**Yaşar University**

**Department of Computer Engineering**

**COMP 4920 Graduation Design Project II, Spring 2023**

**Graduation Project Summary Form**

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| **Project Code and Title:** | O2T – Owhi To Tech |
| **Project Team:** | Emre Görkem AĞKURT \_ 19070001042\_ [gorkemagkurt@gmail.com](mailto:gorkemagkurt@gmail.com)  Uğur BULAN \_ 19070001036 \_  19070001036@stu.yasar.edu.tr |
| **Project Advisors:** | Mehmet Ufuk ÇAĞLAYAN  Arman SAVRAN |
| **Project Deliverables:** | 1. O2T DSD Report 2. O2T Presentation 3. O2T Final Report 4. O2T Team Poster 5. O2T Hardware Subsystem Equipment 6. O2T Software Subsystem Source Codes 7. Android Application 8. Shell Script 9. Python Script 10. Aurdino Script 11. O2T Website Link 12. Project Info Summary [TR] 13. Project Info Summary [EN] 14. Total Work Load Form For Each Member |
| **Project Web Address:** |  |
| **Project Summary**  1. Introduction  The O2T project is a wearable technology aimed at bringing a new approach to sustainable fashion and advertising by developing a wearable textile product with a built-in digital display. Using a digital screen embedded in a textile product such as a T-shirt and a mobile application, the O2T technology allows users to prevent color distortion and wear and tear, thus extending the life of their products. This helps reduce waste and carbon emissions. The O2T technology also offers a new approach to advertising, particularly for athletes supported by companies. The mobile application provides a flexible and dynamic approach to advertising by allowing users to control the display of multiple sponsor logos on the screen.  2. Requirements  Software Subsystems:  Android Application:  -Ability to connect to Raspberry Pi via Bluetooth or Wi-Fi.  -Providing an interface for the user to select the desired function.  -Designing a protocol that will determine the format of the command to be sent.  Raspberry Pi Operating System:  -Python and Shell Script languages are used to process and control commands coming from the Android application.  -Ability to communicate with Arduino.  Arduino:  -Ability to process Python commands to control and display information on the 8x8 LED matrix.  Hardware Subsystems:  Raspberry Pi:  -Bluetooth or Wi-Fi module.  -MicroSD card. (for Raspbian Operating System)  Arduino:  -8x8 LED matrix display.  -Jumper wires.  Note:  An internet connection and a suitable Android device are also required for the project to work.  3. Design  Hardware Subsystem Design:  Power Supply:  -LC 18650 batteries  -USB cable  Raspberry Pi:  Raspberry Pi 3 Model B+  -Wi-Fi module  -MicroSD card  -Jumper wires  Arduino:  -Arduino Uno R3  -8x8 LED matrix display  -Wires  Connections:  -Jumper wires are used for serial communication between Raspberry Pi and Arduino.  -The same ground is used for the connection between Raspberry Pi and Arduino.  -A data cable is used to transfer data from Raspberry Pi to the LED matrix display.  -Arduino's power is obtained from Raspberry Pi's USB port.  -The power of the LED matrix display is obtained from Arduino's 5V pin.  -The ground wire of the LED matrix display is connected to Arduino's ground pin.  Software Subsystem Design:  Android Application:  A protocol design is made to communicate with Raspberry Pi via Bluetooth or Wi-Fi.  A user interface is designed and the user's function selections are sent to Raspberry Pi.  Raspberry Pi:  A shell script is written to control and process commands received from the Android application to control the LED matrix display through Arduino using Python commands.  The Wi-Fi module verifies and controls the network connection to which the Raspberry Pi is connected.  Arduino:  Processes Python commands to control the LED matrix display and reflects the desired function on the screen.  The project will work in harmony between hardware and software components according to these design subsystems.  4. Application and Tests  Firstly, we developed an application using Android Studio for the user to select the desired shape to be reflected on the textile product they wear. The selected shape is sent to Raspberry Pi, where the LED matrix is controlled according to the selected shape and the shape is reflected on the matrix.  For tests, we first checked the communication between the Android application and Raspberry Pi, which was successful. Then, we checked if the LED matrix was working properly, and we did not encounter any problems in these tests.  In addition, we tested the power consumption because we powered Raspberry Pi with LC 18650 batteries. According to the test results, Raspberry Pi can work for approximately 3 hours with batteries.  Since we are students and have limited resources, our tests were limited. However, we did not encounter any problems in the tests we conducted and saw that our project works as we intended.  5. Results  We developed an application using Android Studio for the user to select the desired shape to be reflected on the textile product they wear. The selected shape is sent to Raspberry Pi, where the LED matrix is controlled according to the selected shape and the shape is reflected on the matrix.  For tests, we first checked the communication between the Android application and Raspberry Pi, which was successful. Then, we checked if the LED matrix was working properly, and we did not encounter any problems in these tests.  In addition, we tested the power consumption because we powered Raspberry Pi with LC 18650 batteries. According to the test results, Raspberry Pi can work for approximately 3 hours with batteries.  Since we are students and have limited resources, our tests were limited. However, we did not encounter any problems in the tests we conducted and saw that our project works as we intended. | |

**Notes:**

1. Please read the notes in the Turkish version of this form.