

**UMM AL-QURA UNIVERSITY**  
**COMPUTING COLLEGE AT AL-QUNFOUDAH**  
**SUMMER TRAINING**



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**COMPUTER SCIENCES**

**TRAINED AT:**  
Smart Methods

**FROM 19/06/2022 TO 25/08/2022 A.C FROM 20/11/1443  
TO 27/1/1443 HIJRAH**

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Section one: Introduction, Report sections, Previous projects, Current training projects , Training Courses

## 1.1 Introduction to training:

Training took place in Smart Methods company: a national commercial enterprise established in 2010 AD registered with the Ministry of Commerce and specialized in automated equipment, robotics and artificial intelligence. It is considered the first commercial facility of its kind in the Kingdom of Saudi Arabia in the field of robotics, artificial intelligence and automatic control, and is classified by Forbes International magazine as one of the most innovative companies in the Kingdom of Saudi Arabia in the latest classification in 2015 and classified by the Saudi Authority for Facilities (Monsha'at) as one of the most innovative companies in the world The headquarters is in Jeddah, the business office VISION :

To be the first representative in the Kingdom of Saudi Arabia for the manufacture of robotics, artificial intelligence, control systems and automation. MISSION :Our mission is to meet all the market needs in the field of robotics and artificial intelligence, with a 100% made in Saudi Arabia. Responsible for the company's projects and activities :

engineer / Wissam Abdel Khalek Munshi info@s-m.com.sa

The goal of the training is to build experience, relationships and knowledge, integrate into the programmers environment, get to know students from all over the kingdom, search for solutions as a team without the help of the coach, create familiarization courses in the labor market, develop a view of the future of survival with programmers and manager of more than one technology company in You have to create a team made up from scratch, then create an account in GitHub, and the training was on two projects

(Human-Robot, Robot) in addition to two previous projects (Rating Bot, Competition Bot). There are 5 tracks in the training, the student can work on all tracks and choose only one track that complements each other to build the robot: Internet of Things and Data Systems (IOT):

(Chat bot programming), Synchronization of programmable hand gestures with the bot's dialogue, Programming of bot control panels, Using neural networks in conversations, Programming of bot movement maps, Programming of Arduino and ESP32 controllers, Remote control, Wi-Fi creation

**Artificial Intelligence and Robotics (AI):**

Install Operating System (ROS), Indoor Navigation Systems (SLAM), SLAM Mapping Systems, Sports Motion Coding Systems, and Simulation Systems.

mechanical engineering:

(Foot joint design, hand joint design, step distance calculation, angle calculation during movement)

**Electronic engineering and electrical power:**

(Designing electronic circuits for manual driving without a motor, motor frequency coding systems, designing circuits on Arduino controllers, using various motors

## 1.2 Report sections:

In this report, he will talk first about the courses in this training, and they were about the ROS program and an explanation of the engineering paths, and secondly about the tasks that they carried out and how they benefited from them. It was 3 tasks in the IOT path, 3 tasks in the AI path and 2 tasks for each of the engineering paths, then we will

talk about what are the pros and cons that I encountered through our training in dealing with the new. Ergonomics and then we will make several recommendations for improvement of the course.

### 1.3 Previous projects

- Competition robot



- Coffee pouring robot

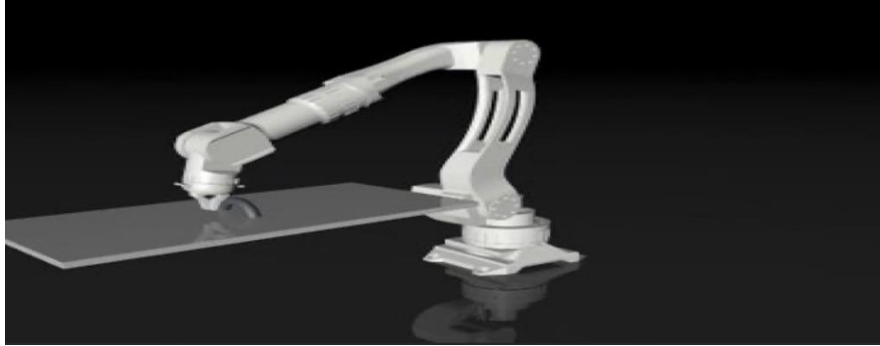


### Current training projects

- evaluation robot



- robotic arm



## 1.4 Training Courses:

Courses names	Coach name	The N.O of hours	The course place	Training center
A course in the use of the concept of Dev OPS	Wissam Abdel Khaleq Munshi	Two hours	In the ZOOM	Smart methods
Hosting engineer	Sami Garami	Two hours	In the ZOOM	Smart methods
Mechanical design	Wissam Abdel Khaleq Munshi	Three hours	In the ZOOM	Smart methods
Electronics in robotics	Wissam Abdel Khaleq Munshi	Three hours	In the ZOOM	Smart methods
ROS operating system	Wissam Abdel Khaleq Munshi	Three hours	In the ZOOM	Smart methods



Section Tow: Scientific and practical benefit: and  
Training tasks

## 2.1 Scientific and practical benefit:

### GitHub:

We worked on github, GitHub is a website and cloud-based service that helps developers store and manage their code, through which training tasks have been delivered.

### Programming Languages:

In our training we used several languages such as java script, css, html, php, and it was a useful experience to apply what we learned during our studies from these languages and learn to work on new languages.

### The Programs used:

Tink ecad, Visual Studio code, Sublome Text ,Node.js , pycharm, Cinema4d

## 2.2 Tasks in the AI path:

### - Robotic operating system (ROS):

we worked on a robotic operating system (ROS) and it is a system that helps us build and reuse codes between robots. The first task in the path of artificial intelligence is to install the ROS system, and to install it we had to first download Virtual box and then install Ubuntu on it and then install the ROS on it, so the work was on the Linux operating system

- Download arm package:

Here we have installed the package for an arm of a robot in Ubuntu and written the installation steps and then photographed the results.

- To complete download arm package:

To complete the previous task, Here we copied and pasted the arm's package commands into the terminal, so that the Riving will automatically appear and have an image of the arm.( <https://s-m.com.sa/ros.txt>)

My personal account contains the tasks that I have performed

Job link:<https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/ROS-Installation>

Job link:[https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/Installing\\_robot\\_arm\\_package](https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/Installing_robot_arm_package)

## 2.3 Task in the IOT path:

- Convert audio into text:

The first task in the system of Internet of Things and data science was to convert audio (in Arabic) into text and we implemented this by writing a code using the language of HTML and java script, which we have studied in the previous term, and this was done through our use of a very simple statement, which is `recognition.lang= 'ar'` . The second

requirement is the first IOT task, which was writing the Wasdom ESP32 segment operation algorithm, which is done on the Arduino program.

-Programming a web page to control the arm using the web serial api and writing the Arduino code for the control:

And that is through using the code that we worked on previously to convert audio to text, then we linked it with an Arduino connected with a motor server tensioner so that when we say right the motor moves 180 degrees and when we say the left moves to zero degrees. And that is by using the code that we worked on previously to convert the voice to text and then we connected it with an Arduino connected with a server-motor motor so that when we say right the motor moves 180 degrees and when we say the left moves to the zero degree, and we connect through the web serial api (library in java script)

-Receive the value of GET:

In this task, we created a web page that contains (gets) a sensor value, provided that the value is an integer then we made a database and finally we made a database that stores its sensor values in the database table.

My personal account contains the tasks that I have performed

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/Convert-audio-to-text-with-javascript>

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/IOT>

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/ESP32>

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/Link-html-page-with-arduino-code>

## 2.4 Tasks in mechanical engineering:

- Calculate the number of joints and the location of the joints:

We have redesigned the robot for joint placement, and also to calculate the distance between joint and link using Cinema4d program. Finally, we had to calculate the movement of the angle of the foot, based on which the robot can walk without a fall.

- **Structural drawing:** Here we designed the robot through the same previous program and also got to know the suspension system, which is system of components allowing a machine (normally a vehicle) to move smoothly with reduced shock.

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/RobotCAD>

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/Foot-the-robot->

## 2.5 Tasks in Electronic engineering and electrical power:

- **Brushless control:** To control the brushless tensioner so that I can make it rotate counterclockwise, that was by drawing an electric circuit and also the algorithm that moves it, and we did that through the Tinkercad program.

- Latching system: Here we have designed an on and off circuit that can be automated, also through the Tinkercad program

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/Using-the-push-button-in-arduino>

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/servo-stepper-and-brushless-motors>

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/ESP32>

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/LED-bulb-and-Arduino-code>

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/Turn-on-the-Photoresistor-Sensor-on-the-Arduino>

Job link: <https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi/-LED-on-the-Arduino>

2.6 Here is the link to my account where you will find all the tasks in detail:<https://github.com/Asma-Ahmed-Aqil-AL-Zubaidi>

Section Three: Section Three: Advantages,  
Disadvantages, Course Development and Conclusions

### 3.1 Advantages of training:

We learned a lot in this training:

-Mechanical Department , Electronics and Power , IOT and software development,

Robotics and AI and Industrial and system engineering:

- Full stack Robotics Engineer Certification

- Professional relationships , building a series of professional relationships with people in the same field will be of great benefit to us in the future

- Self-education , acquiring individual education skills and solving some problems - that are difficult for us as students.

- The simple method of learning

- Apply the acquired knowledge in a practical environment Internship with a company specialized in the technical field represents the first experience opportunity for us as .students, by applying what we have learned from university in a real environment

- We can experience the project giving you a better idea of how it works

- Training improves the performance of the scholars . It helps them to become more skilled and more productive

- Training involves a lot of teamwork, which is a great way to learn to work and get to know fellow



- Understanding the practical environment, gaining the ability to understand what the practical environment needs and what are the characteristics of the environment in which we are supposed to work.
- We took some training courses - Experience Certificate
- We can apply new skills and take on new challenges at work, which improves level for training
- The initiative, we learned that it is good to take the initiative to ask for additional references and take the opportunity to learn from the experienced team and also take the initiative and not be shy about providing solutions to problems if they exist.

### 3.2 Disadvantages of training:

- Some tasks are difficult and complex
- Late reply to messages and our questions
- The organization is very bad
- Delay in submitting university documents
- There is one supervisor for all trainees in the free track compared to the paid track, for each trainee there is a supervisor - Random training system
- Acceptance of many trainees

- There are no training requirements for all tracks, as they are found only in some branches
- Additional training courses only apply to those who have paid
- The training center was small in relation to the large number of trainees
- There is only one supervisor during the execution of tasks
- The lack of computers, so we had to work on our devices
- Failure to provide an opportunity for the student to suggest something that helps improve the method of training
- Priority to attend the headquarters only for students who have paid

### 3.3 Development of Training course:

- Raising students' awareness of the importance of training through Intensive workshops for students on the importance of training for future jobs experience and how to obtain training and University must provide training opportunities for students
- Send university letters to all students on university mail and do not delay in sending them
- CV are important for obtaining coop training in major companies , and Learn how to write a CV professionally , Writing such a phrase in Professional Objective " Training is a mandatory requirement in the study plan that I am looking for in a place where I

can push myself to a new level and refine my talent to make it better so that I can be an active member of the organization in which I work and strive to achieve the desired goals with dedication and professionalism in addition to ensuring self-development in the field of work and ambition in the field to reach self-satisfaction and satisfaction of the bosses "

-It is necessary to provide organization and coordination between the methods, systems and programs prepared in the field of work for the trainees themselves, so that they do not stray from the same content, through the university's suggestion of places for students, including what was previously mentioned.

- Teach students how to write a professional email to apply in companies - These link help communicate with companies:

<https://rattibha.com/thread/1465569268767023106?lang=ar>

### 3.4 Conclusion of the report:

After a hard and enjoyable educational journey, we have come to the end of our training, and the end here is a temporary one, God willing. We will certainly bring back this knowledge and scientific experience again, because of our great benefit, thank God, we have obtained a full stack engineering certificate by doing some tasks from these tracks: mechanical engineering, electrical engineering, electrical power, internet of things, data systems and finally artificial intelligence, the training was on two projects, They are (robot, robot arm,) in addition to programming two previous projects (evaluation, competition robot), in this training we were as close as possible

to our specialization as we apply all knowledge in a practical and accurate way and learned the first steps in how to make a robot, And we took courses that were very useful, we talked in detail about this topic and discussed many advantages and disadvantages related to this topic, and finally we made a set of suggestions, appropriate solutions and constructive recommendations for the development of the course, we have all noticed many positive changes, in terms of gaining experience The process and how the practical environment works, which will certainly affect us in the future. In this training, we combined benefit, pleasure, academic and applied aspects, and we were able to obtain a lot of accurate information and produce a lot of important results. We ask God Almighty to grant us success to work on everything

that is useful to us and build an impressive future. We were able, by the grace of God Almighty, to harness the talents and abilities that we possess for our benefit. We hope that this cooperative course will be the beginning of the ladder of working life for all trainees. Next, we would like to thank our Training Supervisor, Dr. Mashaal After a long and enjoyable trip, I finished the summer training in which I learned the surroundings of my specialization and the other five specialties. It was an experience that added a lot to me, and I will repeat it.