

EIoT Excercises

2020L

Plan Detailed

		<i>Lecture (W)</i>	<i>Laboratorium (L)</i>	<i>Excercise (C)</i>
	<i>Timeslot</i>	<i>Mo 10-12</i>	<i>Mo 14-18</i>	<i>Tue 18-20</i>
	<i>Placeslot</i>	<i>121</i>	<i>CS304</i>	<i>117</i>
1	<i>24.02.2020</i>	Course overview		
2	<i>02.03.2020</i>	IoT overview	Lab 1 – Group 101	
3	<i>09.03.2020</i>	CoAP (1)	Lab 1 – Group 102	Project Intro
4	<i>16.03.2020</i>	CoAP (2)	Lab 2 – Group 101	
5	<i>23.03.2020</i>	MQTT	Lab 2 – Group 102	
6	<i>30.03.2020</i>	UDP and IPv6	Lab 3 – Group 101	
7	<i>06.04.2020</i>	802.15.4	Lab 3 – Group 102	
	<i>13.04.2020</i>	(easter)		
8	<i>20.04.2020</i>	6LoWPAN		
9	<i>27.04.2020</i>	LoRa - LoRaWAN		
10	<i>04.05.2020</i>	Sensors and actuators		
11	<i>11.05.2020</i>	Energy issues		
12	<i>18.05.2020</i>	CPU and memory		
13	<i>25.05.2020</i>	IoT OS		
14	<i>01.06.2020</i>	Bluetooth (1) + Final Test 1	Presentations 1/2	
15	<i>08.06.2020</i>	Bluetooth (2) + Final Test 2	Presentations 2/2	

Your grade

- Quizzes – 25%
 - Two worst grades off
 - Grade of remaining quizzes are averaged
 - Absence counts as zero for the quizz
 - Quizz cannot be retaken
- Excercise – 25%
- Written test – 25%
 - Two attempts, last result counts
- Labs - 25%

Excercise

- Projects will be assigned after the Introductory class for excercises (10th of March 2020 – **Tuesday 18.00-20.00**)
- Groups of 2 people
- your attendance at all exercise classes (listed below) is mandatory. In particular, all of you are requested to be present at both project presentation sessions.
- 13.04 14:15-15:00 Intro to excercises CS3024 (at the lab time slot and at the lab place!!!). All further details will be provided then.
- 1st of June 14:15-18:00 Presentations 1/2 CS304 (at the lab time slot and at the lab place!!!)
- 8th of June 14:15-18:00 Presentations 2/2 CS304 (at the lab time slot and at the lab place!!!)
- No classes on Tuesday.

Timeline

- 10/03/2020 – Project selection starts
 - List of topics available to students
 - Provide a prioritized list of projects (high priority => most desirable by the team)
 - FIFO selection
 - Tutor will assign one of the list to you, based on availability at the moment
- 31/03/2020 - Project selection deadline
 - No selection => no grade
- Two monthly reports:
 - 28/04/2020: Problem definition, IoT architecture, solution overview
 - 26/05/2020: Communication protocols used
- Final report and project presentation
 - 1/06/2020 – First term
 - 8/06/2020 – Second term
- All reports must be sent by email before due time

First report

- Problem definition:
 - What is the problem you want to solve?
 - Why is it important?
- State of the Art:
 - What solutions have been proposed before to solve the same/similar problem? Scientific articles, commercial solutions – explore boths
 - Explain the technology involved, and the data obtained by the end-user from the solution.
 - How such solutions can aid in the decision-taking process?
- Solution definition:
 - How do you plan to solve the problem?
 - What's new in your solution?
 - Who can potentially use your solution?
 - Who can potentially buy your solution?
- IoT Architecture
 - Must include: IoT embedded device, IoT Gateway, Cloud services and End-user application
 - What sensors and actuators are needed for your solution?
 - Where is data going to be processed?
 - Where data is going to be stored?
 - All nodes the same? Specify for each node type sensors, actuators, behaviour
 - What IoT architecture level is it (first lecture)? Why?
 - How many telecommunication segments are there in your architecture?
- Performance planning
 - How often data from sensors should be sent in each segment?
 - What data is needed for node control?

First report

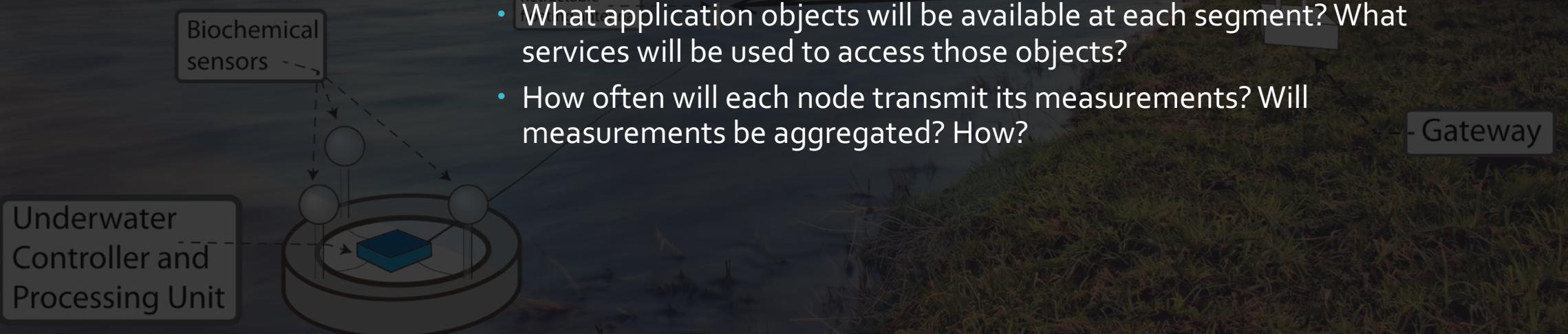
- Problem definition:
 - What is the problem you want to solve?
 - Why is it important?
- State of the Art:
 - What solutions have been proposed before to solve the same/similar problem? Scientific articles, commercial solutions – explore boths
 - Explain the technology involved, and the data obtained by the end-user from the solution.
 - How such solutions can aid in the decission-taking process?
- Solution definition:
 - How do you plan to solve the problem?
 - What's new in your solution?
 - Who can potentially use your solution?
 - Who can potentially buy your solution?
- IoT Architecture
 - What sensors and actuators are needed for your solution?
 - Where is data going to be processed?
 - Where data is going to be stored?
 - All are nodes the same? Specify for each node type sensors, actuators, behaviour
 - What IoT architecure level is it (first lecture)? Why?
 - How many telecommunication segments are there in your architecture?
- Performance planning
 - How often data from sensors should be sent in each segment?
 - What data is needed for node control?

Second report

- Include First report (corrected)
- Definition of communication protocols
 - Specify each telecommunicaiton network segment among your devices
 - What protocols will you use for the link layer, network layer, transport layer and application layer in each segment? Why these and not other ones mentioned in the lecture. Evaluate each possibility
 - What application objects will be available at each segment? What services will be used to access those objects?
 - How often will each node transmit its measurements? Will measurements be aggregated? How?

Second report

- Include First report (corrected)
- Definition of communication protocols
 - Specify each telecommunicaiton network segment among your devices
 - What protocols will you use for the link layer, network layer, transport layer and application layer in each segment? Why these and not other ones mentioned in the lecture. Evaluate each possibility
 - What application objects will be available at each segment? What services will be used to access those objects?
 - How often will each node transmit its measurements? Will measurements be aggregated? How?



Final report

- Include Second report (corrected)
- Node hardware
 - Define the controller each node will use (manufacturer, model)
 - Describe the sensors that will be used at each node (manufacturer, model)
 - Describe the actuators that will be used at each node (manufacturer, model)
 - Justify all your choices
- Performance analysis
 - Calculate the average energy used by each during its normal operation, include the energy used by the controller, the sensors, actuators and radio, taking into account the specifications given by the manufacturer and the TX/sensing rate specified previously
- Plus all questions given for the project at the end of each lecture!

Final report

- Include Second report (corrected)
- Node hardware
 - Define the controller each node will use (manufacturer, model)
 - Describe the sensors that will be used at each node (manufacturer, model)
 - Describe the actuators that will be used at each node (manufacturer, model)
 - Justify all your choices
- Performance analysis
 - Calculate the average energy used by each during its normal operation, include the energy used by the controller, the sensors, actuators and radio, taking into account the specifications given by the manufacturer and the TX/sensing rate specified previously

Final presentation

- Each team has 10 minutes for its project presentation, and 5 minutes for questions from the public

Grading

- Grades from 0 to 5.
 - Half point less by day of delay
-
- First report: 25%
 - Second report: 25%
 - Final report: 25%
 - Final Presentation: 25%

List of available projects

Id	
1	River Pollution Monitoring
2	Air Pollution Monitoring
3	Smart Irrigation
4	Smart Parking
5	Autonomous National Border Control
6	Football Wearables
7	Home Intrusion Detection
8	Gym Wearables
9	Connected & Smart Home
10	Forest and Fire Control
11	Public Transport
12	Retail Shopping
13	Healthcare for the elderly
14	<Your idea>

My choice

Id		My Priority
1	River Pollution Monitoring	10
2	Air Pollution Monitoring	9
3	Smart Irrigation	5
4	Smart Parking	3
5	Autonomous National Border Control	2
6	Football Wearables	1
7	Home Intrusion Detection	4
8	Gym Wearables	6
9	Connected & Smart Home	7
10	Forest and Fire Control	11
11	Public Transport	8
12	Retail Shopping	12
13	Healthcare for the elderly	13
14	<Your idea>	