

## DAFTAR ISI

|  |      |
|--|------|
| HALAMAN JUDUL .....                              | i    |
| HALAMAN PENGESAHAN DOSEN PEMBIMBING .....        | ii   |
| HALAMAN PENGESAHAN DOSEN PENGUJI .....           | iii  |
| HALAMAN PERNYATAAN KEASLIAN TUGAS AKHIR.....     | iv   |
| HALAMAN PERSEMBAHAN.....                         | v    |
| HALAMAN MOTO.....                                | vi   |
| KATA PENGANTAR.....                              | vii  |
| SARI.....  | ix   |
| GLOSARIUM .....                                  | x    |
| DAFTAR ISI .....                                 | xi   |
| DAFTAR TABEL .....                               | xiii |
| DAFTAR GAMBAR.....                               | xiv  |
| BAB I PENDAHULUAN .....                          | 1    |
| 1.1 Latar Belakang .....                         | 1    |
| 1.2 Rumusan Masalah .....                        | 1    |
| 1.3 Batasan Masalah .....                        | 2    |
| 1.4 Tujuan Penelitian .....                      | 2    |
| 1.5 Manfaat Penelitian .....                     | 2    |
| 1.6 Metodologi Penelitian .....                  | 2    |
| 1.7 Sistematika Penulisan .....                  | 3    |
| BAB II LANDASAN TEORI .....                      | 5    |
| 2.1 Gim Karambol.....                            | 5    |
| 2.2 Augmented Reality .....                      | 6    |
| 2.3 Prinsip Kerja Sistem Augmented Reality ..... | 11   |
| 2.4 Vuforia .....                                | 12   |
| 2.5 Vuforia SDK .....                            | 13   |
| 2.6 Target Resource .....                        | 14   |
| 2.7 Unity 3D.....                                | 15   |
| 2.7.1 Unity Software .....                       | 16   |
| 2.7.2 Sejarah Unity dan Perkembangannya.....     | 17   |
| 2.8 Autodesk Maya .....                          | 20   |
| 2.9 Penelitian Sebelumnya .....                  | 20   |
| BAB III ANALISIS DAN PERANCANGAN.....            | 23   |
| 3.1 Pengumpulan Data .....                       | 23   |
| 3.2 Analisis Sistem.....                         | 23   |
| 3.2.1 Analisis Kebutuhan Input .....             | 23   |
| 3.2.2 Analisis Kebutuhan Output .....            | 23   |
| 3.2.3 Perancangan Sistem.....                    | 24   |
| 3.3 Perancangan 3 Dimensi Karambol.....          | 25   |
| 3.3.1 Diagram HIPO.....                          | 25   |
| 3.3.2 Diagram Ringkasan .....                    | 27   |
| 3.3.3 Diagram Detail .....                       | 27   |
| 3.4 Perancangan Halaman Utama .....              | 28   |
| 3.5 Rancangan Marker .....                       | 31   |
| 3.6 Hasil Yang Diharapkan .....                  | 33   |
| BAB IV IMPLEMENTASI DAN HASIL PENELITIAN .....   | 34   |
| 4.1 Implementasi .....                           | 34   |

|                                  |   |    |
|----------------------------------|---|----|
| 4.2                              | Implementasi Pembuatan Aplikasi.....          | 34 |
| 4.3                              | Tahapan Pembuatan Proses.....                 | 35 |
| 4.4                              | Pseudo-code .....                             | 36 |
| 4.5                              | Hasil 3D Karambol .....                       | 37 |
|                                  | 4.5.1 Tampilan Halaman Depan Gim 3D.....      | 39 |
|                                  | 4.5.2 Tampilan Gim 3D Augmented Reality ..... | 40 |
| 4.6                              | Penjelasan Cara Bermain Gim Karambol .....    | 40 |
| 4.7                              | Pengujian dan Analisis.....                   | 44 |
|                                  | 4.7.1 Black Box Testing .....                 | 44 |
|                                  | 4.7.2 System Usability Scale .....            | 45 |
|                                  | 4.7.3 Analisis Hasil Wawancara.....           | 45 |
|                                  | 4.7.4 Hasil Penilaian Responden .....         | 48 |
| 4.8                              | Kelebihan dan Kekurangan Gim.....             | 49 |
| BAB V KESIMPULAN DAN SARAN ..... |   | 50 |
| 5.1                              | Kesimpulan .....                              | 50 |
| 5.2                              | Saran.....                                    | 50 |
| DAFTAR PUSTAKA.....              |   | 51 |
| LAMPIRAN .....                   |   | 53 |

**DAFTAR TABEL**

|  |    |
|--|----|
| Tabel 3.1 Bagian Penjelasan .....                        | 26 |
| Tabel 3.2 Hasil yang Diharapkan.....                     | 33 |
| Tabel 4.1 Pseudo-code .....                              | 36 |
| Tabel 4.2 Hasil Black Box Testing.....                   | 44 |
| Tabel 4.3 Kuisioner Gim Karambol Augmented Reality ..... | 45 |
| Tabel 4.4 Perhitungan dengan metode SUS .....            | 47 |
| Tabel 4.5 Hasil Konversi dari metode SUS .....           | 47 |

## DAFTAR GAMBAR

|   |    |
|---|----|
| Gambar 2.1 Papan Karambol.....                          | 5  |
| Gambar 2.2 Face Tracking.....                           | 7  |
| Gambar 2.3 3D Object Tracking.....                      | 8  |
| Gambar 2.4 Motion Tracking .....                        | 8  |
| Gambar 2.5 Augmented Reality Pelatihan Militer .....    | 9  |
| Gambar 2.6 Augmented Reality Kesehatan.....             | 10 |
| Gambar 2.7 Augmented Reality Arsitektur .....           | 10 |
| Gambar 2.8 Augmented Reality Reparasi Mobil.....        | 11 |
| Gambar 2.9 Cara Kerja Augmented Reality .....           | 12 |
| Gambar 2.10 Diagram Data Vuforia.....                   | 14 |
| Gambar 2.11 Gim Augmented Reality Ping Pong.....        | 20 |
| Gambar 2.12 Gim Augmented Reality Bowling.....          | 21 |
| Gambar 2.13 Gim Augmented Reality Billiard .....        | 22 |
| Gambar 3.1 Skema Marker berbasis Augmented Reality..... | 24 |
| Gambar 3.2 Diagram HIPO .....                           | 26 |
| Gambar 3.3 Diagram Ringkasan.....                       | 27 |
| Gambar 3. 4 Diagram Detail.....                         | 28 |
| Gambar 3.5 Rancangan Halaman Utama.....                 | 28 |
| Gambar 3.6 Rancangan Halaman gim .....                  | 29 |
| Gambar 3.7 Racangan Koin Karambol Warna Putih.....      | 30 |
| Gambar 3.8 Racangan Koin Karambol.....                  | 30 |
| Gambar 3.9 Racangan Koin Karambol Raja.....             | 30 |
| Gambar 3.10 Racangan Pemukul Koin.....                  | 31 |
| Gambar 3.11 Marker 1.....                               | 32 |
| Gambar 3.12 Marker 2.....                               | 32 |
| Gambar 4.1 3D Papan Karambol .....                      | 37 |
| Gambar 4.2 Koin Warna dan Raja 3D.....                  | 38 |
| Gambar 4.3 Koin Putih 3D .....                          | 38 |
| Gambar 4.4 Pemukul 3D.....                              | 39 |
| Gambar 4.5 Tampilan Halaman Depan .....                 | 39 |
| Gambar 4.6 Tampilan Waktu Bermain.....                  | 40 |
| Gambar 4.7 webcam mengarah marker .....                 | 41 |

|   |    |
|---|----|
| Gambar 4.8 Tampilan webcam saat permainan baru dimulai..... | 41 |
| Gambar 4.9 Marker sudah terscan secara sempurna.....        | 42 |
| Gambar 4.10 Tombol Play untuk memulai permainan.....        | 42 |
| Gambar 4.11 Marker pemukul diarahkan ke koin putih.....     | 43 |
| Gambar 4.12 Marker pemukul setelah terkena koin putih.....  | 43 |
| Gambar 4.13 Tampilan Setelah klik Tombol Reset.....         | 44 |
| Gambar 4.14 Penentuan Hasil Penelitian.....                 | 48 |