects – Group 14

Spring 2019

Submitted in partial fulfillment for the degree of Bachelor of Science in Computer Science

Abstract

The use of mobile augmented reality by consumers, and research in the field has become more prominent in the last decade. This has allowed for completely new approaches in solving current problems using this technology as there is a year-on-year increase on smartphone users across the world.

This proposal presents the use of augmented reality in museum navigation on mobile devices. After conducting stakeholder research, there were clear issues presented by current solutions on the market through the form of paper maps. Augmented reality library research was conducted on various platforms to find the appropriate toolkit for the proposed system, and UI/UX prototyping prioritised key design aspects of the system. Following this, the technical architecture and user stories are defined through the model-view controller architectural pattern, along with technologies to be used during implementation. Methods and approaches to implementation are outlined, namely through the agile methodology along with consulting various testing methods.

Contents

Li	st of	Figures	V
Li	st of	Tables	vi
\mathbf{A}	ckno	wledgements	vii
1	Inti	roduction	1
	1.1	Motivation	1
	1.2	Purpose & Scope	1
	1.3	Assumptions	1
	1.4	Coverage	1
2	Bac	ekground and Literature Review	2
	2.1	Background	2
	2.2	AR Libraries	2
	2.3	Software Architecture	2
	2.4	Hardware - Arduino and Raspberry Pis	2
3	Pro	ject Management Processes	3
	3.1	Agile vs Waterfall vs Lean	3
	3.2	Software Development Lifecycle	3
	3.3	Test-Driven Development	3
	3.4	Repository Management	3
4	Rec	quirements	4
	4.1	Gathering	4
	4.2	Stakeholders	4

CONTENTS

	4.3	System	4
	4.4	Functional	4
	4.5	Non-Functional	4
5	Des	ign	5
	5.1	Models	5
		5.1.1 Use Case	5
		5.1.2 Activity	5
		5.1.3 Sequence	5
	5.2	User Interface	5
	5.3	Accessibility	5
	5.4	User consultations	5
6	Imp	lementation	6
	6.1	Backlog	6
	6.2	Sprint Outlines	6
	6.3	Front-end	6
	6.4	Back-end	6
	6.5	Hardware	6
	6.6	Challenges	6
7	Test	ting & Quality Assurance	7
	7.1	Testing conducted	7
		7.1.1 Unit Testing	7
		7.1.2 Integration Testing	7
		7.1.3 Performance and stress testing	7
		7.1.4 Regression testing	7
		7.1.5 User Acceptance Testing (UAT)	7
		7.1.6 Beta Testing	7
	7.2	Deployment	7
	7.3	Formative evaluation	7
	7.4	Functional requirements review	7
	7.5	Non-Functional requirements review	7

CONTENTS

8	Project evaluation			
	8.1	Summative evaluation	8	
	8.2	Future developments	8	
\mathbf{A}	Use	r & Stakeholder Research	9	
В	Use	r Stories	10	
\mathbf{C}	Doc	rumentation Plan	11	
D	Test	ing Plan	12	
\mathbf{E}	Dep	oloyment Plan	13	
\mathbf{F}	Test	ing	14	
\mathbf{G}	Use	r & Stakeholder Feedback	15	
Bi	bliog	graphy	15	

List of Figures

List of Tables

Acknowledgements

Introduction

- 1.1 Motivation
- 1.2 Purpose & Scope
- 1.3 Assumptions
- 1.4 Coverage

Background and Literature Review

- 2.1 Background
- 2.2 AR Libraries
- 2.3 Software Architecture
- 2.4 Hardware Arduino and Raspberry Pis

Project Management Processes

- 3.1 Agile vs Waterfall vs Lean
- 3.2 Software Development Lifecycle
- 3.3 Test-Driven Development
- 3.4 Repository Management

Requirements

- 4.1 Gathering
- 4.2 Stakeholders
- 4.3 System
- 4.4 Functional
- 4.5 Non-Functional

Design

- 5.1 Models
- 5.1.1 Use Case
- 5.1.2 Activity
- 5.1.3 Sequence
- 5.2 User Interface
- 5.3 Accessibility
- 5.4 User consultations

Implementation

- 6.1 Backlog
- 6.2 Sprint Outlines
- 6.3 Front-end
- 6.4 Back-end
- 6.5 Hardware
- 6.6 Challenges

Testing & Quality Assurance

- 7.1 Testing conducted
- 7.1.1 Unit Testing
- 7.1.2 Integration Testing
- 7.1.3 Performance and stress testing
- 7.1.4 Regression testing
- 7.1.5 User Acceptance Testing (UAT)
- 7.1.6 Beta Testing
- 7.2 Deployment
- 7.3 Formative evaluation
- 7.4 Functional requirements review
- 7.5 Non-Functional requirements review

Project evaluation

- 8.1 Summative evaluation
- 8.2 Future developments

Appendix A

User & Stakeholder Research

Appendix B

User Stories

Appendix C

Documentation Plan

Appendix D

Testing Plan

Appendix E

Deployment Plan

Appendix F

Testing

Appendix G

User & Stakeholder Feedback