A Reconfigurable Smart Sensor Interface For Industrial WSN In IOT

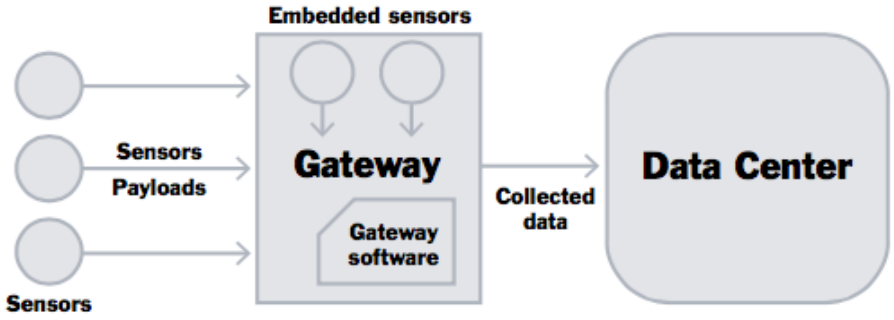
Mahmoud Kalash

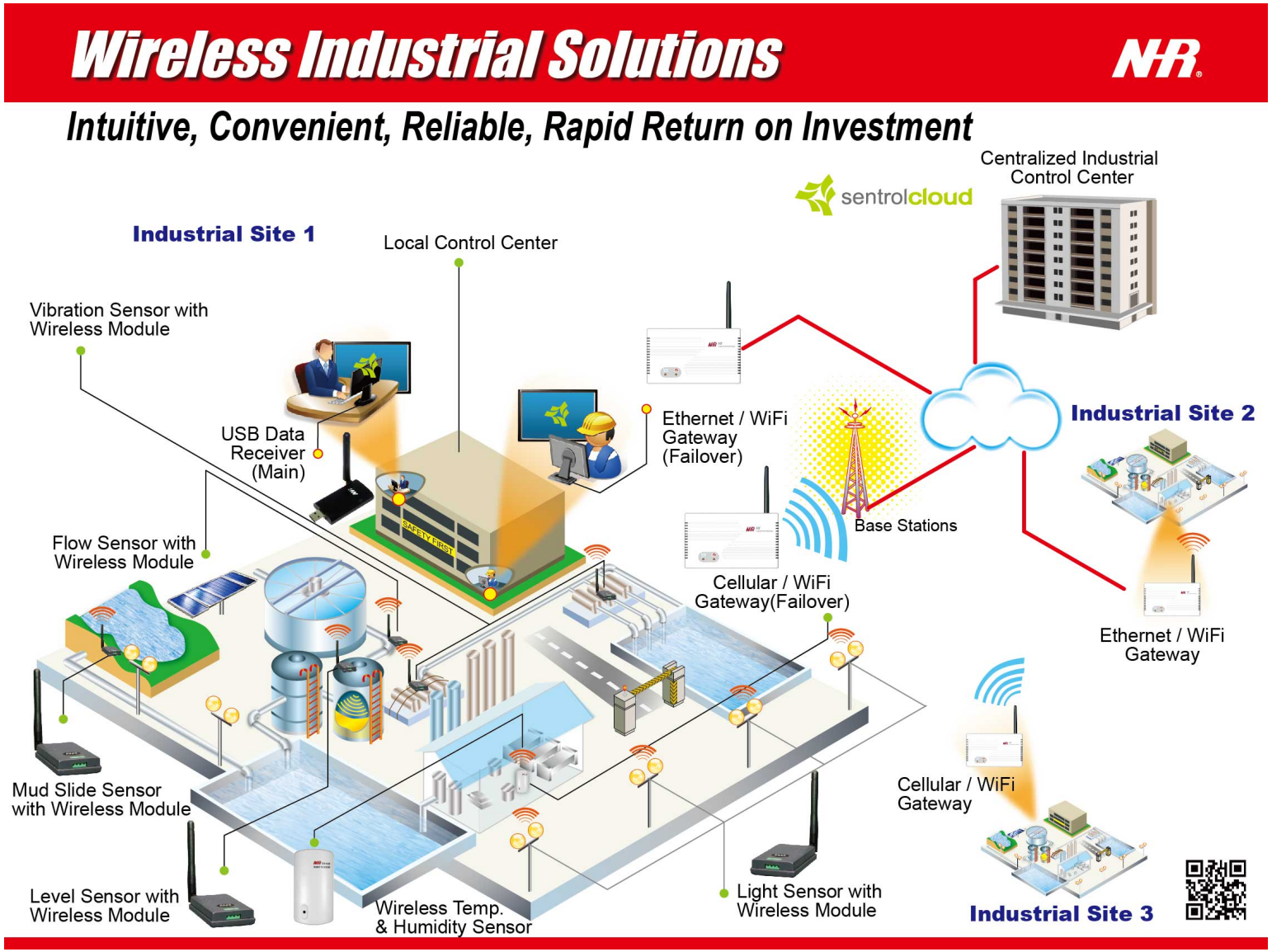
Summary

- Classified as a hardware solution in the IOT world.
- Describe the problem in the currant (until 2014) sensor interface devices.
- hardware solution based on IEEE 1451.
- Implementation and Testing.

Introduction:

- Sensor Interface Device & WSN





Data Acquisition Interface Problems:

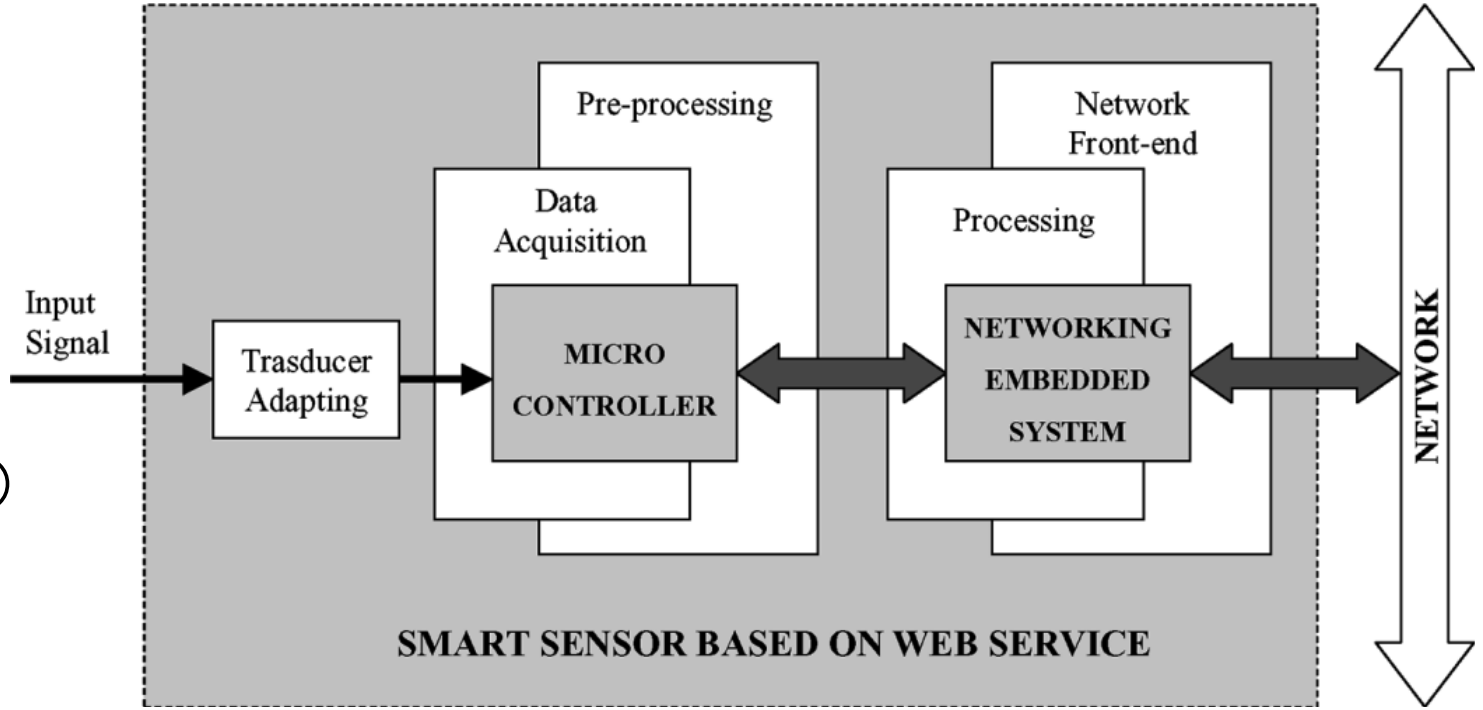
- NOT adaptable to the changing IOT.
- restricted in physical properties of sensors(the connect number, sampling rate, and signal types).
- Using MCU & DATA !!!
- FPGA/CPLD.

IEEE 1451 STIM(Smart Transducer Interface Module)

- Standardize Intelligent sensors interfaces.
- Compatibility Problem.
- sensors interface definition→ Data acquisition.
- Automatically search and connect.

IEEE 1451 Limitations:

- High cost.
- Popularity.
- Availability.



Hardware Interfaces ☺

Complex Structure ☹

Restricted ☹

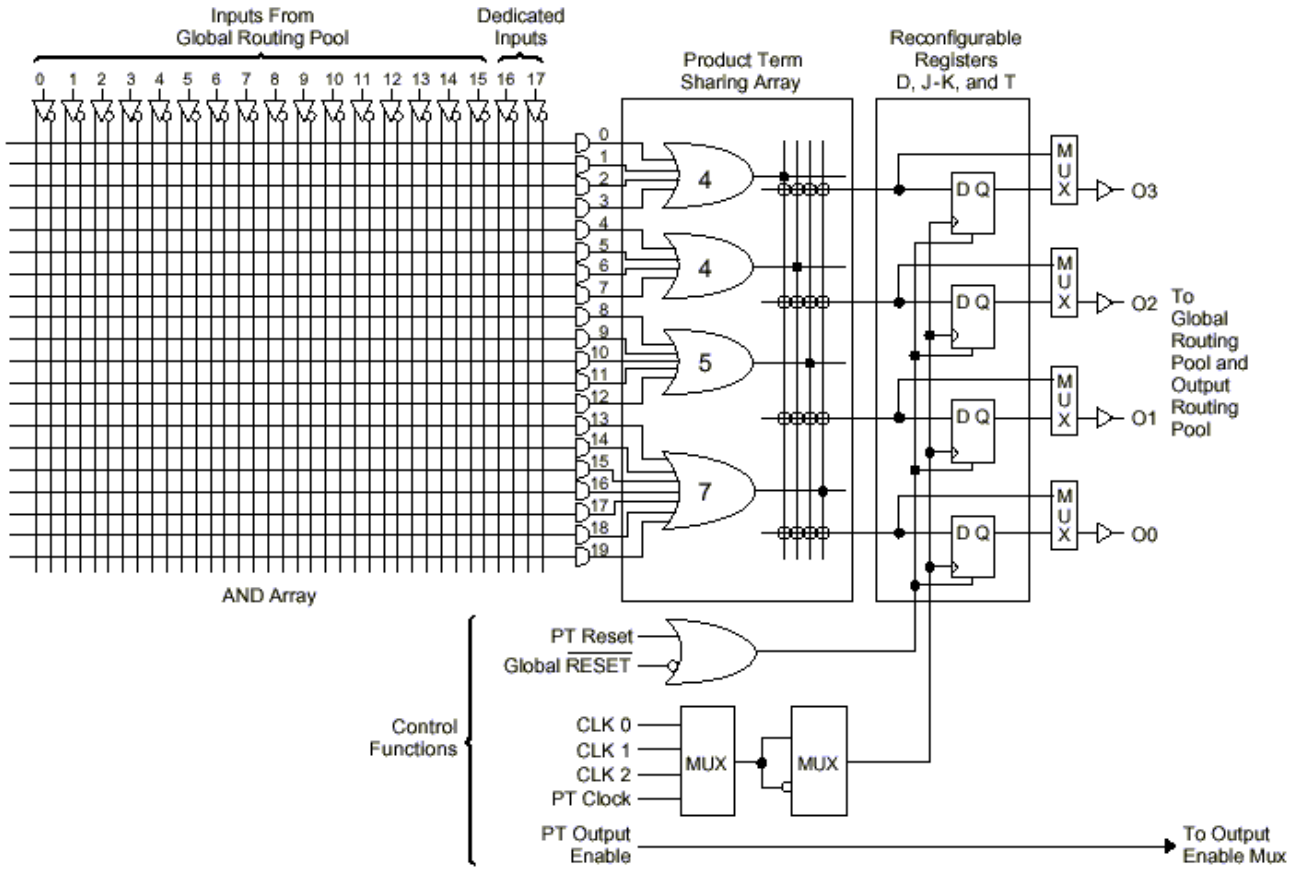
The Designed Solution:

- A Reconfigurable Smart Sensor Interface.

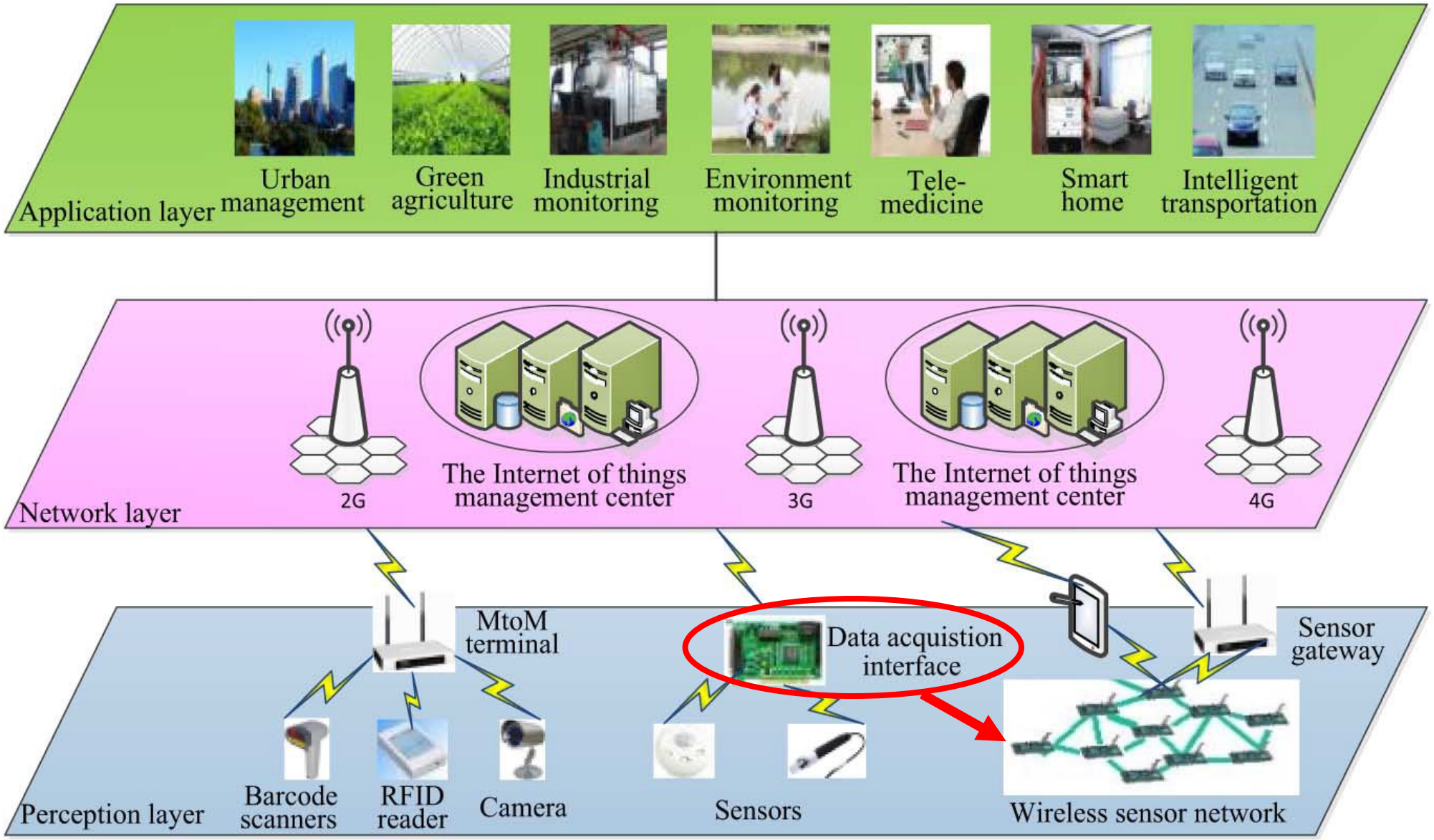
- Advantages:

☺CPLD as Controller : Parallel.

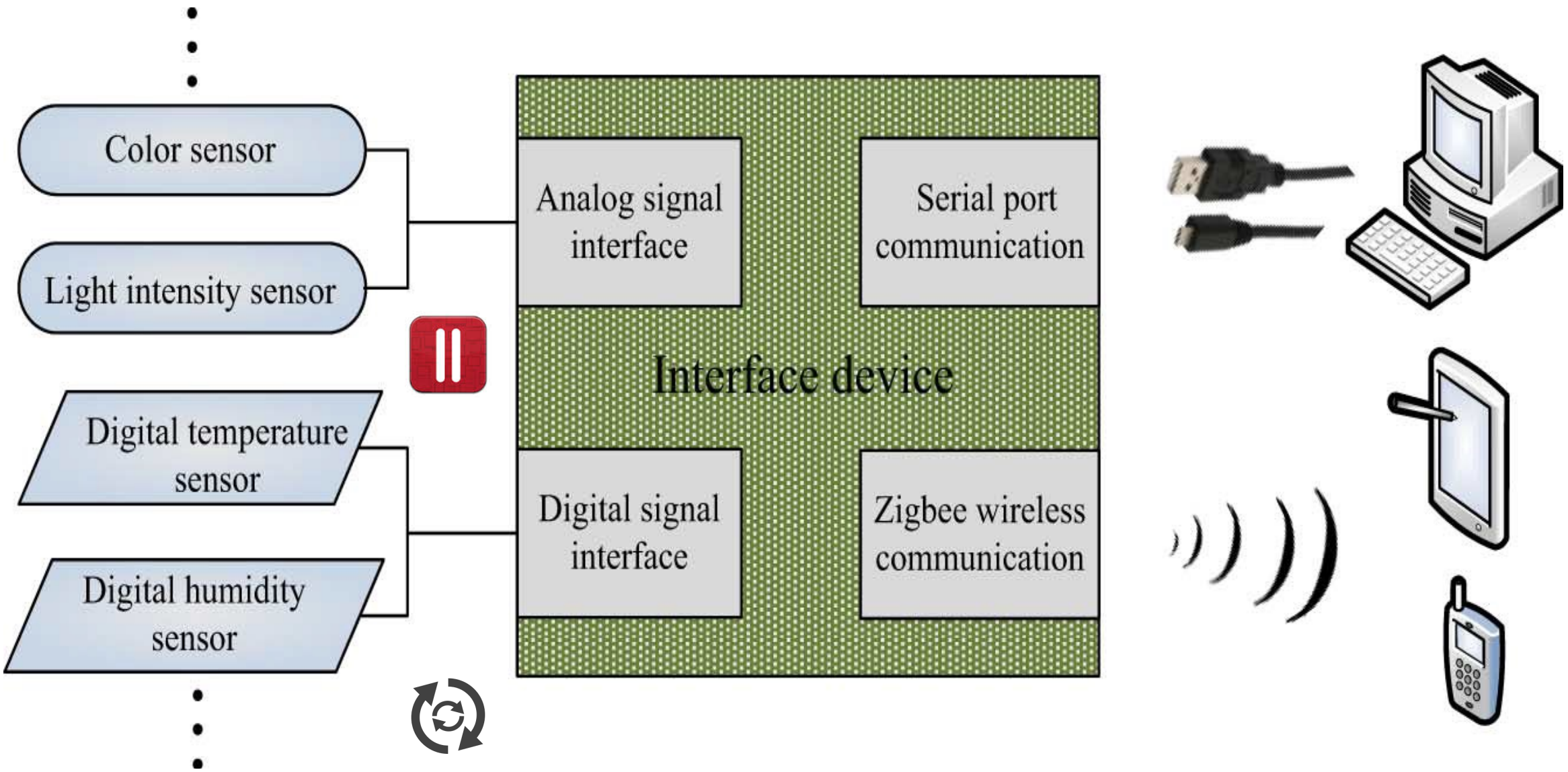
☺Plug &Play.



The Relation with IOT:



Solution Architecture:

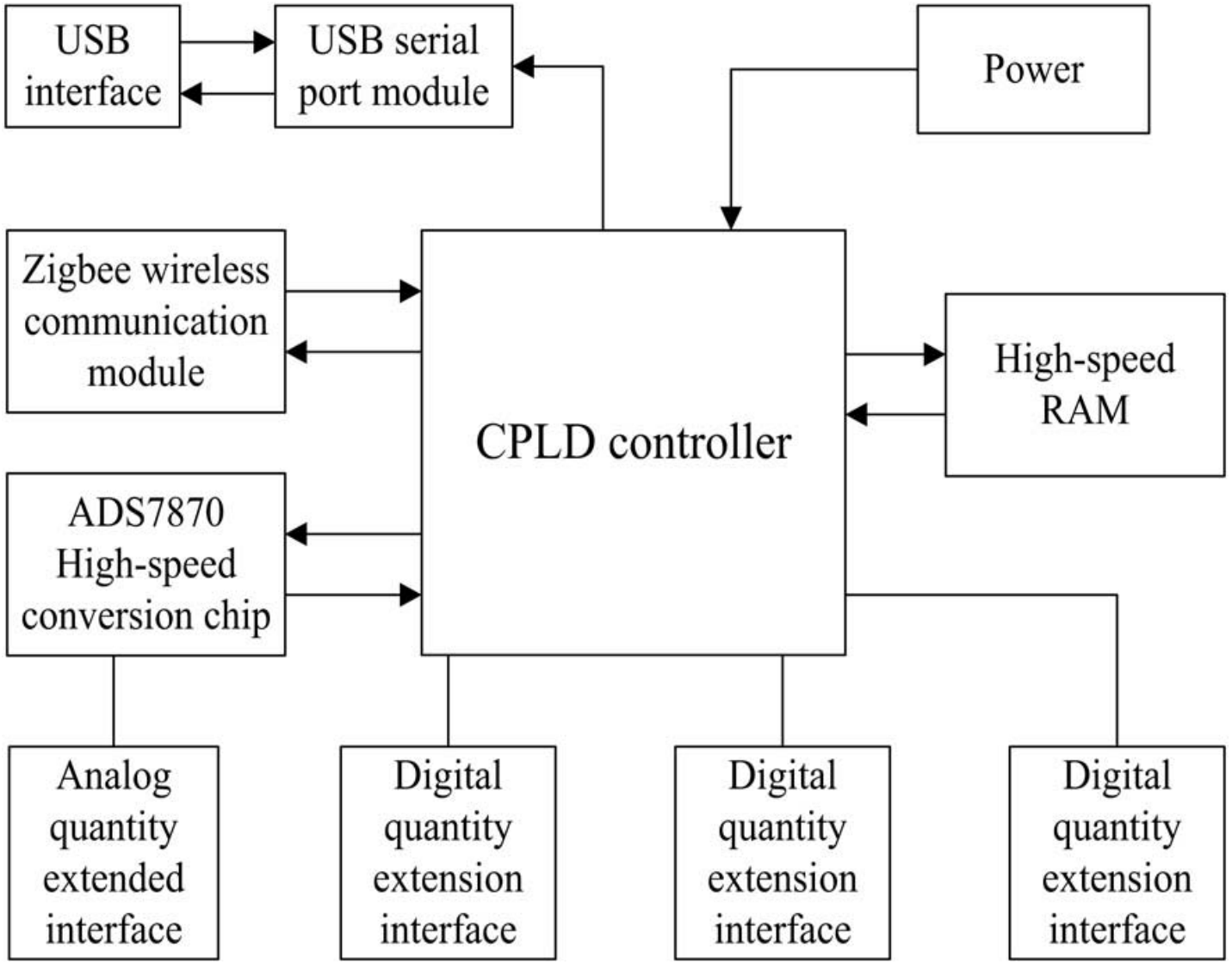


Implementation:

- A. The Introduction of the Hardware Architecture
- B. VHDL Design:
- 1) IEEE1451.2 Protocol Based on VHDL Language Design:
- a) Overall Design of the Intelligent Transmitter STIM:
- b) Module Design of the Spreadsheet TEDS:
- c) Module Design of the Sensor Independent Interface TII:
- 2) The Design of the Interface Device Driver:

Implementation:

- Hardware.
- VHDL Design.



VHDL Design:

- Very-High-Speed Integrated Circuit Hardware Description Language
- Behavior, structure and timing of a logical circuit.

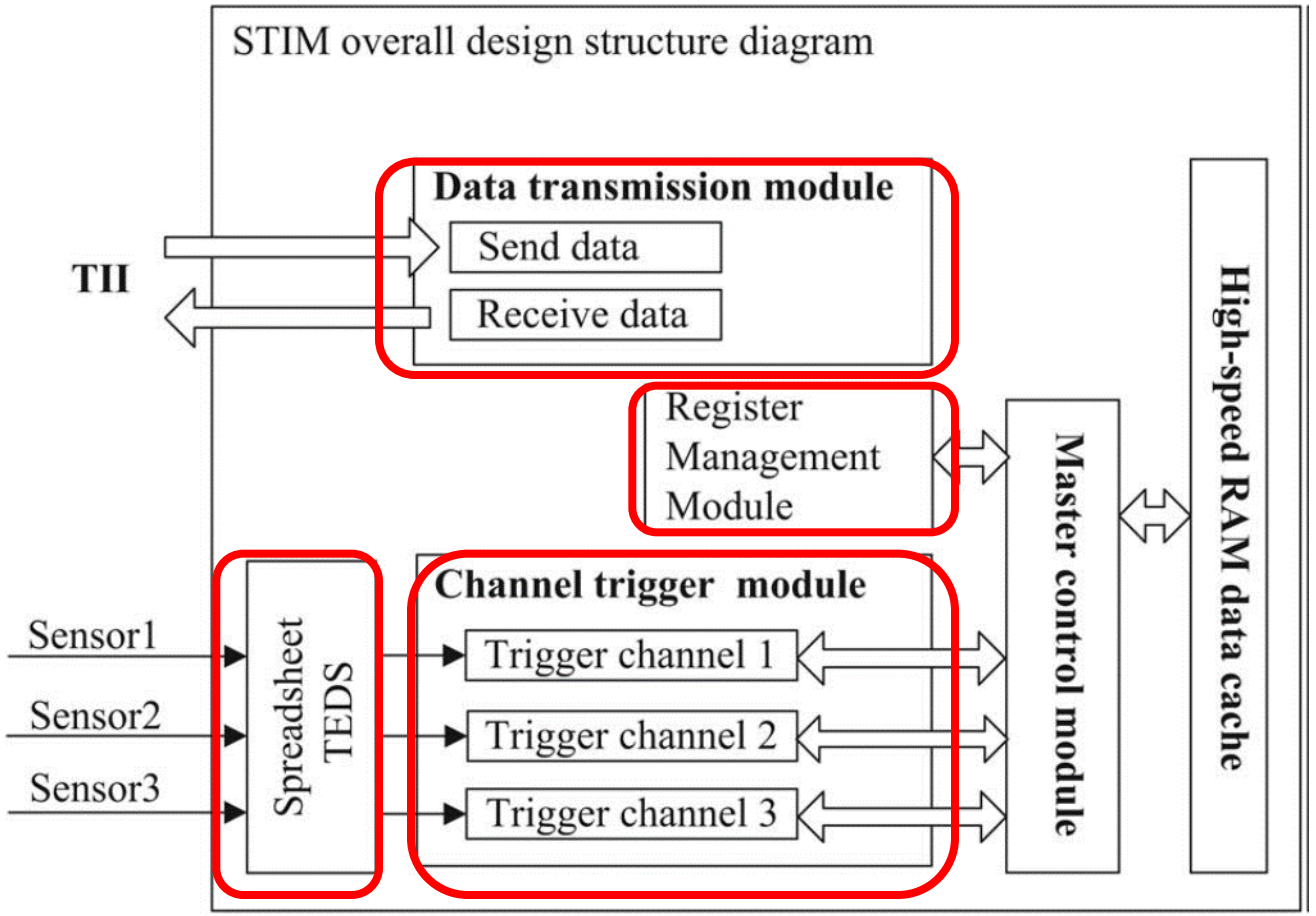
- 1) IEEE1451.2 Protocol Based on VHDL Language Design:
- 2) The Design of the Interface Device Driver:

IEEE1451.2 Protocol Based on VHDL Language Design:

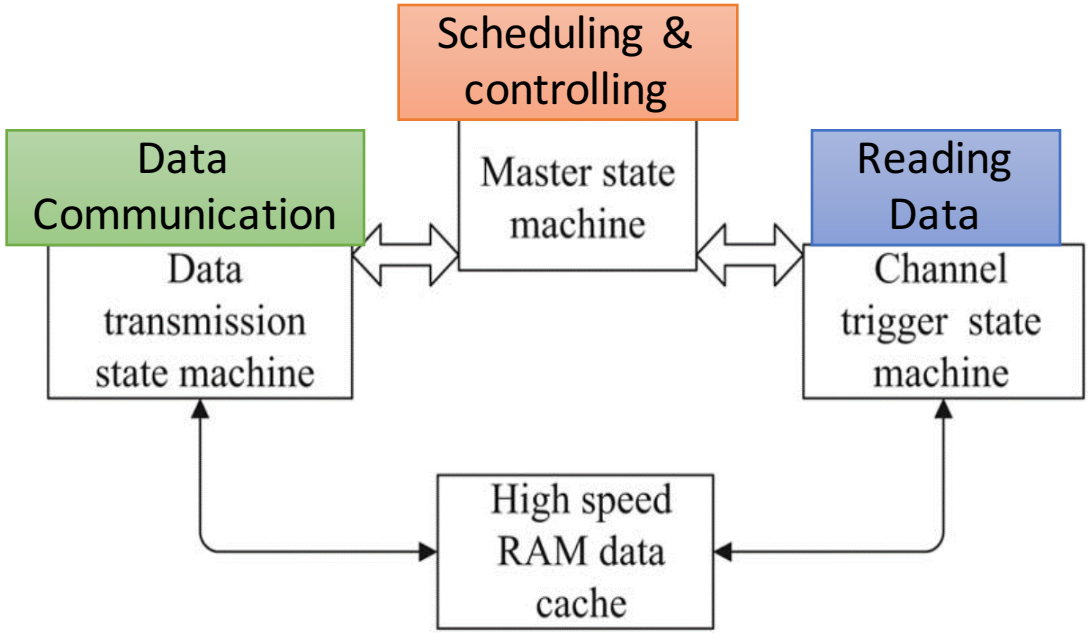
- a) Overall Design of the Intelligent Transmitter STIM:

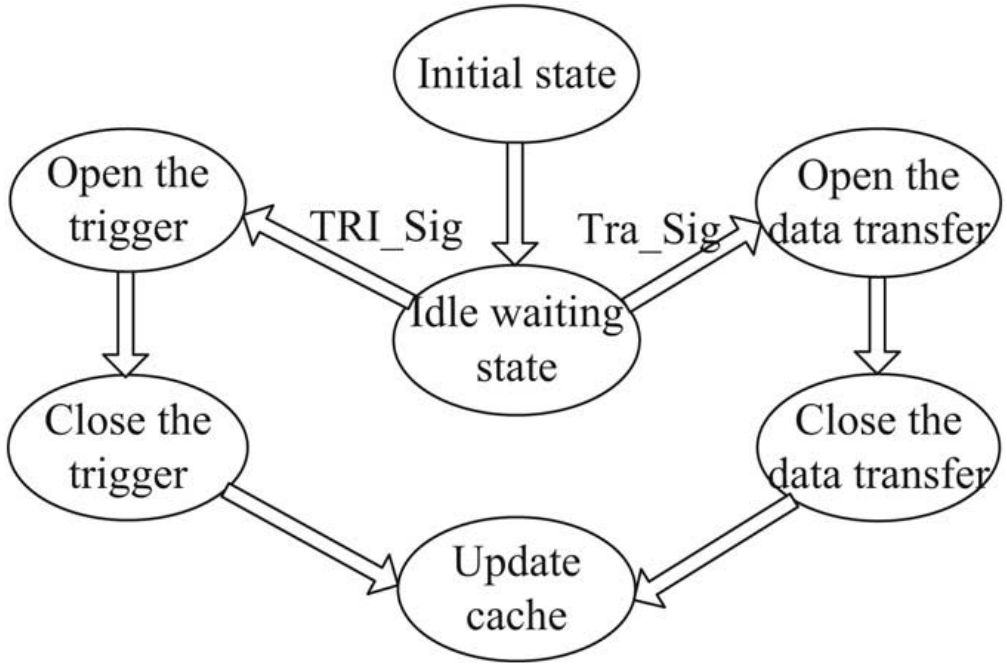
Data Acquisition.

Data Transmission.

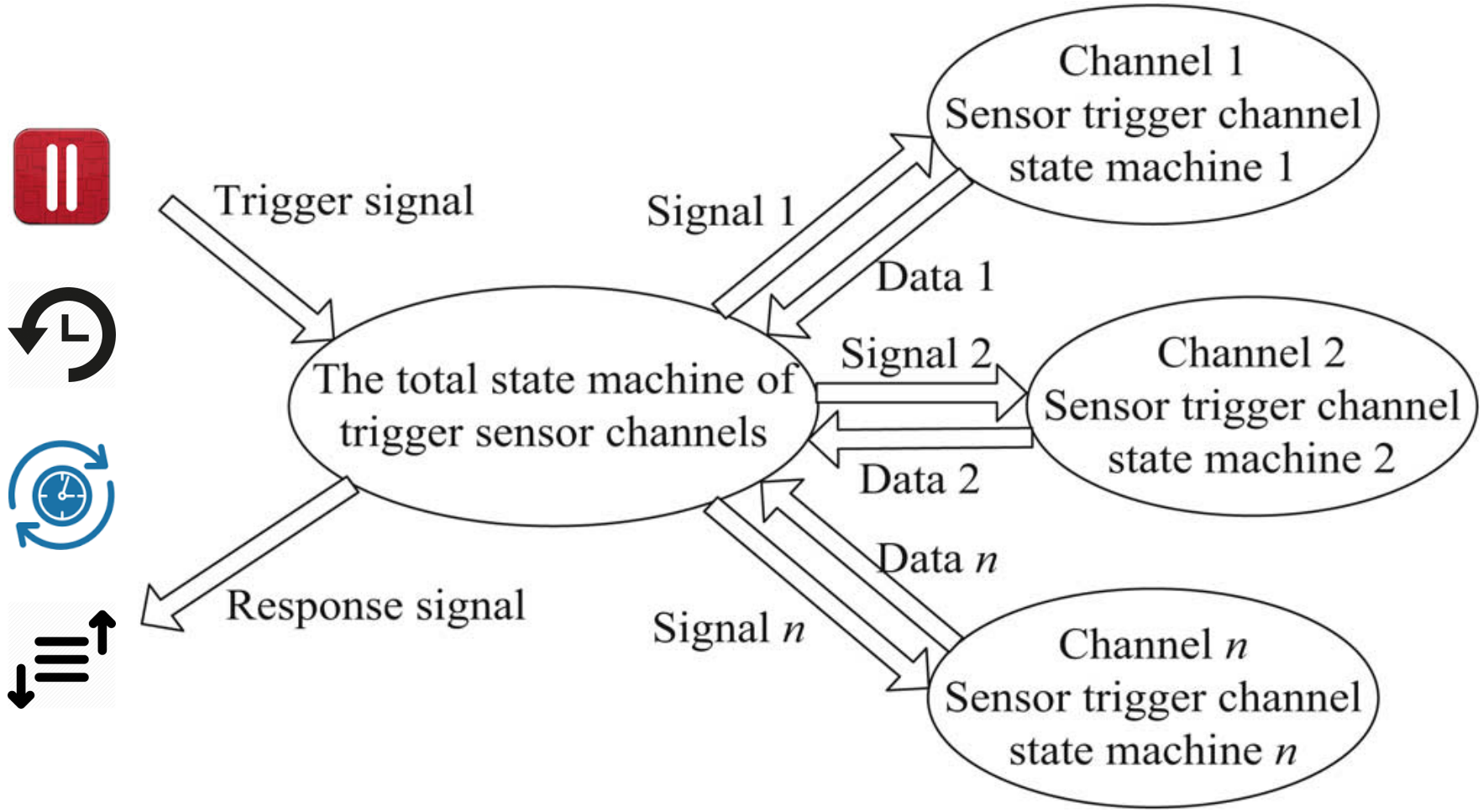


a) Overall Design of the Intelligent Transmitter STIM:

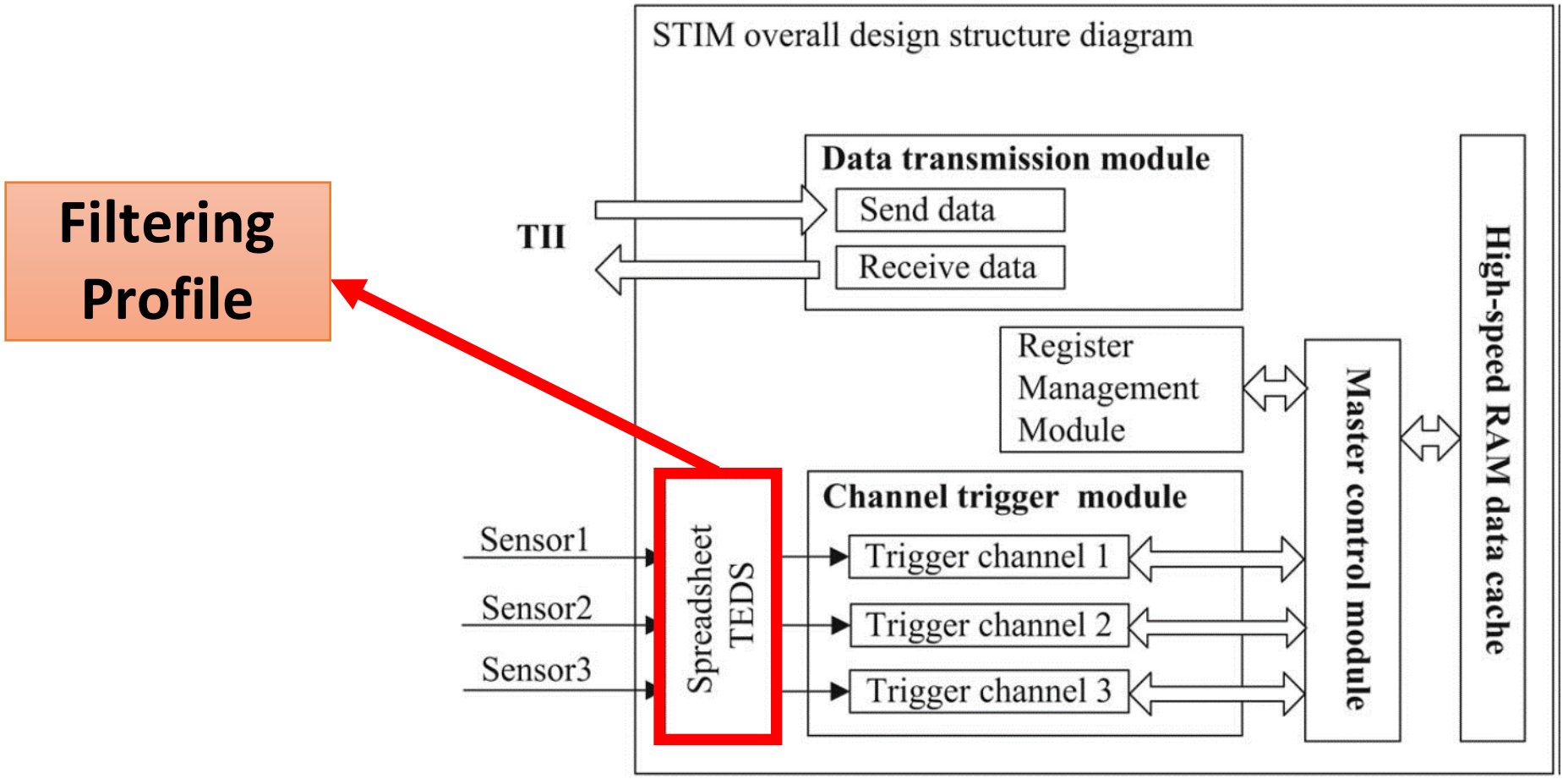




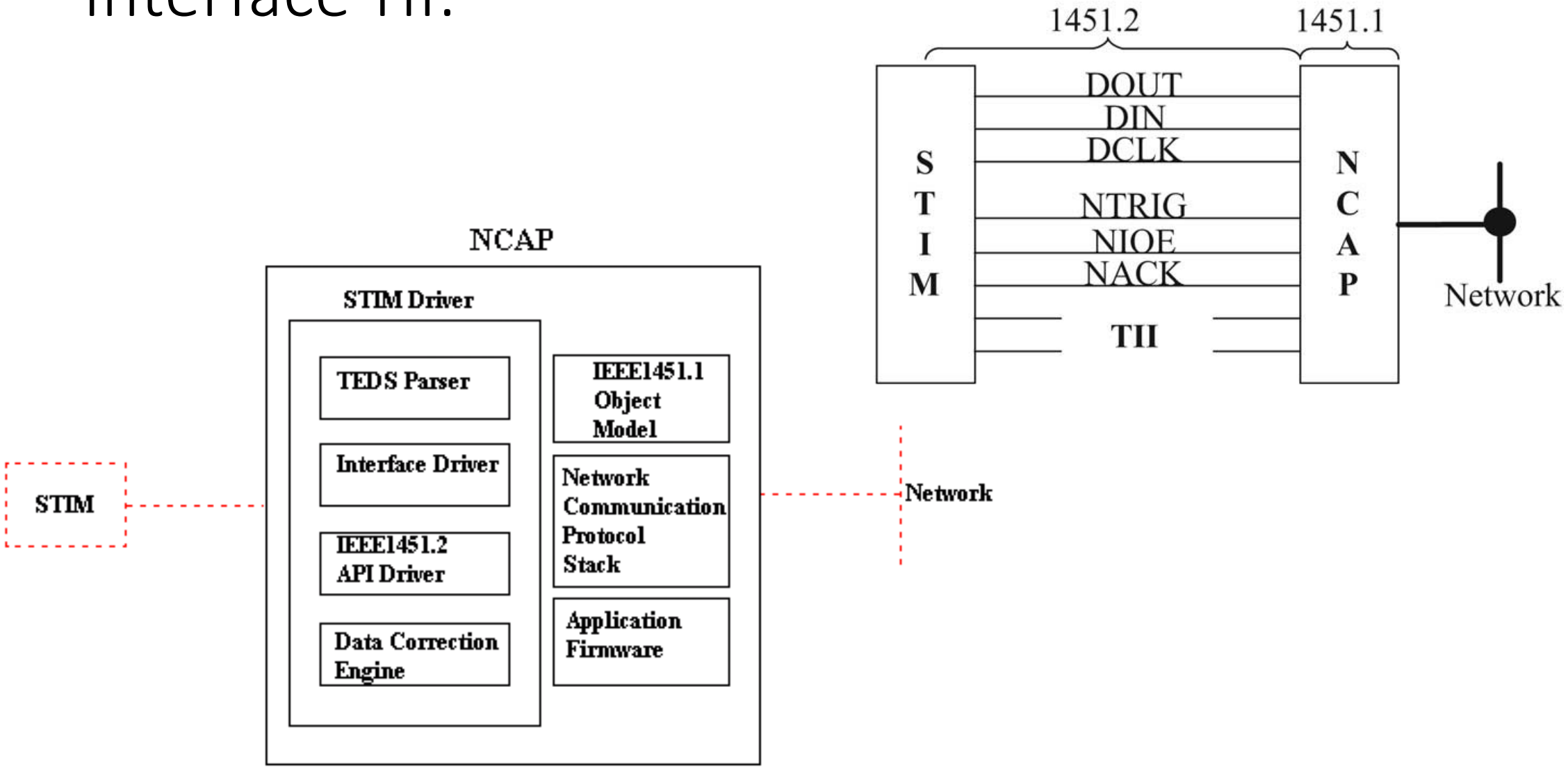
a) Overall Design of the Intelligent Transmitter STIM:



b) Module Design of the Spreadsheet TEDS:

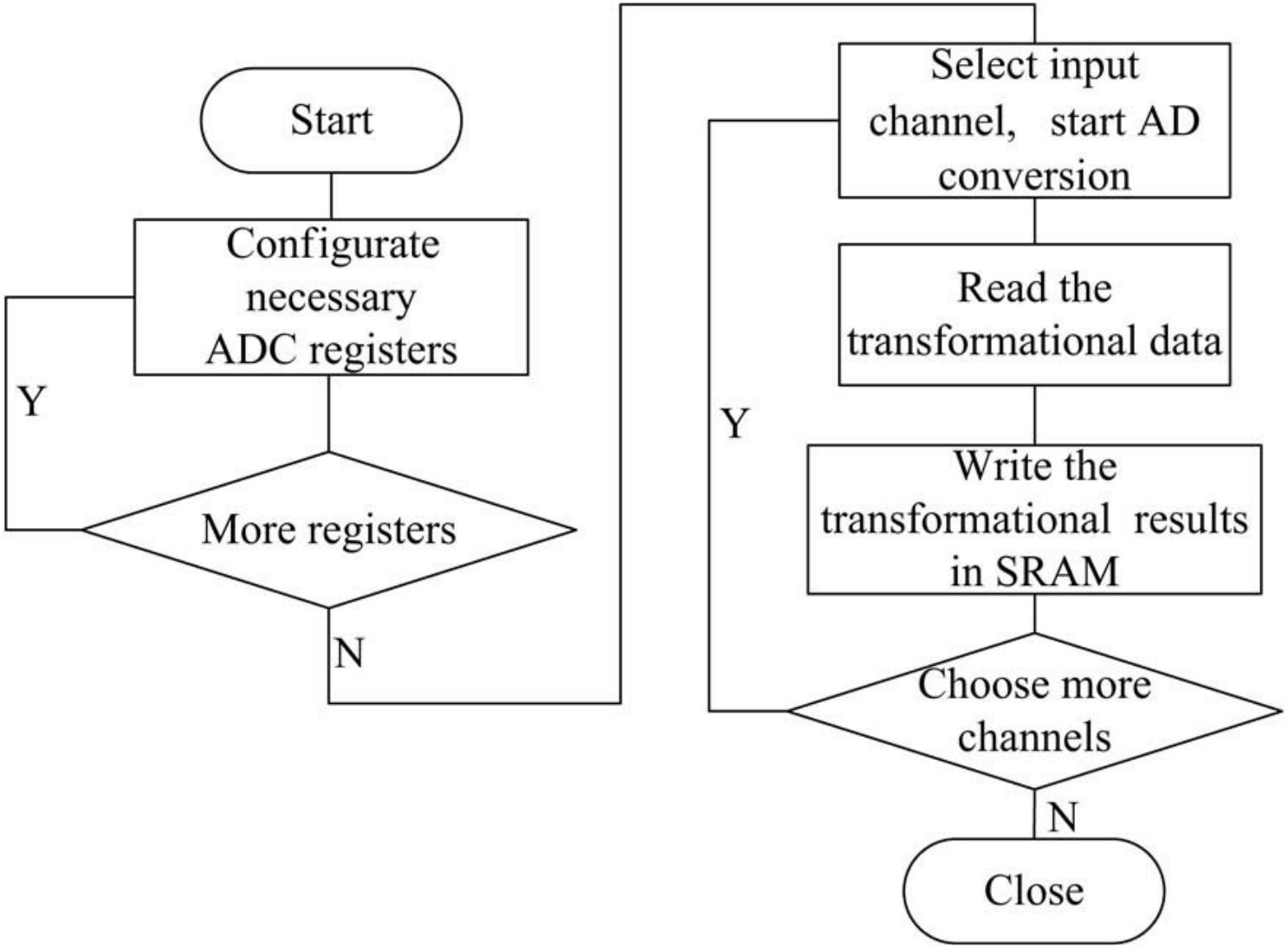


c) Module Design of the Sensor Independent Interface TII:

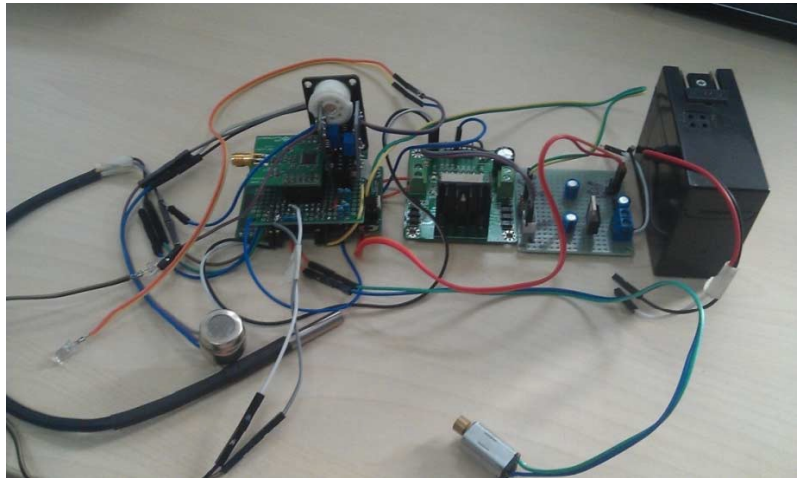


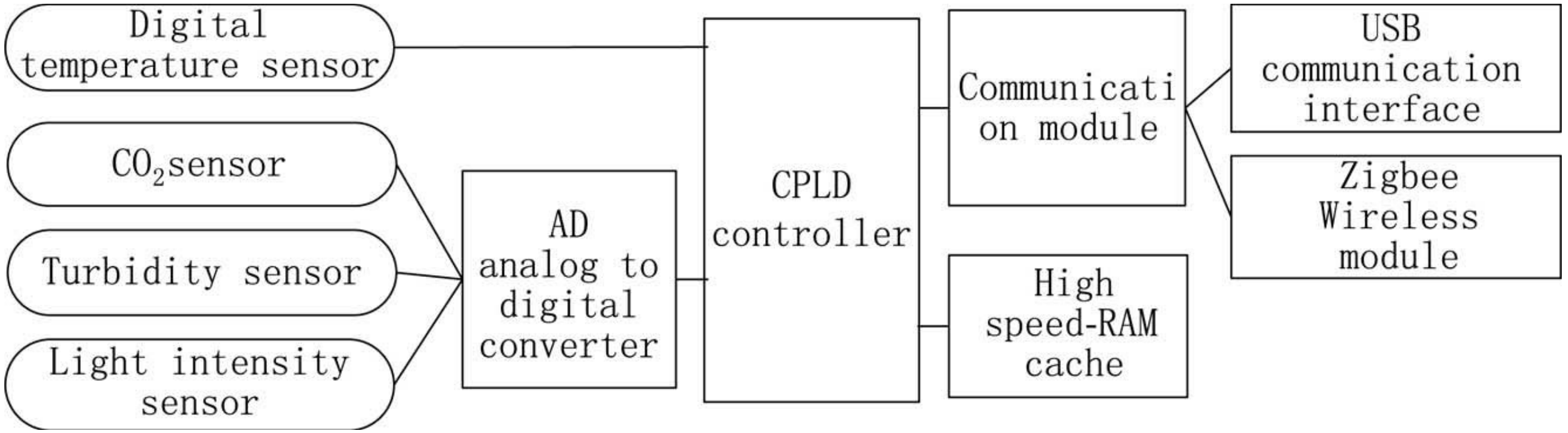
2) The Design of the Interface Device Driver:

- Drivers for every used chip.



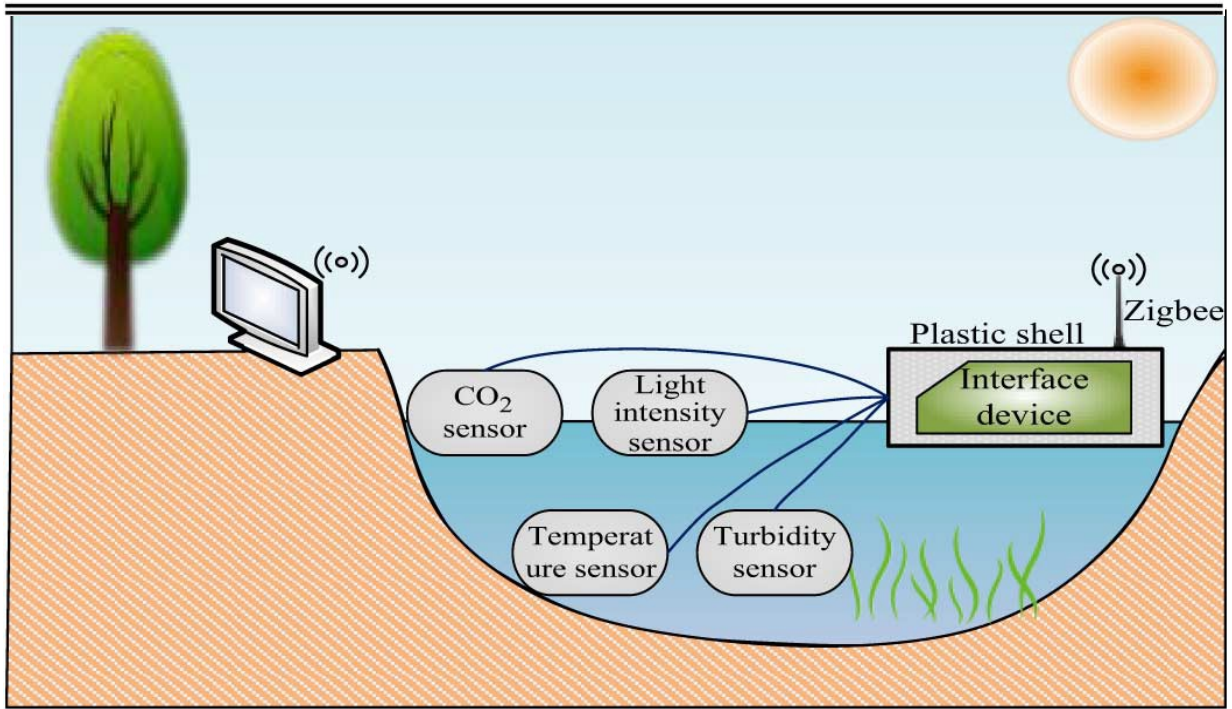
Application in Water Quality Monitoring





Application in Water Quality Monitoring

Name	Type
Temperature sensor	DS18B20
Temperature and humidity sensor	SHTxx series
CO_2 sensor	MG811
Light intensity sensor	GY-30
Turbidity sensor	KIE-TS-300B
Pressure sensor	MPX5999D
PH sensor	YBK10-WQ201



Conclusion

- For further research:
- The function of spreadsheet should be expandable.
- IEEE protocol can be perfected.