

ΑΛΓΟΡΙΘΜΙΚΕΣ ΘΕΜΕΛΙΩΣΕΙΣ ΔΙΚΤΥΩΝ ΑΙΣΘΗΤΗΡΩΝ  
*End-to-end WSN Project 2023-2024*



**ΤΜΗΜΑ ΜΗΧΑΝΙΚΩΝ ΥΠΟΛΟΓΙΣΤΩΝ ΚΑΙ  
ΠΛΗΡΟΦΟΡΙΚΗΣ**

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Εξάμηνο: 10<sup>ο</sup>

# ΑΛΓΟΡΙΘΜΙΚΕΣ ΘΕΜΕΛΙΩΣΕΙΣ ΔΙΚΤΥΩΝ ΑΙΣΘΗΤΗΡΩΝ

## *End-to-end WSN Project 2023-2024*

### PROJECT DEMONSTRATION

#### Ερώτημα 1

1.

```
stathisrav@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/hello-world$ make -j 20 sky-reset-sequence
make[2]: Entering directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/hello-world'
./../tools/sky/msp430-bsl-linux --telosb -c /dev/ttyUSB0 -r
MSP430 Bootstrap Loader Version: 1.39-telos-7
Use -h for help
Reset device ...
Done
make[2]: Leaving directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/hello-world'
make -j 20 sky-upload-sequence
make[2]: Entering directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/hello-world'
++++ Erasing /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Use -h for help
Mass Erase...
Transmit default password ...
++++ Programming /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Invoking BSL...
Transmit default password ...
Current bootstrap loader version: 1.61 (Device ID: f16c)
Changing baudrate to 38400 ...
Program ...
42453 bytes programmed.
++++ Resetting /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Use -h for help
Reset device ...
Done
make[2]: Leaving directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/hello-world'
make[1]: Leaving directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/hello-world'
stathisrav@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/hello-world$ make TARGET=sky login /dev/ttyUSB0
flwrap ../tools/serial-io/serialdump -b115200 /dev/ttyUSB0
connecting to /dev/ttyUSB0 [OK]
#3##2?~#2#~#7#~Hello, world
Hello, world
Hello, world
```

Παράδειγμα hello-world.

2.

```
Done
make[2]: Leaving directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/test_nullnet'
make -j 20 sky-upload-sequence
make[2]: Entering directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/test_nullnet'
++++ Erasing /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Use -h for help
Mass Erase...
Transmit default password ...
++++ Programming /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Invoking BSL...
Transmit default password ...
Current bootstrap loader version: 1.61 (Device ID: f16c)
Changing baudrate to 38400 ...
Program ...
17279 bytes programmed.
++++ Resetting /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Use -h for help
Reset device ...
Done
make[2]: Leaving directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/test_nullnet'
make[1]: Leaving directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/test_nullnet'
stathisrav@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ make TARGET=sky login /dev/ttyUSB0
flwrap ../tools/serial-io/serialdump -b115200 /dev/ttyUSB0
connecting to /dev/ttyUSB0 [OK]
###c###~#~#~#~[INFO: Parent ] Broadcasting MAC address 44c0.6013.0074.1200
[INFO: Parent ] Broadcasting MAC address 44c0.6013.0074.1200
[INFO: Parent ] Broadcasting MAC address 44c0.6013.0074.1200
[INFO: Parent ] Broadcasting MAC address 44c0.6013.0074.1200
```

Διεύθυνση MAC του κεντρικού κόμβου της τοπολογίας αστέρα.



# ΑΛΓΟΡΙΘΜΙΚΕΣ ΘΕΜΕΛΙΩΣΕΙΣ ΔΙΚΤΥΩΝ ΑΙΣΘΗΤΗΡΩΝ

## End-to-end WSN Project 2023-2024

```
make[2]: Entering directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/test_nullnet'
++++ Erasing /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Use -h for help
Mass Erase...
Transmit default password ...
++++ Programming /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Invoking BSL...
Transmit default password ...
Current bootstrap loader version: 1.61 (Device ID: f16c)
Changing baudrate to 38400 ...
Program ...
21809 bytes programmed.
++++ Resetting /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Use -h for help
Reset device ...
Done
make[2]: Leaving directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/test_nullnet'
make[1]: Leaving directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/test_nullnet'
stathisrav@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ make TARGET=sky login /dev/ttyU
rlwrap ../../tools/serial-io/serialdump -b115200 /dev/ttyUSB0
connecting to /dev/ttyUSB0 [OK]
C3c#CcCR-C"oC{oC{o[INFO: Leaf ] Sending data: ID=0, Count=0, Temp=32.91, Hum=44.11 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=1, Temp=33.2, Hum=44.31 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=2, Temp=33.2, Hum=43.91 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=3, Temp=33.6, Hum=44.28 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=4, Temp=32.62, Hum=44.71 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=5, Temp=32.52, Hum=46.49 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=6, Temp=32.56, Hum=45.40 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=7, Temp=32.68, Hum=44.97 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=8, Temp=32.75, Hum=44.24 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=9, Temp=32.76, Hum=43.88 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=10, Temp=32.81, Hum=43.61 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=11, Temp=32.87, Hum=44.24 to 44c0.6013.0074.1200
[INFO: Leaf ] Sending data: ID=0, Count=12, Temp=32.44, Hum=45.70 to 44c0.6013.0074.1200
```

Αποστολή μηνύματος προς τον κεντρικό κόμβο από ένα φύλλο.

```
Program ...
20381 bytes programmed.
++++ Resetting /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Use -h for help
Reset device ...
Done
make[2]: Leaving directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/test_nullnet'
make[1]: Leaving directory '/home/stathisrav/Downloads/sensorsproject/contiki-ng/examples/test_nullnet'
stathisrav@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ make TARGET=sky login /dev/ttyU
rlwrap ../../tools/serial-io/serialdump -b115200 /dev/ttyUSB0
connecting to /dev/ttyUSB0 [OK]
##3###2-#2*{#o!+o?}J#/'o#[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=74, Temp=30.18, Hum=
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=75, Temp=30.15, Hum=46.45
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=75, Temp=30.13, Hum=45.17
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=79, Temp=30.9, Hum=46.39
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=76, Temp=30.13, Hum=46.29
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=80, Temp=30.12, Hum=47.47
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=77, Temp=30.26, Hum=52.74
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=81, Temp=30.11, Hum=48.12
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=78, Temp=30.27, Hum=46.36
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=82, Temp=30.11, Hum=47.24
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=79, Temp=30.26, Hum=45.90
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=83, Temp=30.12, Hum=47.1
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=80, Temp=30.23, Hum=45.37
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=84, Temp=30.15, Hum=46.62
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=81, Temp=30.23, Hum=45.63
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=85, Temp=30.9, Hum=46.49
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=82, Temp=30.20, Hum=45.96
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=86, Temp=30.9, Hum=46.62
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=83, Temp=30.22, Hum=46.26
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=87, Temp=30.8, Hum=46.88
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=84, Temp=30.19, Hum=45.30
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=88, Temp=30.8, Hum=46.62
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=185, Count=85, Temp=30.19, Hum=45.24
[INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=89, Temp=30.8, Hum=46.52
```

Παραλαβή μηνυμάτων του κεντρικού κόμβου από τα 2 φύλλα.

# ΑΛΓΟΡΙΘΜΙΚΕΣ ΘΕΜΕΛΙΩΣΕΙΣ ΔΙΚΤΥΩΝ ΑΙΣΘΗΤΗΡΩΝ

## End-to-end WSN Project 2023-2024

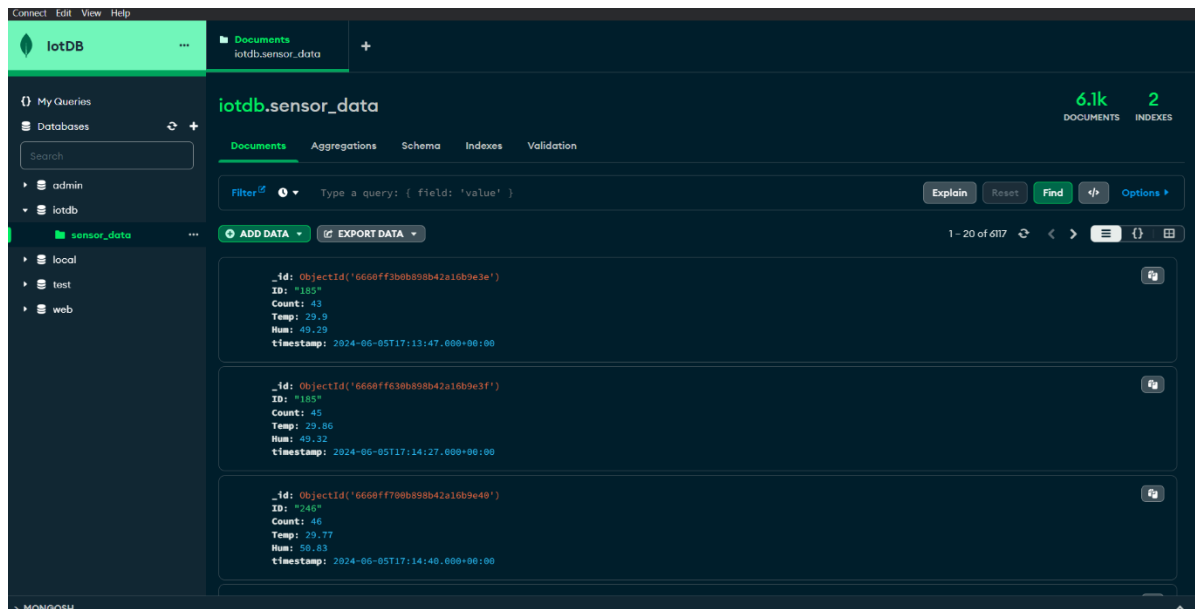
### Ερώτημα 2

```
stathisravg@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ ls
stathisravg@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ make TARGET=sky PORT=/dev/ttyUSB0 serialdump > out_pipe
stathisravg@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ open: No such file or directory
stathisravg@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ ls
build serialdump-20240603-1325
nullnet-broadcast.c serialdump-20240603-1326
nullnet-broadcast.csc serialdump-20240603-1345
nullnet-broadcast.ihex serialdump-20240603-1357
nullnet-unicast.c serialdump-20240603-1401
nullnet-unicast.csc serialdump-20240604-0727
nullnet-unicast.ihex serialdump-20240604-0744
out_pipe serialdump-20240605-0839
read_pipe.py utils.h
stathisravg@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ make TARGET=sky PORT=/dev/ttyUSB0 serialdump > out_pipe
stathisravg@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ open: No such file or directory
stathisravg@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ make TARGET=sky PORT=/dev/ttyUSB0 serialdump > out_pipe
stathisravg@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ connecting to /dev/ttyUSB2 [OK]

stathisravg@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ python3 read_pipe.py
(2024-06-05 08:43:12) [INFO: Parent ] Received data from a9b0.6013.0074.1200: ID=185, Count=93, Temp=38.1, Hum=44.91
(2024-06-05 08:43:12) [INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=95, Temp=29.60, Hum=46.3
(2024-06-05 08:43:12) [INFO: Parent ] Received data from a9b0.6013.0074.1200: ID=185, Count=114, Temp=30.9, Hum=43.58
(2024-06-05 08:43:13) [INFO: Parent ]
Received data from 94e6.6013.0074.1200: ID=246, Count=116, Temp=29.93, Hum=44.28
(2024-06-05 08:43:13) [INFO: Parent ] Received data from a9b0.6013.0074.1200: ID=185, Count=115, Temp=30.9, Hum=42.78
C:\Traceback (most recent call last):
  File "read_pipe.py", line 75, in <module>
    line = os.read(pipe_fd, 1024).decode().strip()
KeyboardInterrupt

stathisravg@ubuntu:~/Downloads/sensorsproject/contiki-ng/examples/test_nullnet$ python3 read_pipe.py
(2024-06-05 08:43:59) [INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=117, Temp=29.97, Hum=43.58
(2024-06-05 08:44:03) [INFO: Parent ] Received data from a9b0.6013.0074.1200: ID=185, Count=116, Temp=30.9, Hum=42.51
(2024-06-05 08:44:19) [IN
FO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=118, Temp=29.98, Hum=43.85
(2024-06-05 08:44:23) [INFO: Parent ] Received data from a9b0.6013.0074.1200: ID=185, Count=117, Temp=30.12, Hum=42.38
(2024-06-05 08:44:39) [INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=119, Temp=29.97, Hum=43.65
(2024-06-05 08:44:43) [INFO: Parent ] Received data from a9b0.6013.0074.1200: ID=185, Count=118, Temp=30.12, Hum=42.31
(2024-06-05 08:44:59) [INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=120, Temp=29.97, Hum=43.88
(2024-06-05 08:45:03) [INFO: Parent ] Received data from a9b0.6013.0074.1200: ID=185, Count=119, Temp=30.9, Hum=42.58
(2024-06-05 08:45:19) [INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=121, Temp=29.95, Hum=43.98
(2024-06-05 08:45:23) [INFO: Parent ] Received data from a9b0.6013.0074.1200: ID=185, Count=120, Temp=30.9, Hum=42.65
(2024-06-05 08:45:39) [INFO: Parent ] Received data from 94e6.6013.0074.1200: ID=246, Count=122, Temp=29.97, Hum=44.1
```

Εκτέλεση αρχείου κώδικα read\_pipe.py σε δεύτερο terminal όπου από κάθε γραμμή παίρνει τα απαραίτητα δεδομένα και τα αποθηκεύει σε πραγματικό χρόνο σε βάση δεδομένων.



Βάση Δεδομένων MongoDB.



### Ερώτημα 3

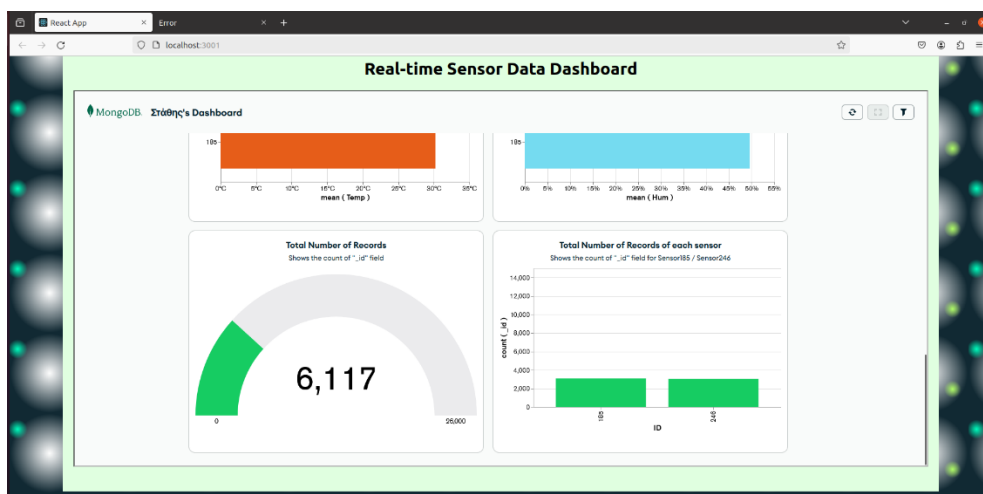
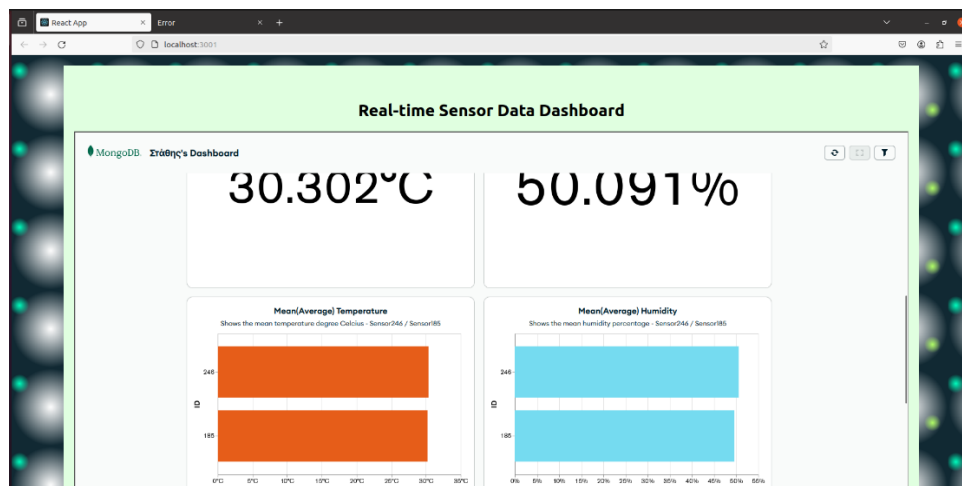
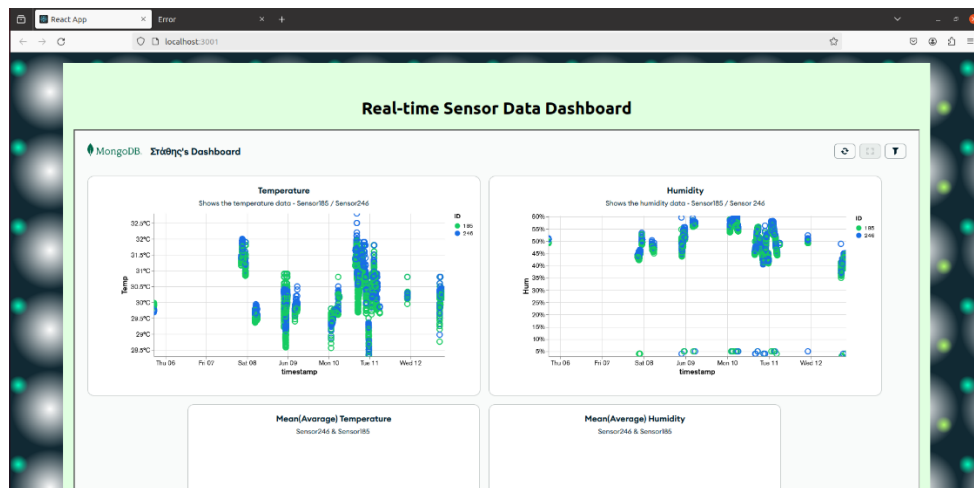
```
JSON Raw Data Headers
```

Save Copy Pretty Print

```
[{"_id": "f666bf1c3db0e9b0d42ab0bece", "ID": "185", "Count": "43", "Temp": "29.9", "Hum": "49.29", "Lstimestamp": "2024-06-05T17:13:47.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "46", "Temp": "29.77", "Hum": "50.83", "Lstimestamp": "2024-06-05T17:14:40.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "47", "Temp": "29.76", "Hum": "51.15", "Lstimestamp": "2024-06-05T17:15:00.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "47", "Temp": "29.87", "Hum": "49.7", "Lstimestamp": "2024-06-05T17:15:27.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "49", "Temp": "29.73", "Hum": "50.86", "Lstimestamp": "2024-06-05T17:15:46.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "50", "Temp": "29.7", "Hum": "51.6", "Lstimestamp": "2024-06-05T17:16:08.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "51", "Temp": "29.69", "Hum": "50.99", "Lstimestamp": "2024-06-05T17:16:40.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "52", "Temp": "29.72", "Hum": "50.9", "Lstimestamp": "2024-06-05T17:16:40.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "53", "Temp": "29.84", "Hum": "49.64", "Lstimestamp": "2024-06-05T17:17:00.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "54", "Temp": "29.86", "Hum": "49.35", "Lstimestamp": "2024-06-05T17:17:22.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "56", "Temp": "29.73", "Hum": "50.89", "Lstimestamp": "2024-06-05T17:18:08.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "56", "Temp": "29.91", "Hum": "49.35", "Lstimestamp": "2024-06-05T17:18:07.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "57", "Temp": "29.73", "Hum": "50.9", "Lstimestamp": "2024-06-05T17:18:20.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "59", "Temp": "29.90", "Hum": "49.29", "Lstimestamp": "2024-06-05T17:19:07.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "59", "Temp": "29.76", "Hum": "50.89", "Lstimestamp": "2024-06-05T17:21:00.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "61", "Temp": "29.79", "Hum": "50.83", "Lstimestamp": "2024-06-05T17:19:40.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "62", "Temp": "29.94", "Hum": "49.19", "Lstimestamp": "2024-06-05T17:20:07.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "63", "Temp": "29.73", "Hum": "50.9", "Lstimestamp": "2024-06-05T17:20:27.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "60", "Temp": "29.77", "Hum": "50.83", "Lstimestamp": "2024-06-05T17:21:00.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "14", "Temp": "31.16", "Hum": "44.15", "Lstimestamp": "2024-06-07T20:33:18.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "15", "Temp": "31.18", "Hum": "43.85", "Lstimestamp": "2024-06-07T20:33:18.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "16", "Temp": "31.22", "Hum": "43.71", "Lstimestamp": "2024-06-07T20:33:58.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "17", "Temp": "31.23", "Hum": "43.51", "Lstimestamp": "2024-06-07T20:34:10.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "18", "Temp": "31.43", "Hum": "44.38", "Lstimestamp": "2024-06-07T20:34:31.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "18", "Temp": "31.26", "Hum": "43.45", "Lstimestamp": "2024-06-07T20:34:38.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "19", "Temp": "31.4", "Hum": "44.28", "Lstimestamp": "2024-06-07T20:34:51.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "185", "Count": "19", "Temp": "31.26", "Hum": "43.41", "Lstimestamp": "2024-06-07T20:34:58.000Z"}, {"_id": "f666ff1f90b090d42ab09e40", "ID": "246", "Count": "20", "Temp": "31.37", "Hum": "44.3", "Lstimestamp": "2024-06-07T20:35:00.000Z"}, {"_id": 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# ΑΛΓΟΡΙΘΜΙΚΕΣ ΘΕΜΕΛΙΩΣΕΙΣ ΔΙΚΤΥΩΝ ΑΙΣΘΗΤΗΡΩΝ

## *End-to-end WSN Project 2023-2024*

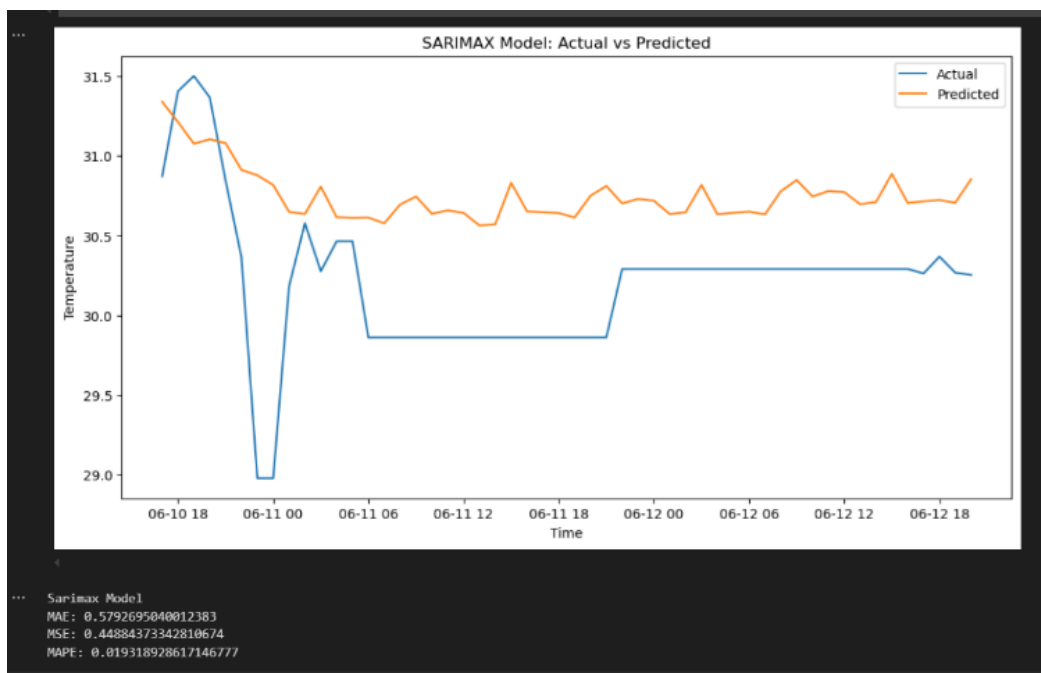
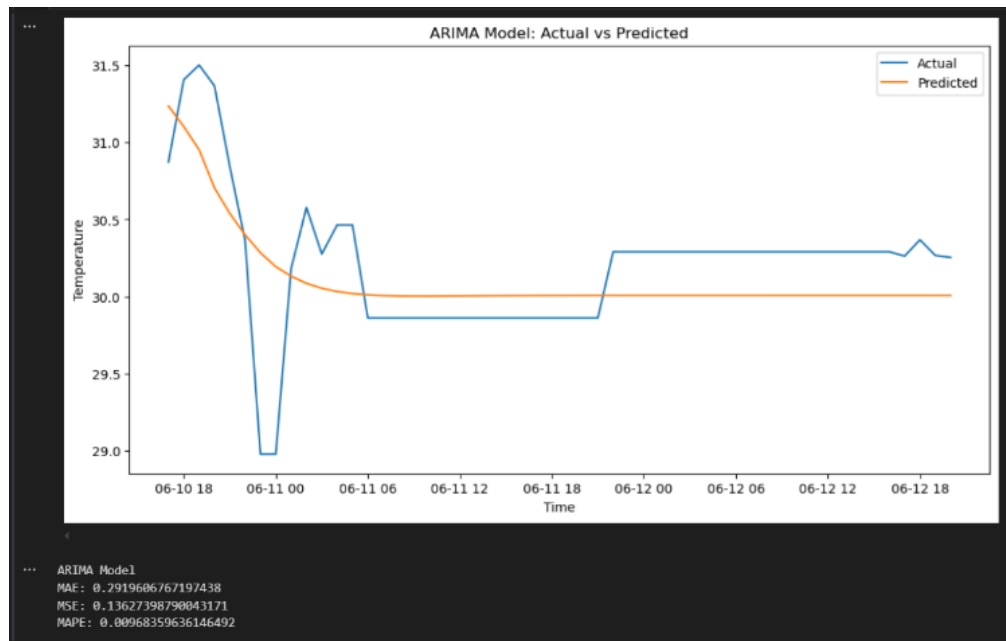


Υλοποίηση web app στην οποία φαίνονται real time οι μετρήσεις των αισθητήρων.

# ΑΛΓΟΡΙΘΜΙΚΕΣ ΘΕΜΕΛΙΩΣΕΙΣ ΔΙΚΤΥΩΝ ΑΙΣΘΗΤΗΡΩΝ

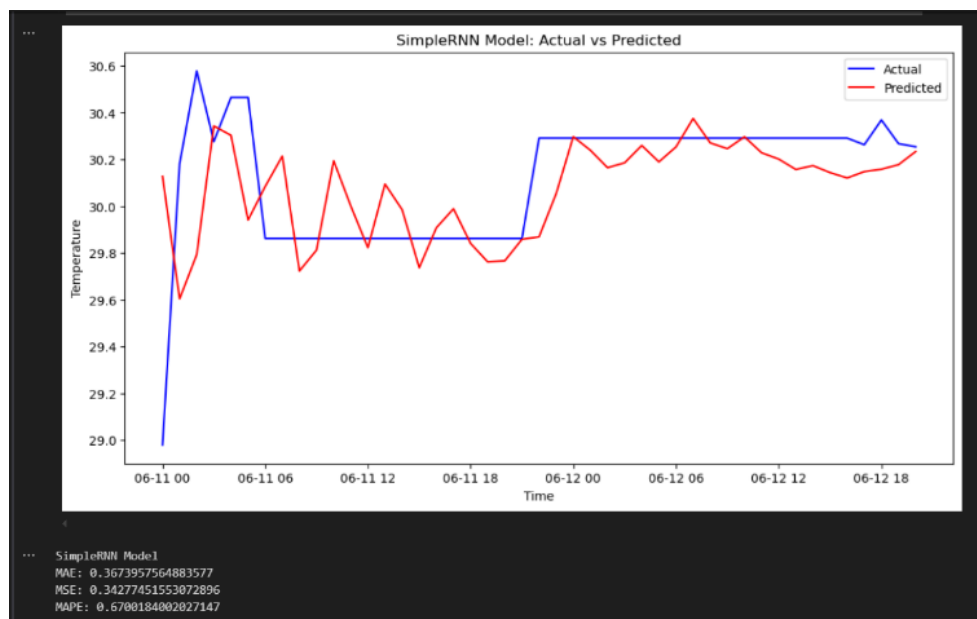
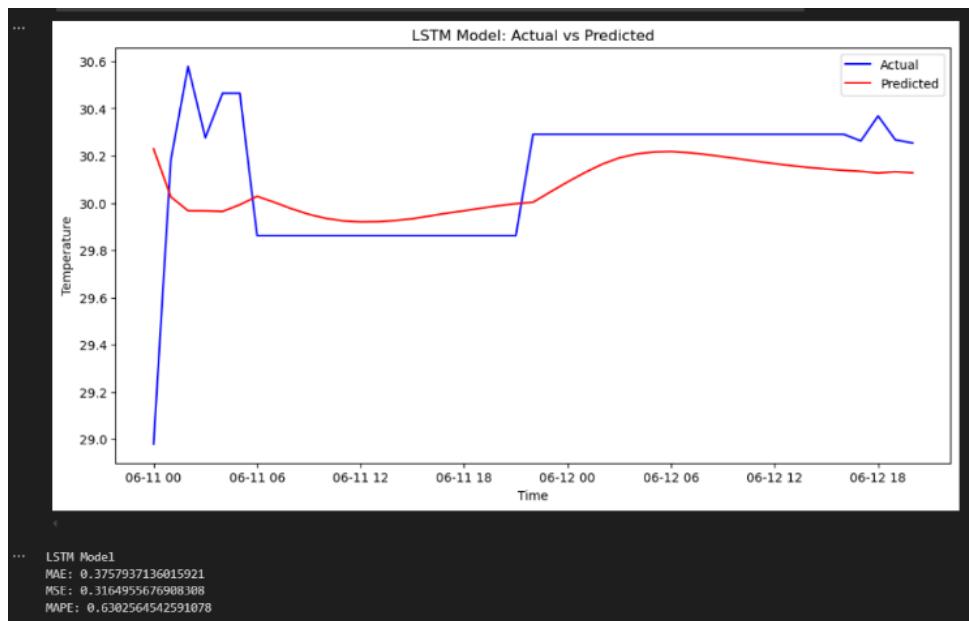
## *End-to-end WSN Project 2023-2024*

### Ερώτημα 4



# ΑΛΓΟΡΙΘΜΙΚΕΣ ΘΕΜΕΛΙΩΣΕΙΣ ΔΙΚΤΥΩΝ ΑΙΣΘΗΤΗΡΩΝ

## *End-to-end WSN Project 2023-2024*



Εκπαίδευση μοντέλων ARIMA, SARIMAX, LSTM, SimpleRNN τα οποία προβλέπουν τις επόμενες τιμές των μετρήσεων.