



King Fahd University of Petroleum & Minerals
College of Engineering Sciences
Electrical Engineering Department

Summer Training Program

“.....**Smart Methods**....”


Final Report

(The Internet of Things)

Submitted to

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1. Abstract

The summer training in the Smart Methods company was simulation of a real work environment where we work on a specified task and using the available sources to accomplish the task before the deadline with continuous evaluation.

The accepted tasks accomplished are four, the first one is about making a user interface where the user uses sliders to control the power engines that control the arm of the robot. The second task is to create HTML page control panel that specifies the directions of the movement of robot arm.

The third task is to add a chat bot with automatic replies to the user's questions and suggestions.

The fourth task is to create a database of the directions of the movement of the robot arm. Those tasks were accomplished using a combination of (HTML, CSS, JavaScript) and using IBM Watson assistance to create the chat bot.

2. Acknowledgement

I thank the university of King Fahd University of Petroleum and Minerals for giving me the opportunity to enroll in the summer training program of 203 despite the pandemic situation. Also, I would like to express my gratitude to the engineers working in Smart Method company for their efforts and dedication to deliver lectures and weekly meetings and their simple and understandable explanations of the tasks and their cooperation and continuous communication with the students.

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5. Report Chapters

Chapter 1: Introduction (Company, plan, etc.)

The summer training of the term 203 was in the Smart Methods company. The company is a national commercial institution that was founded in 2010 and specialized in robotic equipment and robotics and artificial intelligence and provide services for researchers and creative people in the Arab world. Smart Methods is ranked by Forbes magazine as one of the most creative companies in Saudi Arabia in 2015. The company has a vision to be the first representative of Saudi Arabia in the manufacturing of robotics, artificial intelligence, control systems and automation. The company produced 843 implemented and registered innovations, 675 supported scientific research, 36 robots and mechanical systems, 1675 electronic circuits.

The company's plan in the summer training is to make a festival that is completely managed by robots the serve the attendees. To create these robots, the engineers were distributed based on their major and specialty to 5 paths which are mechanical engineering, electronic engineering, robots engineering and artificial intelligence, software engineering and the internet of things, Industrial and systems engineering.

I selected software engineering and the internet of things path due to my knowledge and experience and passion in front end web development languages (HTML, CSS, JavaScript). In the path of internet of things, we are focused on how to control the robot arm remotely. The company holds meetings weekly to explain multiple tasks and the engineers choose between them based on their preference and to finish them before the deadline. The engineer should depend on himself to finish the tasks by using any available source. The submitted tasks will be evaluated by the advisor of the company.

Chapter 2: Design & Requirements of IOT Control System

The use of internet of things in control systems opened a lot of opportunities and ways that could make our life easier.

The internet of things (IOT) is the use of software and other technologies that interact with the physical objects that are embedded with sensors that connect with the internet which have a processing ability to exchange data with other systems and devices.

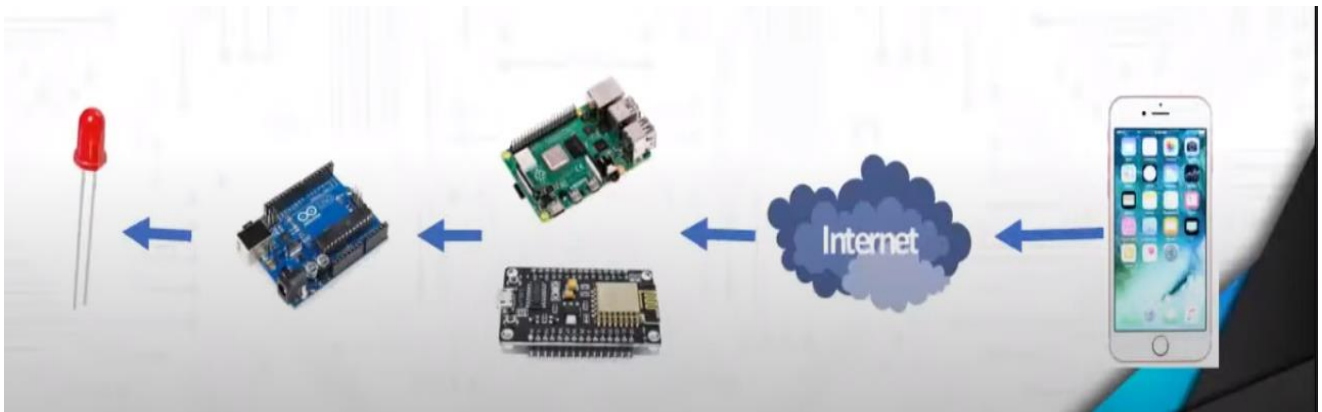


Figure 1: Simple IOT control system.

The robot arm must be controlled remotely using an application that uses a user interface that is designed by front end development languages to make controlling the robot arm no matter how far away the user an easy task.



Figure 2: Project Diagram.

The idea of our project is to connect the user through the user interface in the browser to the internet which is connected to webserver that changes the data in the database. Then by using the Raspberry Pi that is connected to the Arduino that controls the engine of the robot arm.

In the path of internet if things (IOT), we are concerned about the user interface that specify the power of every engine and the dictions of the movements of the robot arm and how to connect it to the database.

The requirements of the project:

- Knowledge of front-end development languages (HTML, CSS, JavaScript) and back-end development languages (PHP, MySQL).
- Microsoft Visual Studio (Code Editor) which is an integrated development environment from Microsoft. It is used to develop computer programs, as well as websites, web apps, web services and mobile apps.
- GitHub is a provider of Internet hosting for software development and version control using Git.



Figure 3: Development Languages.

Chapter 3: Case Studies (should be planned and supported with problem origin, photos, calculations, and solution(s); if applicable.

Task 1:

The first task is creating an HTML page that has sliders to choose a value from 0 to 100 for 6 engines to control the robot and there are two buttons to run or save the settings. The page is made of a combination of front-end web development languages (HTML, CSS, JavaScript).

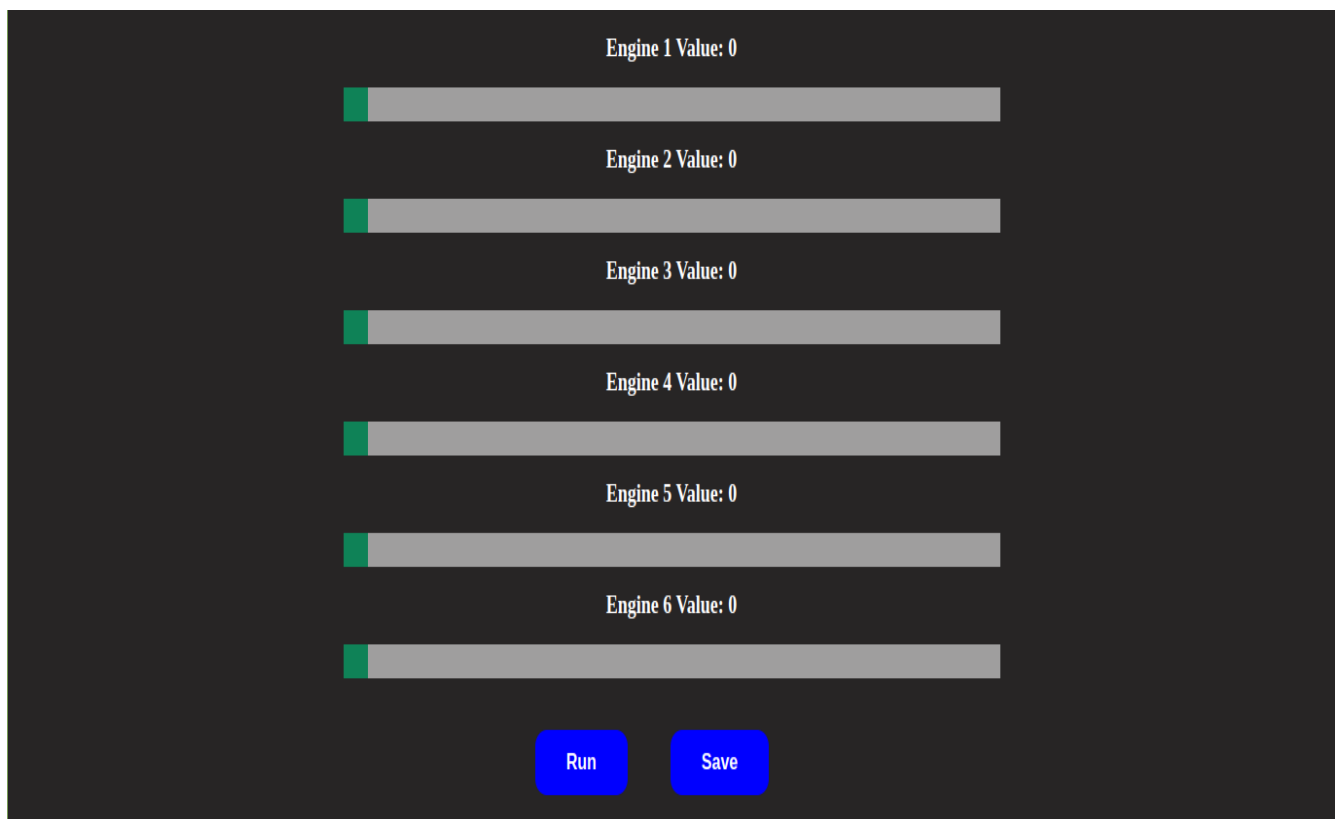


Figure 4: Engines Power Sliders.

Link of the project and codes:

<https://github.com/SO3BE/Task-1->

Task 2:

This task is about making a control panel that controls the movement directions of the robot: forward, right, left, backward, stop (User Interface).

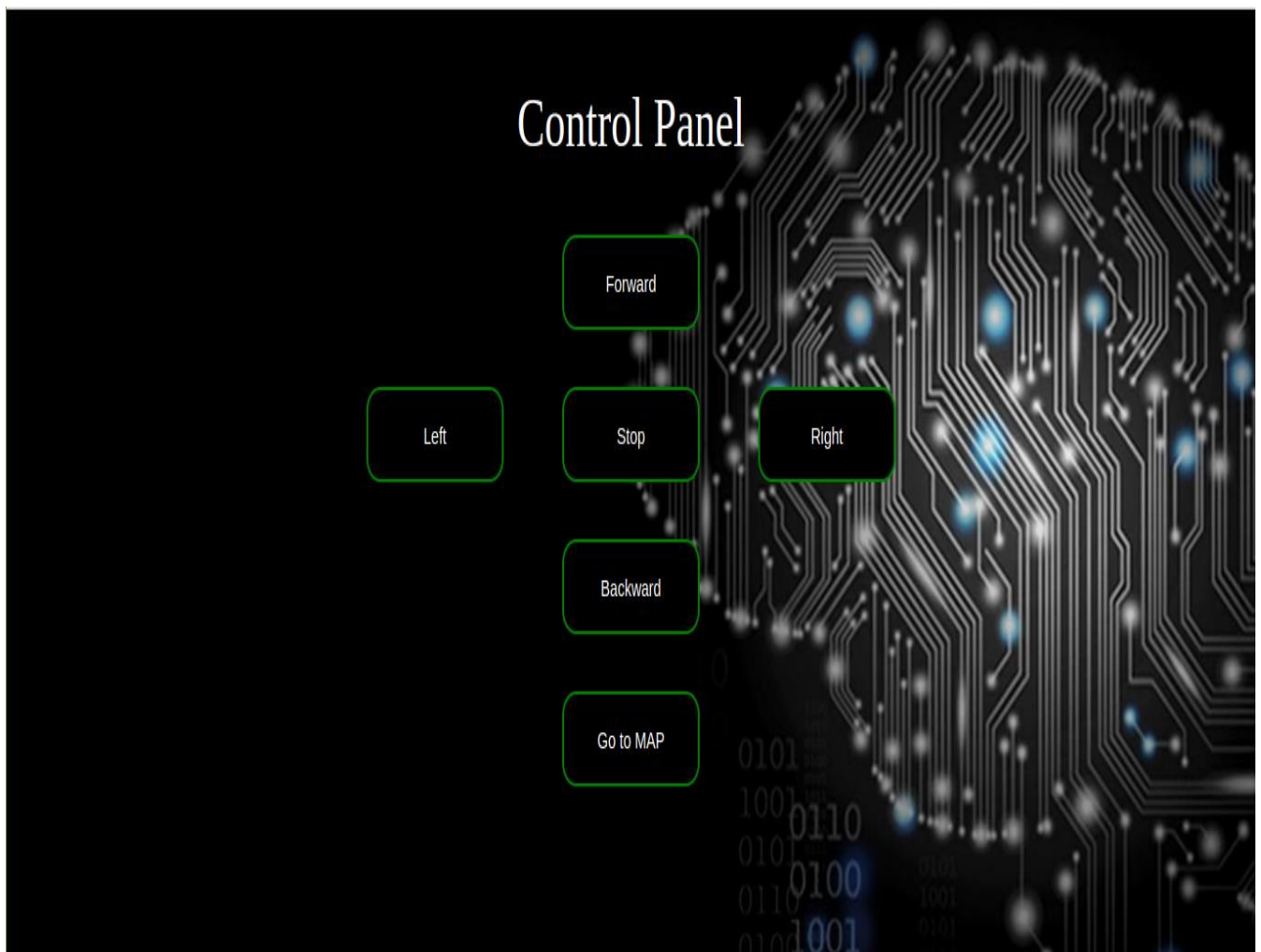


Figure 5: Control Panel of Directions.

Link of the project and codes:

<https://github.com/SO3BE/Task-2->

Task 3:

This task is about making a control panel that controls the movement directions of the robot: forward, right, left, backward, stop, with adding a chat bot to it.

This chat bot is created using IBM Watson which assists you to create and modify the automated reply based on project and preferences, also there are ready-made templates.

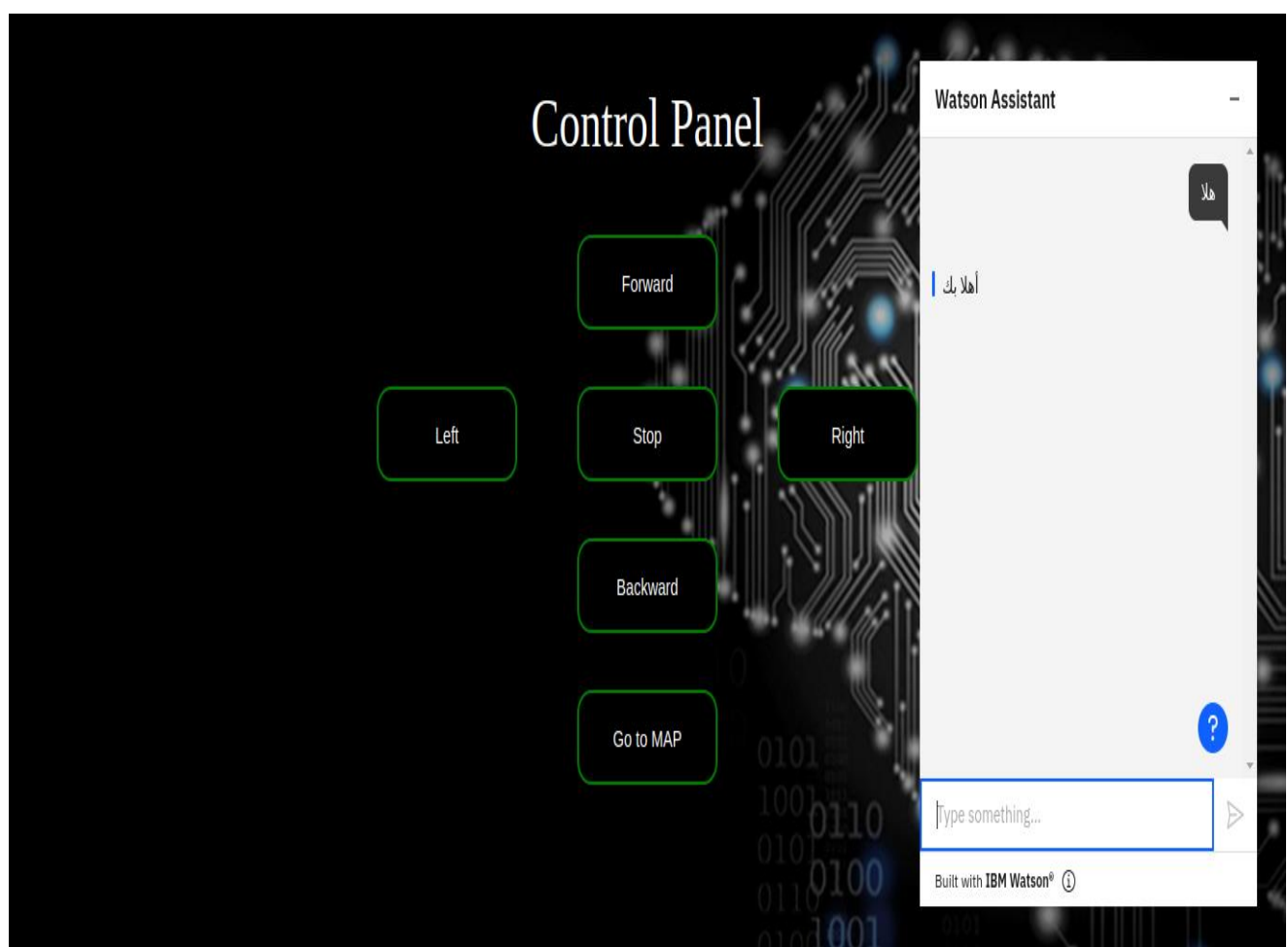


Figure 6: Control Panel with Chat Bot.

Link of the project and codes:

<https://github.com/SO3BE/Task-3>

Task 4:

Creating database for the control panel directions.

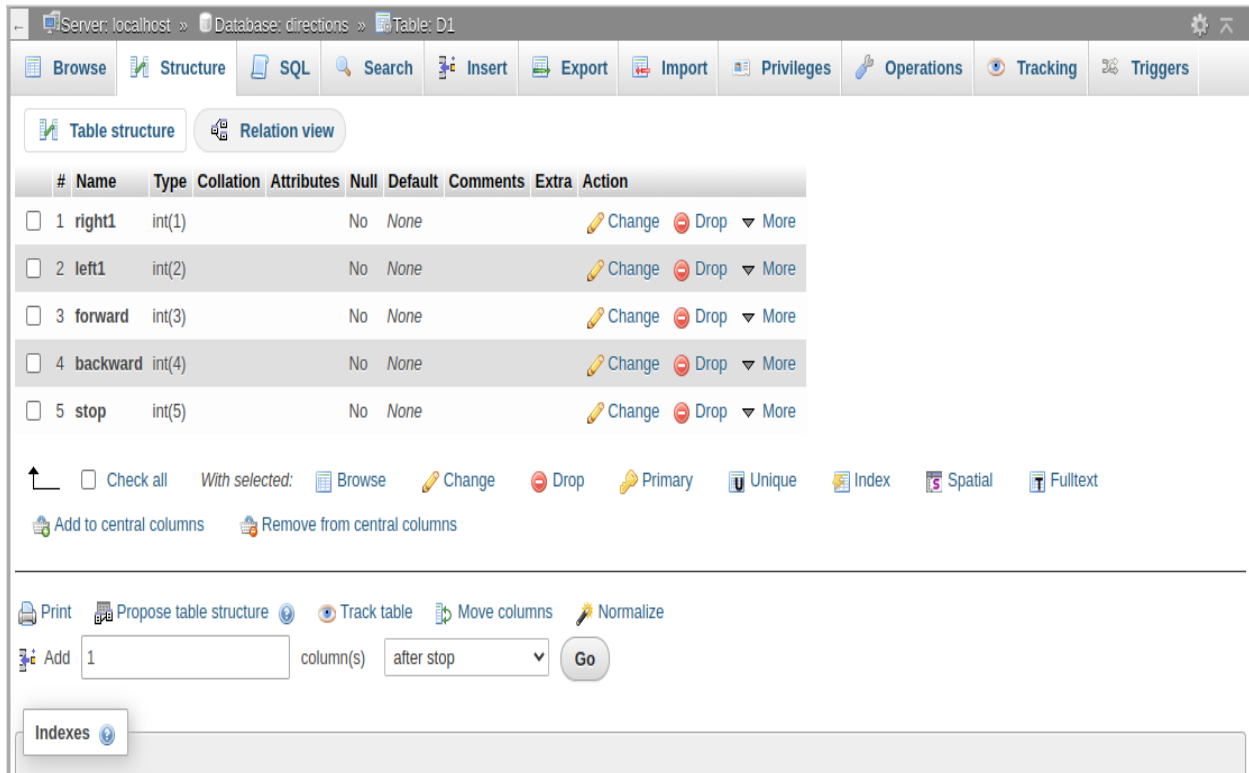


Figure 7: Directions Database.

Link of the project and codes:

<https://github.com/SO3BE/Task-4>



Chapter 4: Conclusions and Recommendations (Summaries of the coop outcomes and experiences)

The project of the internet of things has a lot of tasks that were distributed to the students, and my tasks were mainly about front-end development which enhanced my ability and knowledge of the languages (HTML, CSS, JavaScript) and the designing a stylish page. Also, we learned about making chat bots with automatic replies that use artificial intelligence with ready-made templates which are very handy and can be used in a lot of applications like commercial websites and any business that involve dealing with customers.

Summer training at Smart Methods was a wonderful experience and very similar to a real work environment that involves cooperation with continuous evaluation.

Note: Due to the lengthy codes of the tasks, the codes are in the GitHub links at the end of each task and the appendices.

6. Appendices

- <https://github.com/SO3BE/Task-1->
- <https://github.com/SO3BE/Task-2->
- <https://github.com/SO3BE/Task-3>
- <https://github.com/SO3BE/Task-4>

7. References

- [1] *Simple Iot control system.* (n.d.). Retrieved from <https://youtu.be/AszJoVJlneg>.
- [2] *Project Diagram.* (n.d.). Retrieved from <https://youtu.be/AszJoVJlneg>.
- [3] *Development Languages.* (n.d.). Retrieved from https://www.pngitem.com/middle/hmimbmi_html-css-js-php-mysql-hd-png-download/.
- [4] *Engines Power Sliders.* (n.d.). Retrieved from <https://so3be.github.io/Task-1-/1.html>.
- [5] *Control Panel of Directions.* (n.d.). Retrieved from <https://so3be.github.io/Task-2-/1.html>.
- [6] *Control Panel with Chat Bot.* (n.d.). Retrieved from <https://so3be.github.io/Task-3/1.html>.
- [7] *Directions Database.* (n.d.). Retrieved from <http://localhost/phpmyadmin/>.