Graphical Programming for TinyML, the Easiest Way to Start with Embedded ML

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Prepare

- **Codecraft**:  
  - [https://ide.tinkergen.com/](https://ide.tinkergen.com/)

- Make sure you have the latest Device Assistant installed  
  - windows: v2.7.0.6  
  - mac: v2.7.0.6

- **Wio Terminal**  
Catalogue

- **What**
  - TinyML with Wio Terminal & Codecraft

- **How**
  - Use Wio Terminal & Codecraft to achieve TinyML

- **Demo**
What is TinyML with Terminal & Codecraft.
TinyML with Wio Terminal & Codecraft

- **ML**: It is seen as a part of artificial intelligence. Machine learning algorithms build a model based on sample data, known as "training data", in order to make predictions or decisions without being explicitly programmed to do so.

- **TinyML**: Tiny in TinyML means that the ML models are optimized to run on very low-power and small-footprint devices such as various microcontrollers (MCUs)
  - Advantages: ubiquitous, small, consume small amounts of energy, and are comparatively cheap, etc.
  - Disadvantages: limited RAM/FLASH size, limited computing power, and power consumption is extremely sensitive, etc.

- TinyML with **Wio Terminal & Codecraft**: Codecraft, a graphical programming platform, provides a beginner-friendly (yet powerful) web interface and toolkit for the whole TinyML pipeline starting from data collection all the way up to model deployment and extensive use.
TinyML with Wio Terminal & Codecraft

Wio Terminal

- ARM Cortex-M4F core running at 120MHz (Boost up to 200MHz)
- 4 MB External Flash, 192 KB RAM
- WIFI, BT
- LCD screen
- Built-in Modules: Accelerometer, Microphone, Speaker, Light Sensor, Infrared Emitter
- MicroSD Card Slot, 5-Way Switch, Programmable Buttons
- Grove
- Raspberry Pi 40-pin Compatible GPIO

Get one: https://www.seeedstudio.com/Wio-Terminal-p-4509.html
TinyML with Wio Terminal & Codecraft

Codecraft

- Graphical programming platform
- Powered by Edge Impulse

EDGE IMPULSE

- Whole TinyML pipeline
How

Use Wio Terminal & Codecraft to achieve TinyML.
Please Open [https://ide.tinkergen.com/](https://ide.tinkergen.com/)
1. To create and use models, you need to login (top right corner of the page). Requires Sign-Up for new users.

2. Click “Model Creation” to see the interface “Creating new models for embedded machine learning” where Codecraft provides machine learning frameworks for different types of sensor.

3. All machine learning processes are composed of 4 steps.

   - Model creation: Create models based on the sensors to be used.
   - Data Acquisition: Collect data using Wio Terminal.
   - Training & Deployment: Train the model with the collected data and deploy the trained model after the completion of training process.
   - Programming: Program to use the machine learning models.
TinyML for Codecraft

Model Creation
TinyML for Codecraft

Data Acquisition
TinyML for Codecraft

Training & Deployment

- Neural network scale selection
- Parameter values
  - Number of training cycles
- Learning rate
TinyML for Codecraft

Programming and using
Demo
Simple and easy-to-use. Wio Terminal supports embedded machine learning now!

Select hardware for programming

- Stage mode
- Grove Zero
- Arduino (Uno/Mega/ElegirmerKit)
- micro:bit
- M.A.R.K (CyberEye)
- Grove Joint
- GLINT
- Bittle
- Wio Terminal

My projects

View all
Import project

Codecraft courses

View all
TinyML for Codecraft

```
setup
  screen towards default
  set text size to super big
Serial baud rate 9600 bps

loop
  Accelerometer Model: Get data and perform prediction once for current model
    # Accelerometer Model: Is prediction result other_word ? or Accelerometer Model: Is prediction result idle ?
    Serial printn height
    else
      print Accelerometer Model: Result of Current prediction
      change pos x by 25
      Serial printn Accelerometer Model: Result of Current prediction
    if Accelerometer Model: Is prediction result d ?
    Delay ms 1000
    Serial printn secoend temp at x y z
end program
```
TinyML for Codecraft

Built-in Accelerometer

Fall Detection by using Wio Terminal’s built-in accelerometer

Daily Activities Recognition by using built-in accelerometer
TinyML for Codecraft

Built-in Light Sensor

Barcode recognition (built-in light sensor)

Gesture Recognition of Rock vs Vulcan
TinyML for Codecraft

Built-in Microphone

Voice Activated Robo Car on Microcontroller with TinyML

Color Command using Codecraft and Wio terminal


https://www.hackster.io/Salmanfarisvp/speech-recognition-using-wio-terminal-codecraft-1c4a1
Get the complete course from GitHub

https://github.com/TinkerGen/No-code-Programming-to-Get-Started-with-TinyML
Join us on Discord

https://discord.gg/ETam44RtKR
Thanks!