1. Home Automation and Smart Home
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
    e. Conclusion
    f. Please refer to section Remarks for all the projects of this document.
    g. For free articles please have a look on free journals like: http://www.mdpi.com/journal/sensors, http://www.mdpi.com, http://www.hindawi.com/journals/; for paid articles, please come and take them with an UPT IP; in this way, most of them are for free :-)

2. Ambient Assisted Living
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
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3. Ambient Assisted Living and the Internet of Things
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
    e. Conclusion
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4. Context-Aware Solutions in Ambient Intelligence
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
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    h. You can consult the book Ambient Intelligence of Arthur Norman; ask for it at razvan.bogdan@cs.upt.ro

5. Sensor Networks in Ambient Intelligence
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
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    h. You can consult the book Ambient Intelligence of Arthur Norman; ask for it at razvan.bogdan@cs.upt.ro

6. Ambient Intelligence and Wearable Devices
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
    e. Conclusion
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7. Sensor Networks and Sensor Data Acquisition in Ambient Assisted Living Systems
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
    e. Conclusion
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8. Ambient Assisted Living Healthcare Frameworks, Platforms, Standards, and Quality Attributes
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
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9. Home Care Monitoring System
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
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10. Ambient Intelligence Dependability and Security
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
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11. Energy Efficient Internet of Things Based on Wireless Sensor Networks
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
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12. Ambient Intelligence and Internet of Things
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
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13. Security in the Internet of Things
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
    e. Conclusion
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14. Random Number Generation for Internet of Things
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
    e. Conclusion
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15. Ambient Intelligence and the Smart City
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
    e. Conclusion
    f. Please refer to section Remarks for all the projects of this document.

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h. You can consult the book Ambient Intelligence of Arthur Norman; ask for it at razvan.bogdan@cs.upt.ro

16. Ambient Agents: Embedded Agents for Remote Control and Monitoring
    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
    e. Conclusion
    f. Please refer to section Remarks for all the projects of this document.
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    h. You can consult the book Ambient Intelligence of Arthur Norman; ask for it at razvan.bogdan@cs.upt.ro

17. Sensor network simulation by Complex Networks using Gephi tool
    a. What are Complex Networks? (send an email to razvan.bogdan@cs.upt.ro for additional references)
    b. Working with Gephi (https://gephi.org/users/)
    c. Define, comment and explain upon *all the algorithms and filters* of Complex Networks that are to be found in Gephi. State the used reference/references in order to complete this task
    d. Take an example of a sensor network (reference should be indicated) and demonstrate how to simulate it in Gephi.
        i. Apply different layout properties
        ii. Apply different algorithms and filters. Comment on them with respect to your sensor network.
        iii. Try to characterize the sensor network based on the algorithms and filters that Gephi offers.
        iv. Obtained graphics in Gephi. Discussion.

e. Conclusion

f. Please refer to section Remarks for all the projects of this document.

18. Network Stream Categorization and Intrusion Detection

    a. The problem involves writing a program for Deep Packet Inspection. There are a number of patterns (in regular expression format) that we want to inspect in all network packets that we get. There are three tasks that have to be done.

        i. Stream Categorization: As TCP packets come in; the program should determine the category of the stream based on the first few (usually 4) packets in the stream. Some examples of categories are FTP, HTTP, IMAP, SMTP, TELNET, etc.

        ii. Category Specific Intrusion Detection: Based on the category, the program should be able to determine some specific patterns in the network packets. For example if the category is SMTP, the program should be able to find the regular expression pattern "vrfy\s+decode" in the packets of the same stream. Obviously, this specific pattern recognition should not be done for other categories.

        iii. Category---Independent Intrusion Detection: There are a number of regular expression patterns that should be tested against all packets no matter what category they are belonging to.

    b. As the input, the system/program should be able to get the patterns and network traffic (the traffic can be input to the program as online of offline traffic). The goal of the project is to achieve as mush performance as possible to recognize these patterns.

    c. Please refer to section Remarks for all the projects of this document.

19. Cost efficiency considerations in Embedded Systems testing.

    a. Introduction: State general ideas about this domain, briefly present the sections of the paper.
    b. Previous Work: Existing solutions + **Identify some problems**
    c. Proposed Solution: try to propose some solutions (architecture, code, pseud-code)
    d. Results: quantify your proposed solution by metrics, measurements, performance measurements, simulations etc.
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20. Secure Embedded Systems

    a. security and cryptography in embedded systems

    b. implementation of embedded systems security are assessed at both the theoretical level, and practical level (typical attack scenarios are to be examined)

    c. techniques and control mechanisms for engineering high assurance embedded systems are to be examined

    d. methods of mitigating against attacks (example: try using **Delta Concepts**)

    e. Consider different scientific articles (e.g. 2) talking about Secure Embedded Systems and present a survey of those articles highlighting the research problems that are presented.

    f. Conclusion

    g. Please refer to section Remarks for all the projects of this document.

21. Networks' Attack Analysis and Detection

    a. How to realize such an attempt? How to analyze network traffic and detect a malicious pattern? Etc.

    b. Use a free software dedicated for this task (Snort, others etc) and present it

    c. Programming the tool

    d. Case studies.

    e. Simulate your own attacks + obtained logos to prove the results. Discussions!!

    f. Consider different scientific articles (e.g. 3) talking about Attack Analysis and Detection and present a survey of those articles highlighting the research problems that are presented.

    g. Conclusion

    h. Please refer to section Remarks for all the projects of this document.

Remarks for all the projects:

1. Projects assignments will be posted on https://docs.google.com/spreadsheets/d/1w8KlwhqjzRBuO1fvO_J2CaRX-EYZAybrsHGu_zP7RiE/edit?usp=sharing

2. Send email to razvan.bogdan@cs.upt.ro for your desired project. In each group of students from the two groups, each theme can be taken only once.

3. Each of the above themes should be presented using IEEE article format: http://www.ieee.org/conferences_events/conferences/publishing/templates.html

    a. Your paper should be between 5 and 7 pages.

    b. The content of your project (scientific paper):

    Each paper will have to follow the IEEE rules of writing a paper as directed above. The sections of the paper should be:

    I. *Introduction:* present the general ideas about the domain of your paper (project). Very briefly present the sections of the paper.

    II. *Previous Work:* take 5-7 research articles, industry/commercial/open source implementations and describe which topics are addressed. Also, each presented ideas, cite it with the appropriate reference among those 5-7 (or even more) resources.

    Identify some problems in this state-of-the-art literature/projects that you read. Clearly state those problems (it might be one or even more).

    III. *Proposed solution:* propose **YOUR OWN** solution for the problem (or even problems) you identified in the Previous Work section. State how you would address the problem, graphically present the solution, you can even write code, schemes, pseudo-code, have an architecture, code implementation etc.

    IV. *Results:* The tangible results (measurements, tables, graphics, metrics(!), performance measurement) which are coming out from your proposed solution, put them here with nice explanations. Do you have an improvement when implementing your solution? Why? Or why not?

    V. *Conclusion and future work:* concluding remarks and other possible ideas on how you would further progress with your research.

4. Each article should be written in your own words or, if taken some exactly words of other authors (from you references) it should be stated by "…..". Therefore pay attention to plagiarism. *If plagiarism is used, you will fail the lab*. What is plagiarism and how to avoid it:

    a. http://www.ieee.org/publications_standards/publications/rights/plagiarism_FAQ.html

    b. www.ieee.org/documents/plagiarism.pps

5. Any questions regarding the themes: razvan.bogdan@cs.upt.ro or in B413 lab: Wednesday 16-18,30;

6. **In week 8 there will be a partial presentation of what you have done for the project. The discussion will take place in room B413A. This discussion is mandatory.**

7. The final project should be presented in CW13 of this semester

8. *If you want to propose your own project* following the structure from point 3, send me an e-mail where you present the proposed theme. Such a theme should be from advanced embedded systems topics, such as: ambient intelligence, ambient assisted living, internet of things, context awareness, wearable devices, smart home, home automation etc.