In partnership with: Microsoft Reactor

.NET Conf 2022

Student Zone

Using IoT sensors with .NET

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Water consumption tracking with .NET IoT

- Let’s build prototype of smart bottle
- We need to tell how much water was consumed
- Where do we start?
  - We need sensors
  - We need to connect those sensors somewhere

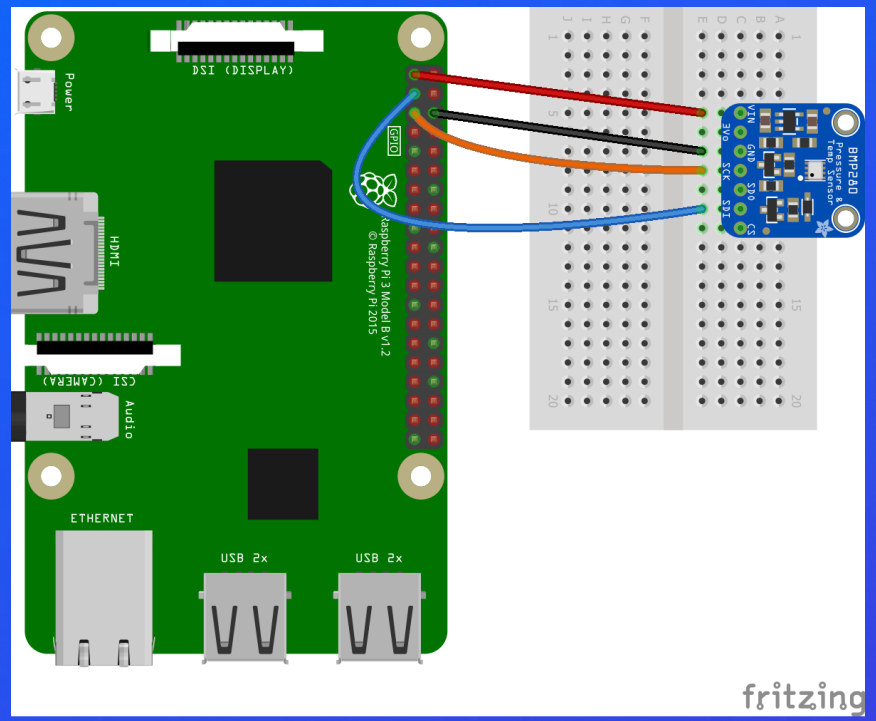
This might sound a bit intimidating if you’ve never done this before ☺

Detailed instructions: https://github.com/microsoft/dotnetconf-studentzone

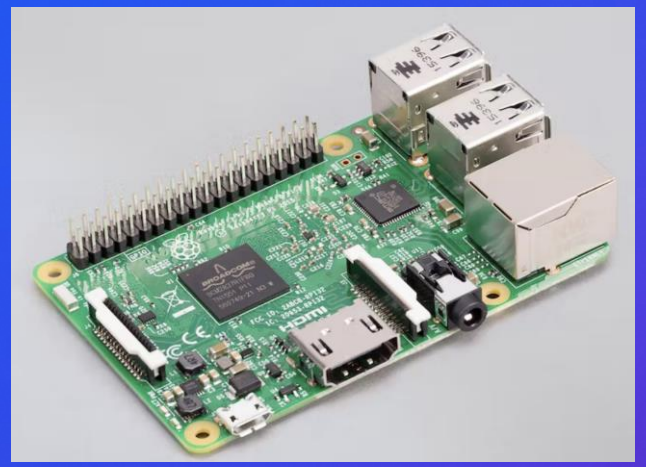
=> “Using IOT and .NET”

How do we read from sensors

- Communication: I^2C, SPI, GPIO, PWM, …
- For example, I^2C – 4 cables: GND, VCC/VIN, SCL/SCK, SDA/SDI



For Raspberry Pi – Linux is preferred



BMP280 != BME280

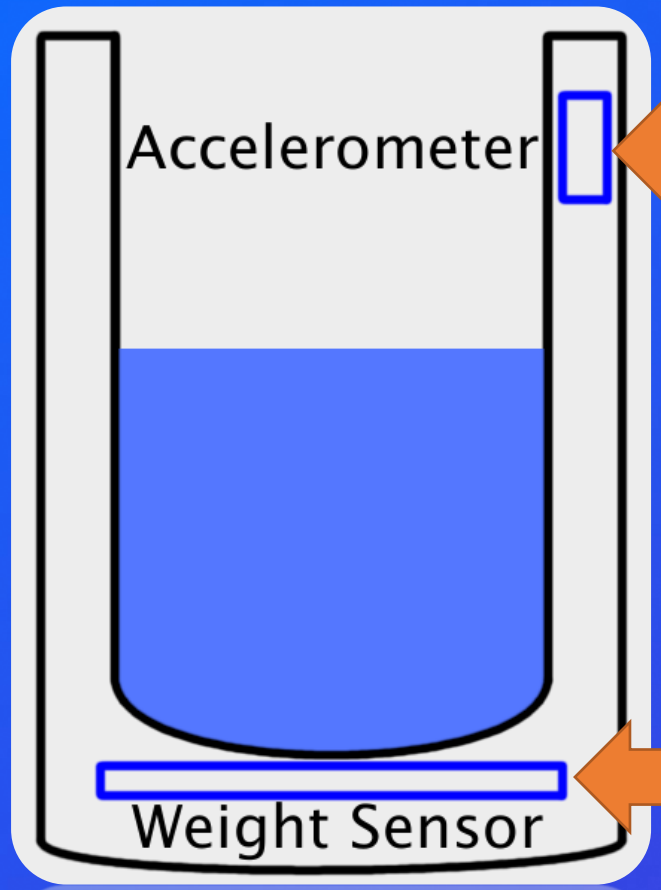
But how do I connect I²C to my PC?

- Either use Raspberry Pi or other board with pins exposed or use i.e. FT4222
- What's FT4222? USB device with pins

Works on Windows, Linux, macOS!

This is actually FT4222

Example design - idealistic



LIS3DH

Did we pick up the bottle?

Thanks to Diego for sponsoring

HX711

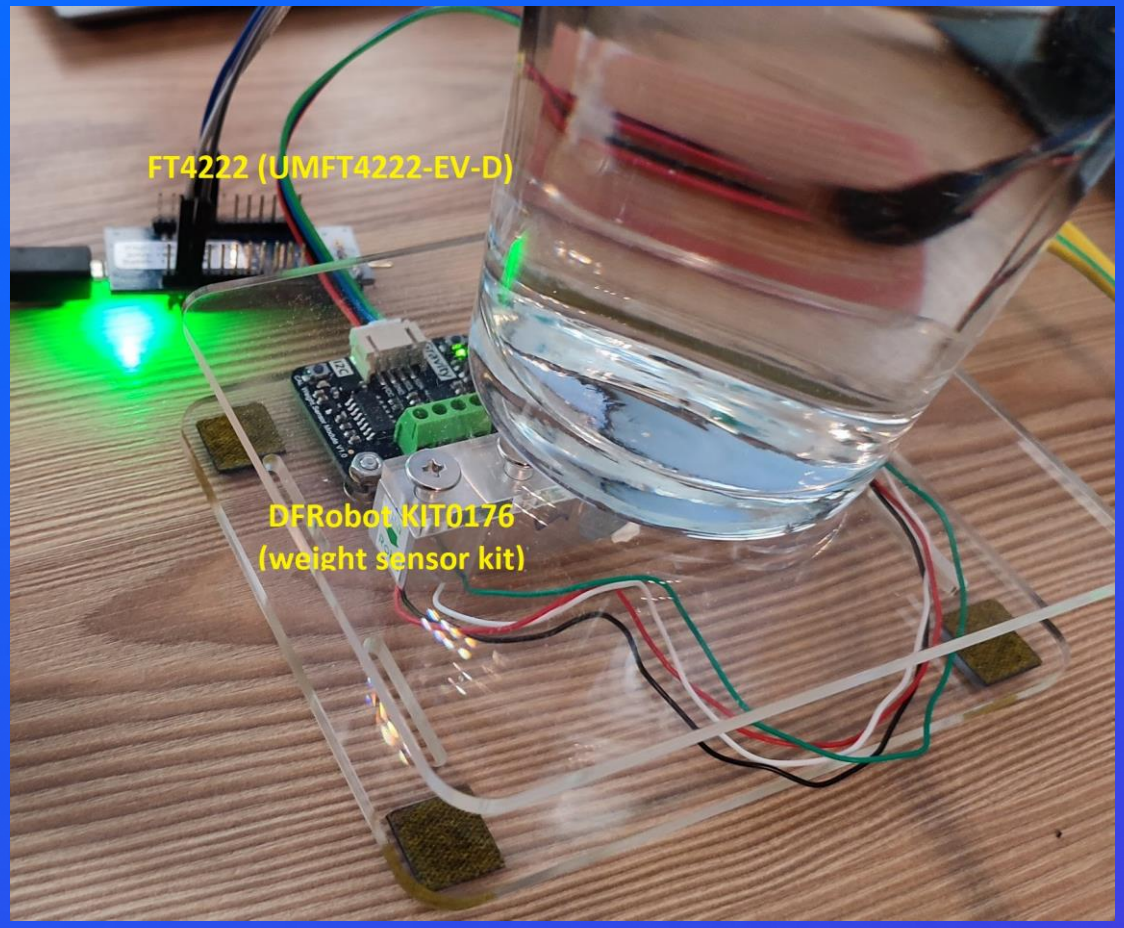
How much did we drink?

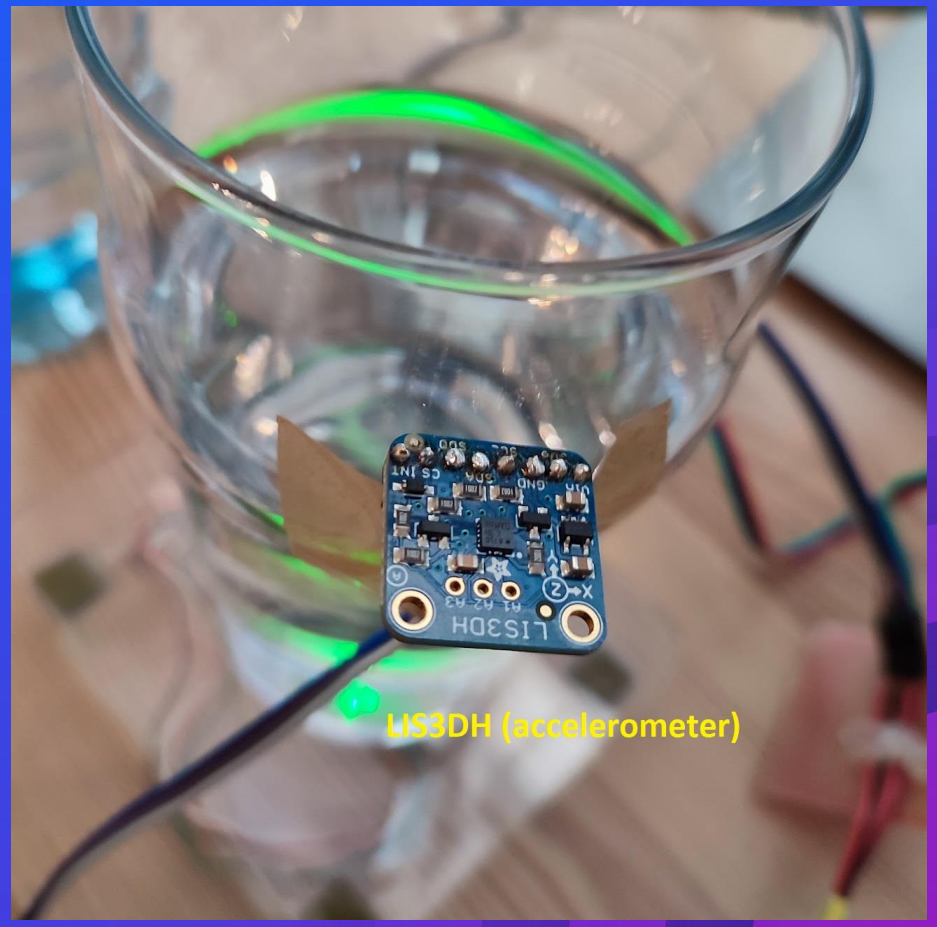
Prototype – let’s simplify design

- Realistically designing and producing bottle for prototype is expensive
- We can do some shortcuts and simplifications here as proof of concept

- We’ll use glass and attach accelerometer with a tape
- We can use weight sensor module and have it as a separate element
- We need to be able to iterate quickly – FT4222 will be very handy

Weight sensor module + FT4222 + Accelerometer





Weight sensor kit is I2C while HX711 is not. It’s a bit tricky to read on non-real-time OS
Underneath it still uses HX711

We've assembled it and now what?

- Let's use my favorite language – C#
- .NET IoT: https://github.com/dotnet/iot/
  - List of supported devices: https://github.com/dotnet/iot/blob/main/src/devices/README.md
    - ADC/DAC/Accelerometers/Gas sensors/Liquid sensors/Light sensors/Barometers/Thermometers/Displays/RFID/... (very long list of devices)
  - Available as NuGet package Iot.Device.Bindings
  - Supports FT4222
  - Supports DFRobot I2C weight sensor module and LIS3DH*
    - * Available in Iot.Device.Bindings version 2.3.0-prerelease

Coding time…

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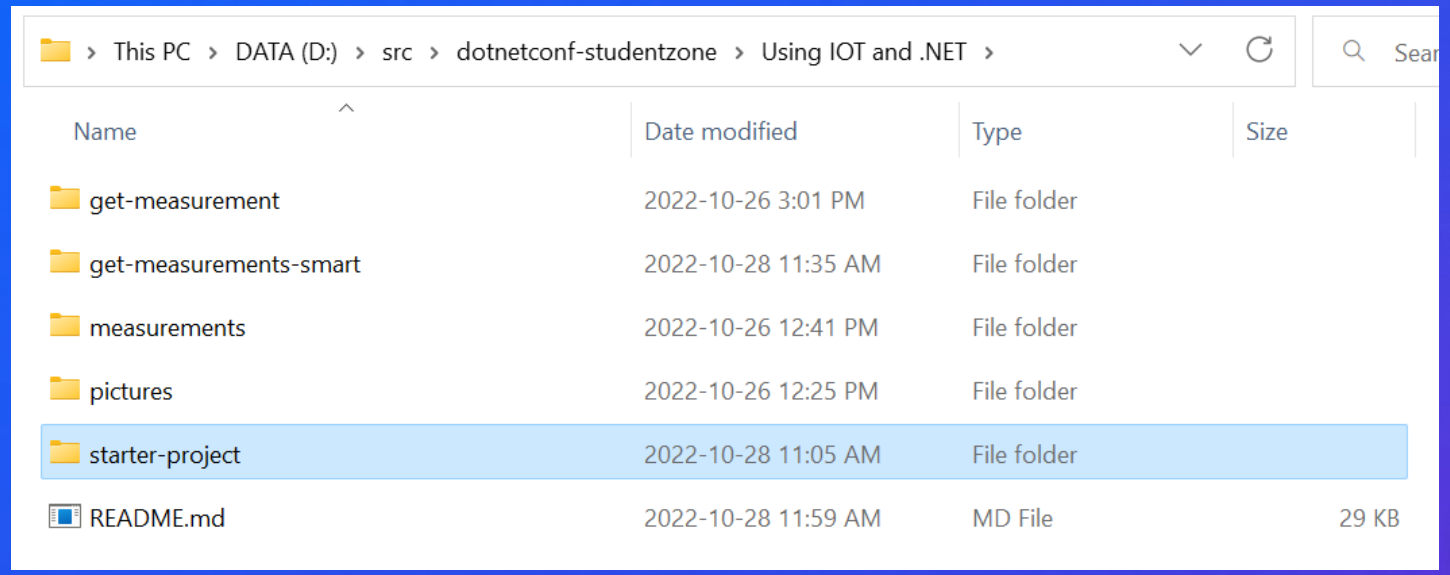

Student Resources
http://aka.ms/learnstudent

Cloud Skills Challenge
https://aka.ms/dotnetstudentcsc

GitHub Repo
https://github.com/microsoft/dotnetconf-studentzone
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Thank you! ☺