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The Environmental Science Education for Sustainable Human Health

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Design of Environmental measuring devices and Environmental sensors learning modules

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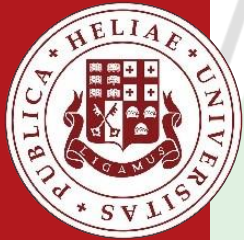
Iliia State University





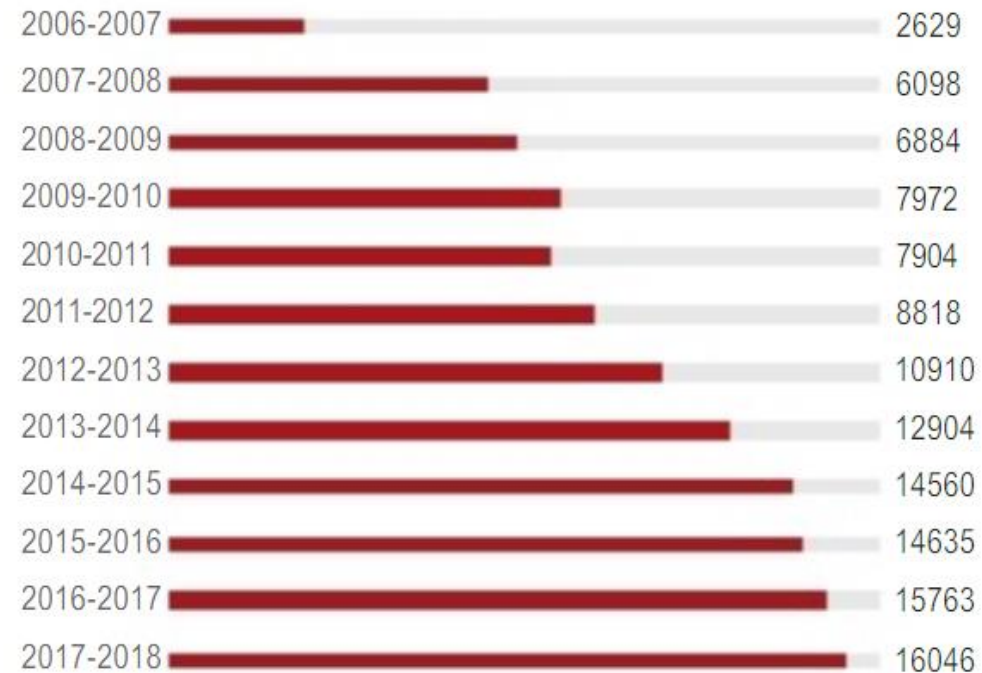
Ilia State University

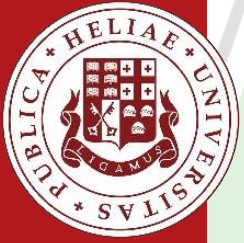




Facts and Figures

- Established in 2006 as a merger of several institutions
- 300 Professors and over 1000 researchers and invited teachers
- 4 Schools
- 16046 Students
- 23 Undergraduate (BA) and 49 Graduate (MA, PhD) Programs
- Around 30 Research Institutes and Centers
- No. 1 Research university in South Caucasus, according to SCimago Institutions Rankings
- No. 1 choice in number of study fields among Georgian freshmen since 2015

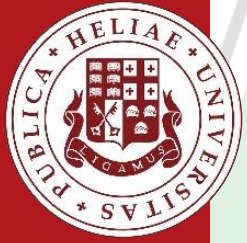




New Building for Engineering and Technologies

- New Building for engineering programs, in cooperation with San Diego State University Georgia to be finished by January 2019
- It will host modern study rooms, co-working spaces and most importantly, following laboratories:
 - Hydraulics Lab
 - Structural Lab
 - Geotechnical Lab
 - Surveying Lab
 - Electrical Engineering Lab
 - Software Engineering Lab
 - Design Lab





Science Popularization



Iliauni Science Picnic - is one of the largest and most successful annual outdoor events organized by Ilia State University since 2012 which aims at popularizing science among various age groups. The event attracts more than 20,000 visitors every year.



Environmental Monitoring and Measurement Devices

course

Topics

Modern environmental protection sensors (gas, temperature, pressure etc.);
Sensor networks;
Data acquisition and processing;
Scanning Electron Microscope;
Transmission Electron microscope;
Visible light and infrared spectrometers for GIS;
Radiation sensors (alpha, beta, and gamma radiation);
Renewable energy sources (solar cells);
Electron Energy Networks (production, transmission and distribution);
Smart networks and Energy storage systems;



Environmental measuring devices module goals and objectives

Module goal is to familiarize students with the environment protection sample measurement tools such as Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), optical and infrared spectrometers, X-ray structure analyzer (XRD).

Module objectives

1. Study the principles of operation of Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM).
2. Study the principles of operation of optical and infrared spectrometers.
3. Study the principles of operation of X-ray structure analyzer (XRD).
4. Study the principles of operation of Energy dispersive x-ray spectroscopy (EDX).
5. Train students in measurement device controlling using LabVIEW software.
6. Train students in data analysis using Microcal Origin software.



Environmental sensors module goals and objectives

The purpose of the Module is to give students established, practical knowledge of modern software and hardware resources, which are used in the construction of environment observation systems.

Module objectives

Study the principles of operation of a variety of sensors.

Study the principles of pairing sensors with a microprocessor.

Study the modern IoT (The Internet of Things) systems, in a way of creating multi-task sensor networks.

Acquiring basic knowledge of Python scripting language to perform some data processing.

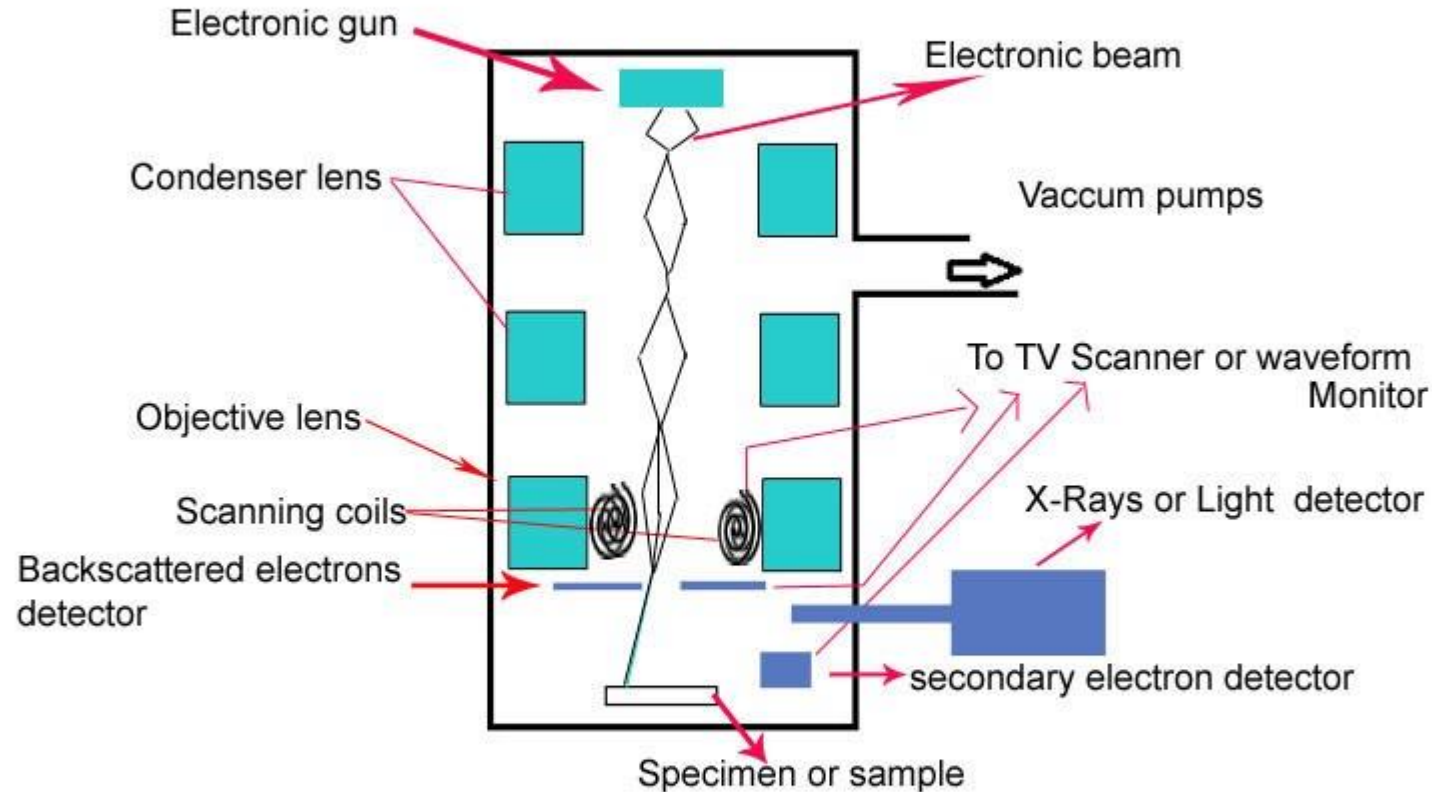
Study the principles of different technologies of saving data from sensors.

Study the principles of different technologies of data visualization.



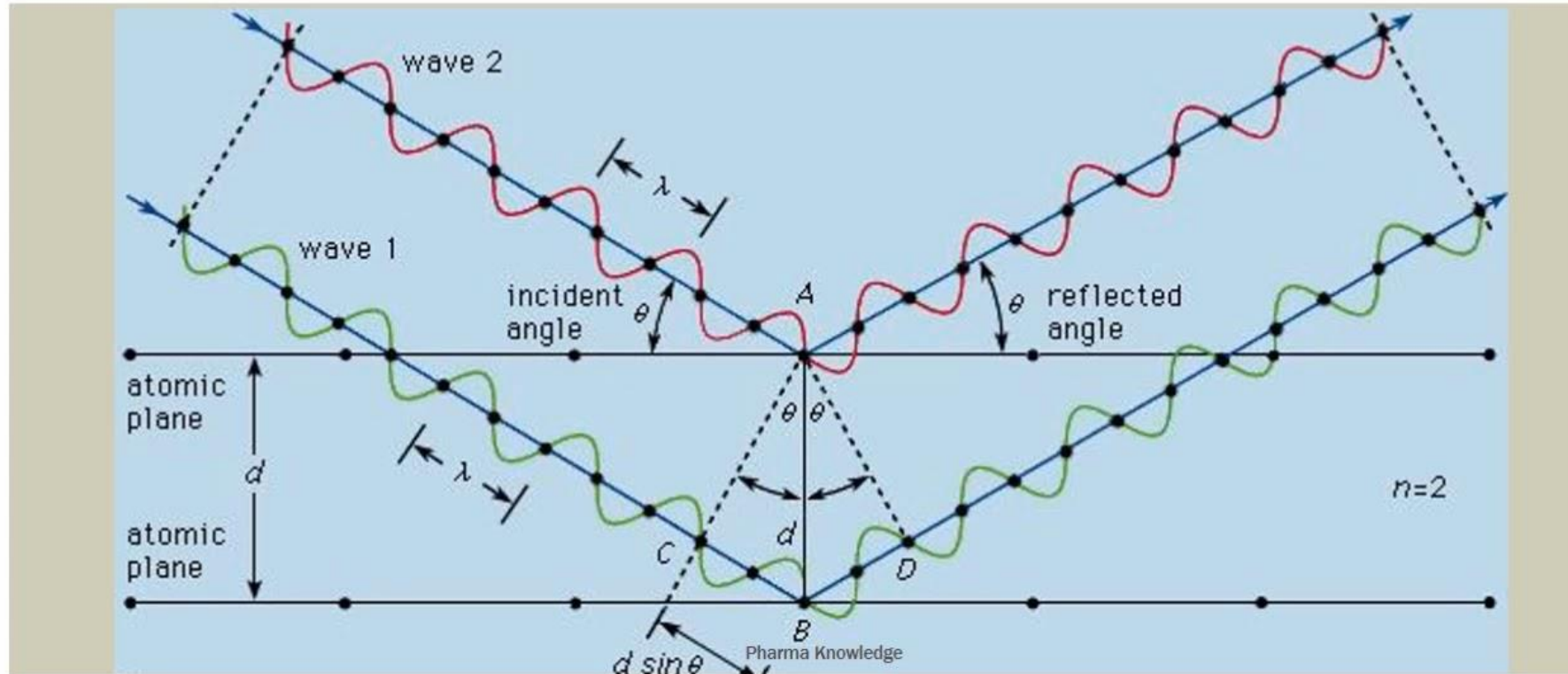
Scanning Electron Microscopy (SEM) with Energy Dispersive X-Ray

SEM - Scanning electron microscope.

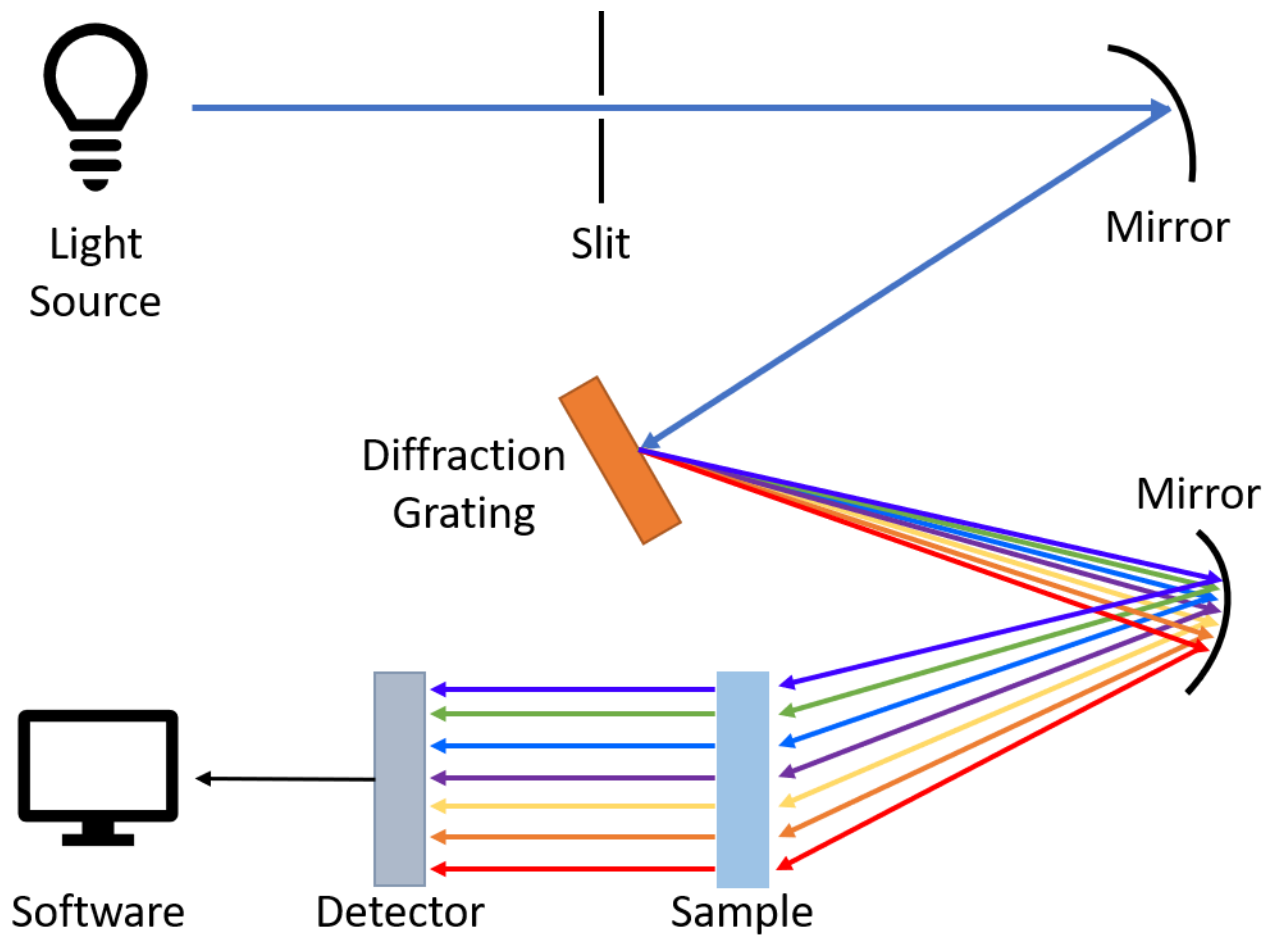


X-ray diffraction analysis

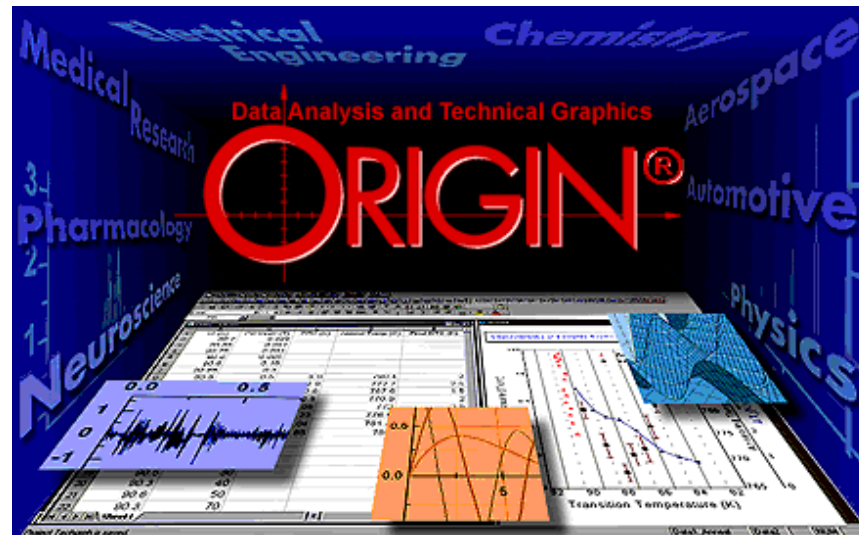
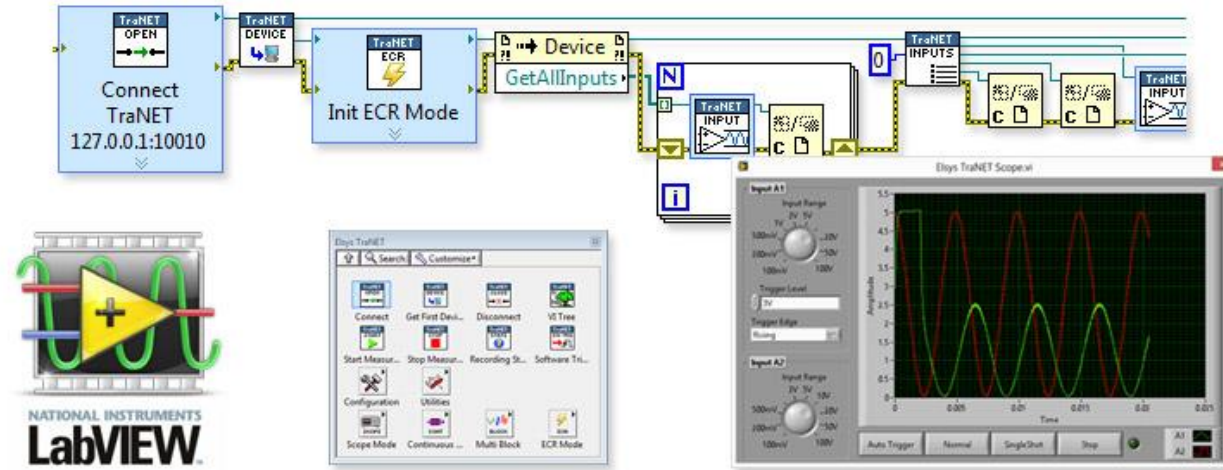
DERIVATION - BRAGG'S LAW



Optical and infrared spectroscopy



National Instruments LabVIEW and Microcal Origin software



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Acquiring basic knowledge of Python scripting language to perform some data processing.

Study the principles of different technologies of saving data from sensors.

Study the principles of different technologies of data visualization.





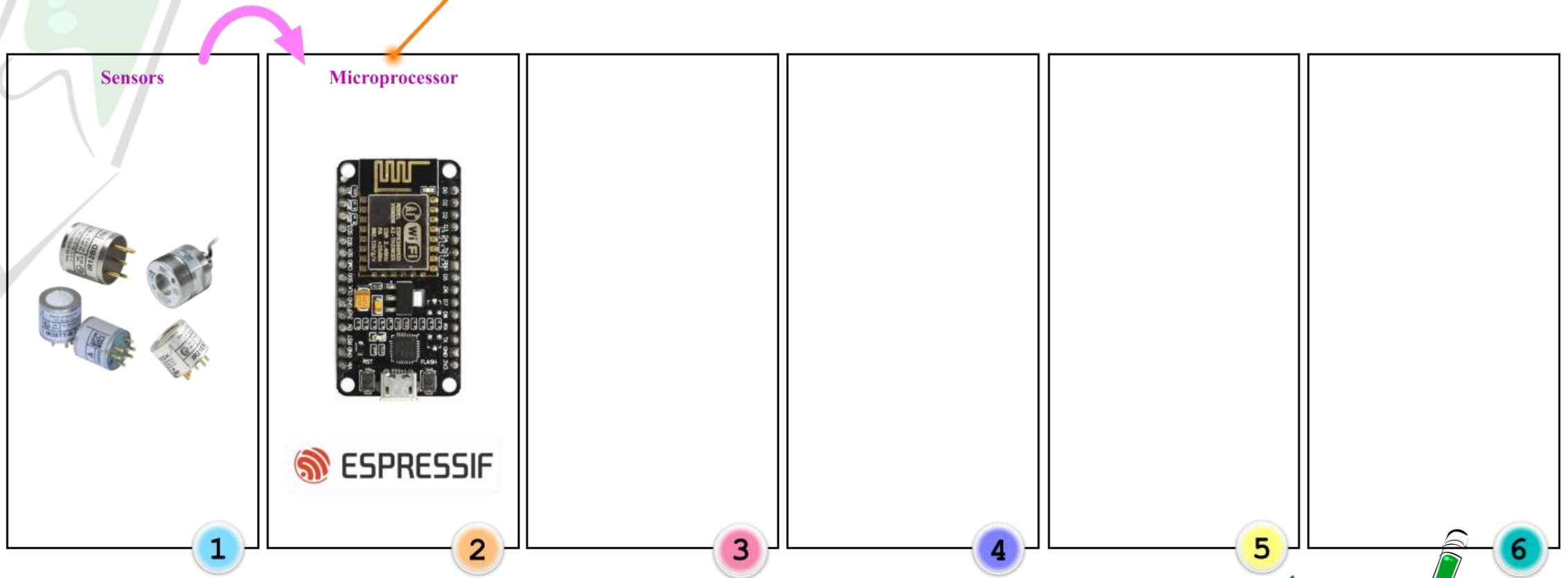
Study the principles of operation of a variety of sensors

Sensors

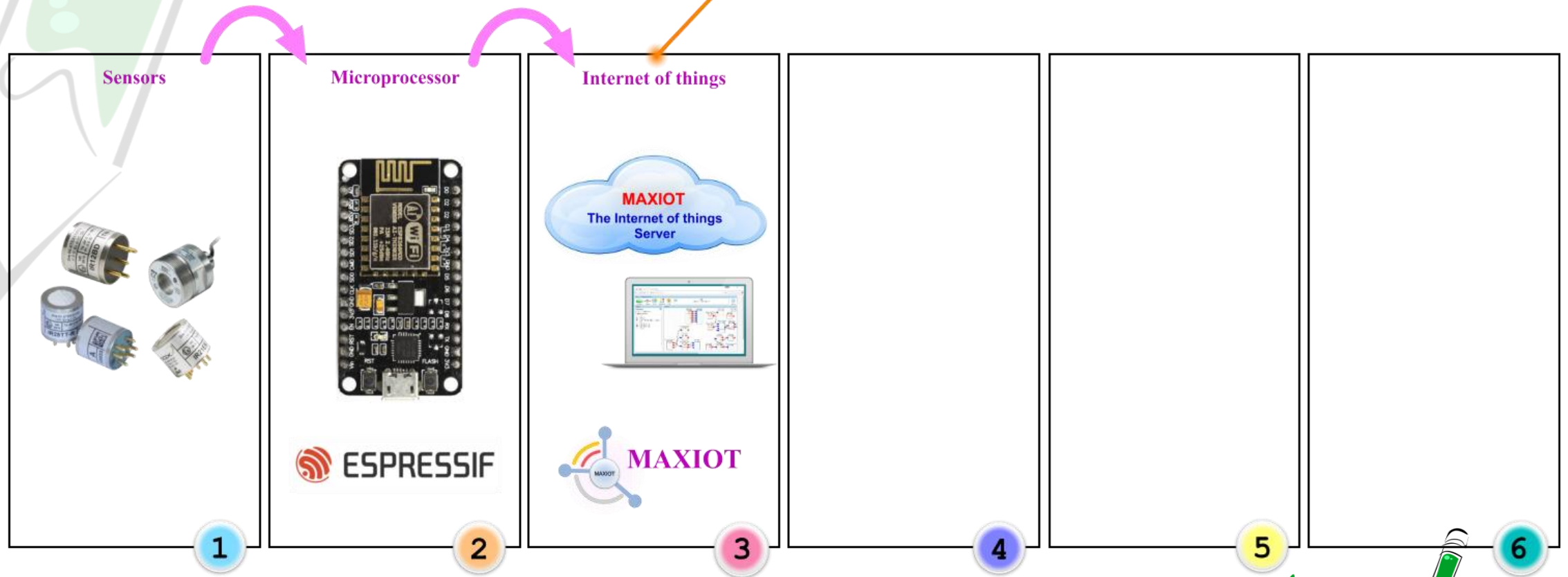
1 2 3 4 5 6

The diagram consists of six rectangular boxes arranged horizontally. The first box on the left is labeled '1' at the bottom center and contains several different types of sensors, including cylindrical and rectangular components with pins. The remaining five boxes, labeled '2' through '6' at their respective bottom centers, are empty. An orange line extends from the title above to the top-left corner of the first box.

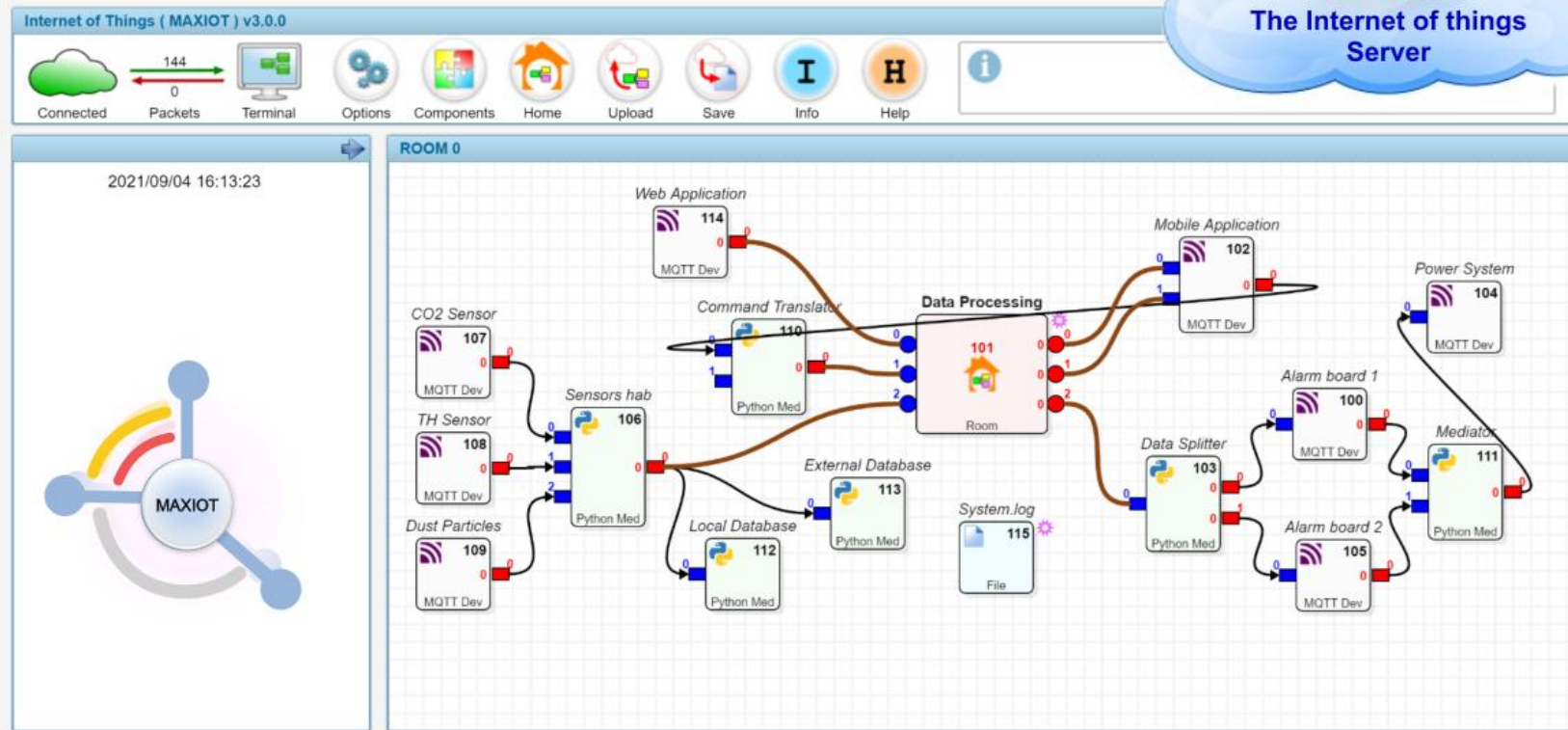
Study the principles of pairing sensors with a microprocessor



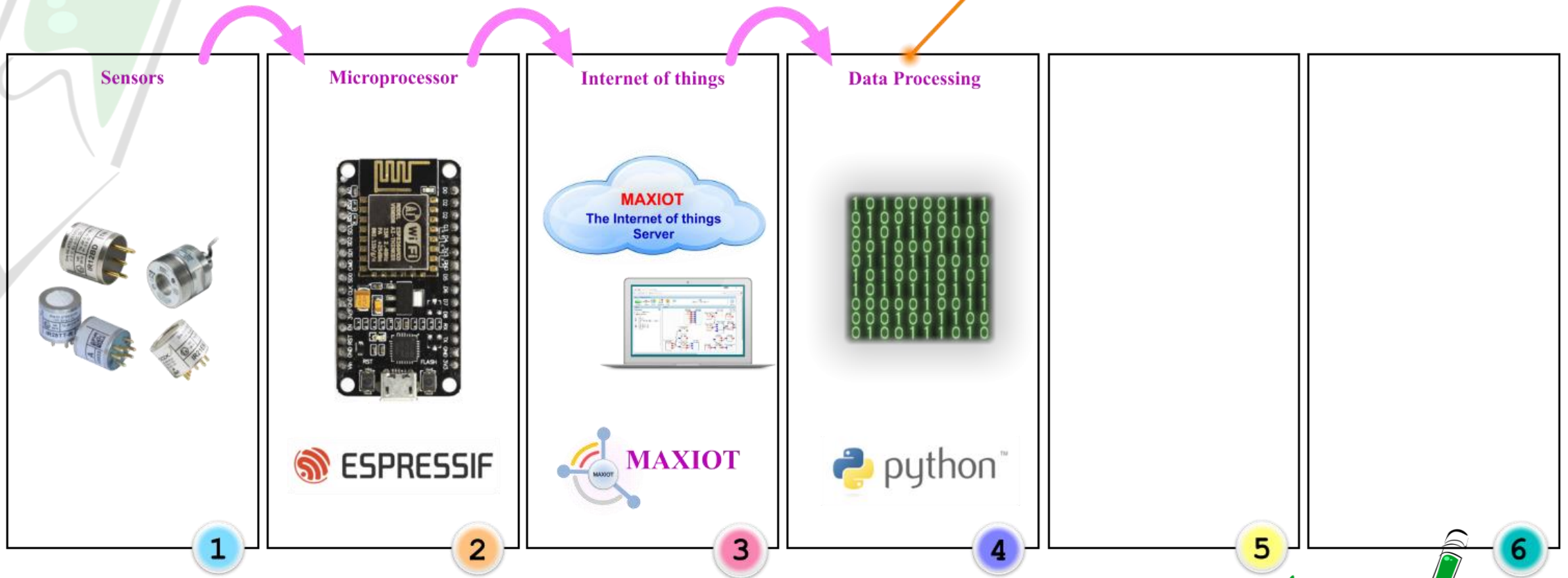
Study the modern IoT (The Internet of Things) systems



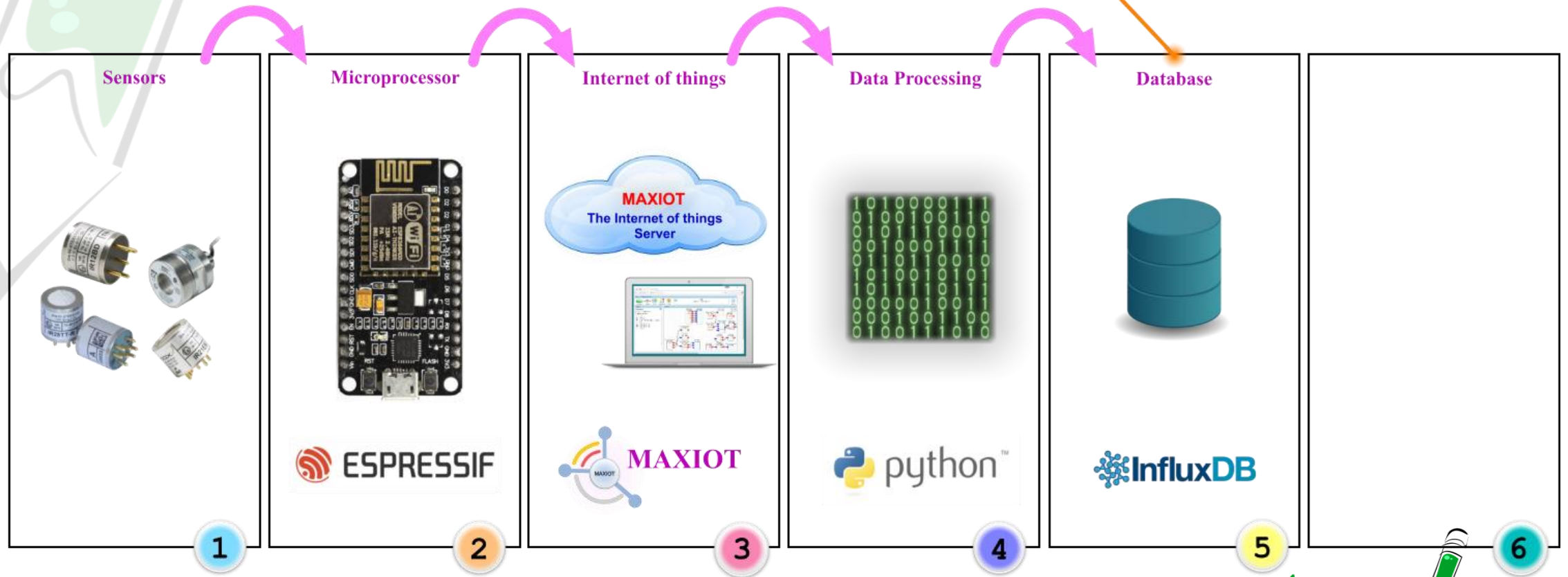
MAXIOT IoT SYSTEMS v3.0



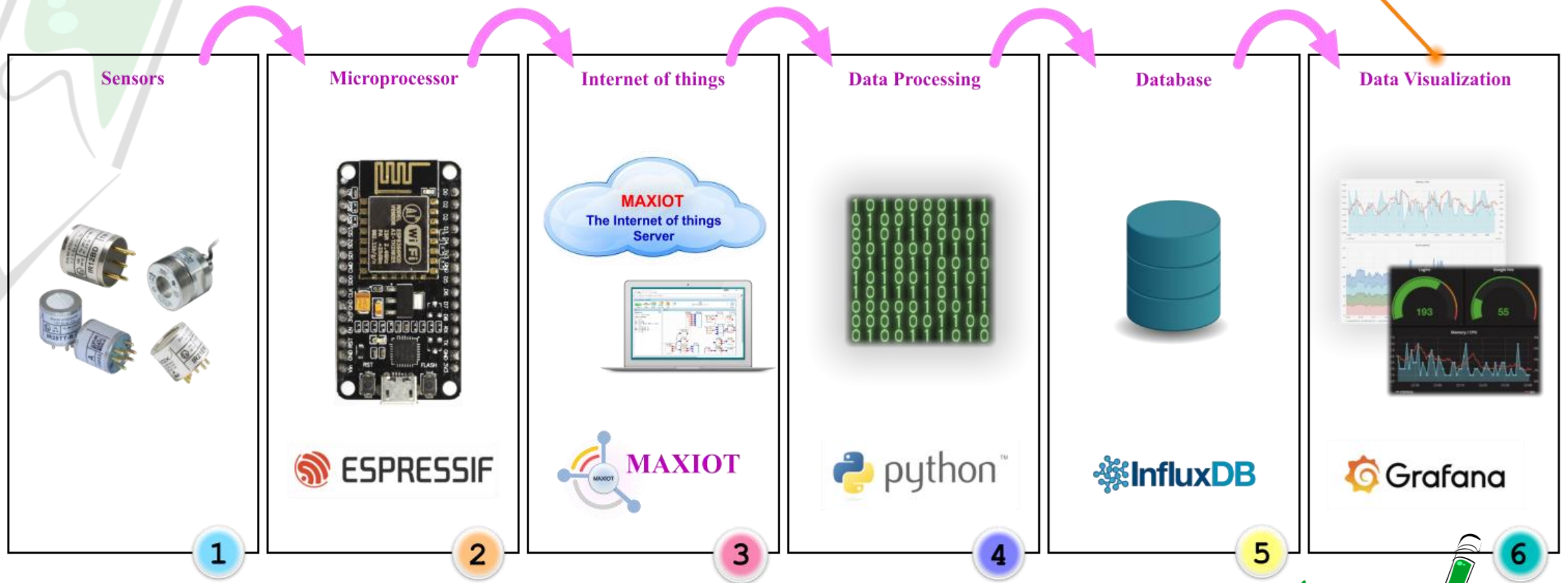
Study the Python scripting language to perform some data processing



Study the principles of different technologies of saving data from sensors



Study the principles of different technologies of data visualization





Thank you for your kind attention!

Name, Surname and email of the speaker