DEVS

PRESENTS

Roadmap for becoming a

Successful IOT ENGINEER

IOT Engineer Roadmap for Beginners

Following is the roadmap to learning **IOT** skills for a total beginner. It includes FREElearning resources for technical skills (or tool skills)

Prerequisites: Having development boards like Arduino or ESP32 can definitely make things easier, but it's not a strict requirement. You can still work on many projects using basic components and a bit of creativity.

Total Duration: **3Months** (**3 hours** of study Every Day) Also,

1. C++ Programming

- **Week 1** : Learn the basics of C++ (syntax, data types, control structures).

- **Week 2** : Dive into more advanced topics (OOP, pointers, memory management).

Resources :

https://youtu.be/vLnPwxZdW4Y?si=onzuuJsnS6xrm3YC

2. Basics of Electronics

- **Week 3** : Study basic electronic components (resistors, capacitors, transistors).

- **Week 4** : Learn about circuits and how to read circuit diagrams.

Resources :

https://youtube.com/playlist?list=PLWv9VM947MKjuqlJVp5m_Edf66SrFSHx2&si=GPT_YTHRmdYeLUQj

Month 2: Tools and Software

3. Simulation Software (Tinkercad)

- **Week 5** : Get familiar with Tinkercad interface and basic functionalities.

- **Week 6** : Create simple circuits and simulate them.

Resources :

Explore the site and learn

https://www.tinkercad.com/

4. Python Programming

- **Week 7** : Learn the basics of Python (syntax, data types, control structures).

- **Week 8** : Explore Python libraries relevant to IoT(cvzone , fermata.. just have a look)

Resources :

https://youtu.be/kqtD5dpn9C8?si=sCrDtb_9ZuI0Qh_f

Month 3: Practical Applications

5. Overview of Embedded Systems and IoT

- **Week 9** : Understand the basics of embedded systems.

- **Week 10** : Learn about IoT architecture and applications.

Resources :

https://www.embedic.com/technology/details/introduction-to-arduino-embedded-system-2023?srsltid=AfmBOoofqFCthxApX1Ykc6ie_Wl5I290eShxYCRCofN-1DqUo_0NWCaI

6. Sensors and Actuators

- **Week 11** : Study different types of sensors (temperature, humidity, motion).

- **Week 12** : Learn how to interface sensors with microcontrollers.

Resources :

https://youtu.be/DlG6LY84MUU?si=gjC_XlPXiR4B5eC0

7. Arduino Basics

- **Week 13** : Get started with Arduino IDE and basic programming.

- **Week 14** : Build simple projects using Arduino (e.g., LED blink, sensor data reading).

Resources :

https://www.linkedin.com/learning/learning-arduino-interfacing-with-analog-devices/integrating-analog-devices-with-arduino?u

https://www.linkedin.com/learning/learning-arduino-foundations-2/getting-started-with-arduino-22858971?u=0=0

8. ESP Boards (ESP8266/ESP32)

- **Week 15** : Learn about ESP boards and their features.

- **Week 16** : Set up the development environment for ESP boards.

- **Week 17** : Create IoT projects using ESP boards

Resources :

https://www.youtube.com/watch?v=aLEKiGNfHZw&list=PLlLe2PpVuiVJ7bdUtQHkXIlMzqxeOtrqd

9. ESP with Blynk

- **Week 18**: Learn about Blynk and how to use it with ESP boards.

- **Week 19**: Create IoT projects using ESP boards and Blynk (e.g., remote monitoring and control).

Resources :

https://blynk.io/

10. OpenCV with Python and Arduino

- **Week 20** : Learn the basics of OpenCV and how to use it with Python.

- **Week 21** : Create projects integrating OpenCV with Arduino (e.g., face detection, object tracking).

Resources :

https://youtu.be/mfiRJ1qgToc?si=t-TWqJNSy8Vpxqkq

SAMPLE PROJECTS FOR ARDUINO (Just to kick start with basics you have to perform every task given in the resources materials)

1. **LED Blink**:
   o This is the "Hello World" of Arduino projects. It involves programming the Arduino to blink an LED on and off at regular intervals.
   o **Components**: Arduino board, LED, resistor, breadboard, and jumper wires.
   o **Skills Learned**: Basic coding, understanding of digital output.

2. **Button-Controlled LED**:

- o Expand on the LED blink project by adding a button to control the LED. The LED will turn on when the button is pressed and off when released.
- o **Components**: Arduino board, LED, resistor, push button, breadboard, and jumper wires.
- o **Skills Learned**: Reading digital input, debouncing a button.

3. **Temperature and Humidity Monitor**:
- o Use a DHT11 sensor to measure temperature and humidity and display the readings on a serial monitor or an LCD screen.
- o **Components**: Arduino board, DHT11 sensor, LCD display (optional), breadboard, and jumper wires.
- o **Skills Learned**: Using sensors, reading analog input, displaying data.

4. **Traffic Light Controller**:
- o Simulate a traffic light system using LEDs of different colors (red, yellow, green) and control their sequence with the Arduino.
- o **Components**: Arduino board, red, yellow, and green LEDs, resistors, breadboard, and jumper wires.
- o **Skills Learned**: Timing functions, controlling multiple outputs.

5. **Servo Motor Control**:
- o Control the position of a servo motor using a potentiometer. The servo motor will move to different angles based on the potentiometer's position.
- o **Components**: Arduino board, servo motor, potentiometer, breadboard, and jumper wires.
- o **Skills Learned**: PWM (Pulse Width Modulation), reading analog input, controlling actuators.

  - [Arduino Video 1](https://youtu.be/BLrHTHUjPuw?si=mV-VbTDKOrAii9KP)

  - [Arduino Video 2](https://youtu.be/zJ-LqeX_fLU?si=Rg-N5SUlRDK4PJkl)

  - [Arduino Playlist](https://youtube.com/playlist?list=PL-I2UNsCsk1QRQ8VEKFc59RzXhPPWau6W&si=gAeAtjojvEseUcX4)

  - [Arduino Video 3](https://youtu.be/aIUuLu_sl_8?si=h93ufXjzCaCWb025)

  - [Arduino Video 4](https://youtu.be/QO_Jlz1qpDw?si=3gwmtq2SY7eG3rYN)

About Hackathon: An hackathon is a focused event where participants come together to create mobile or web applications within a limited time, typically 24-48 hours. Teams work intensively on ideation, design, development, and presentation of a functional app prototype. It's a great way for developers to enhance skills, network, and potentially launch new products or startups. -Do participate in hackathon which improves our knowledge.

The Internet of Things (IoT) represents a transformative shift in how we interact with technology, offering unprecedented opportunities for innovation across various sectors. An effective IoT roadmap provides a structured approach to harnessing these opportunities, ensuring that projects are well-planned, scalable, and sustainable.

Always remember, these tools are just means to execute your ideas. Always focus on enhancing your creativity