Internet of Things & Data Analytics

Security in IoT

Presentation

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Index

Professors

Guillermo Botella Juan (gbotella@ucm.es)

- Physicist, Electronic Engineer
- PhD in Physics (Computer Engineer)
- Computer Architecture and Automation Dept.
- Interests:
  - Embedded systems
  - Cryptography, Quantum Computing
  - ... and IoT security.

Professors

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- Computer Engineer, Electronic Engineer
- PhD in Computer Science (Automatic Control)
- Computer Architecture and Automation Dept.
- Interests:
  - Embedded systems
  - Real-time biomedical signal processing
  - ... and IoT security.

Index

Subject content

1. Introduction to IoT Security
   - OWASP Internet of Things Project
2. What is a penetration test in IoT
   - Different cases of study
   - Pentest project: Smart Socket
3. Cryptography

Index

Calendar

1st week (Prof. J.Recas):
- Introduction to Security
- Pentest Example: IP Camera

2nd week (Prof. G.Botella) :
- Cryptography (I)

3rd week (Prof. J.Recas):
- Comm. protocols exploits
- Pentest example: Smart Bulb

4th week (Prof. G.Botella):
- Cryptography (II)

5th week (Prof. J.Recas) :
- Pentest project: Smart Socket

6th week (Prof. G.Botella):
- Cryptography (III)

7th week (G.Botella & J.Recas):
- Student Projects

Index

Evaluation

- Lab assignments (**40%** of overall grade):
  - Quizzes and class assignments
  - Work in groups
- Pentest Project (**30%** of overall grade)
  - Pentest project: Smart Socket
  - Work in pairs
- Personal paper project (**30%** of overall grade)
  - IoT security project proposal
  - Paper project, no development involved
  - Individual assignment (around 15 pages)

Personal Paper Project (I)

- Provide a description of the individual proposal before the beginning of this module:
  - Pdf file, 1 page maximum extension
  - Use diagrams or graphics if needed.
- You will receive feedback related to it
  - Accepted, major revision, minor revision, reject.
- As a suggestion, some points to answer as a guide:
  - What is the objective of your personal project?
  - In what scenarios can be used this work? How will its adequacy be assessed?
  - To what problem are the solutions going to be compared? What analysis will be developed to make the comparison?

Personal Paper Project (II)

- Some topics (suggestions):
  - Tools for security analysis
  - Exploitation of REST API vulnerabilities in an IoT environment
  - Computer Security in Industry
  - Security in the Software Development Life Cycle
  - Exploit IoT vulnerabilities with GNU radio
  - Exploit Security mechanisms imposed by IOS and Android for IOT mobile applications
  - Shodan tool: The device search engine
  - Risks with RFID cards
  - Fuzz Testing in IoT
  - Vulnerabilities in cloud-based systems
  - Exploitation of communication protocols such as BLE, ZigBee, 6LoWPAN and zWave through insecurities and vulnerable implementations
  - Attack vectors on utility vehicles using CAN BUS
  - Applied Cryptography
  - Etc.

Index

Bibliography

- Gupta, A. The Iot Hacker's Handbook : A Practical Guide to Hacking the Internet of Things; Apress: New York, 2019.
- Guzman, A.; Gupta, A. Iot Penetration Testing Cookbook : Identify Vulnerabilities and Secure Your Smart Devices; Packt Publishing: Birmingham, UK, 2017.
- Brian Russell; Drew Van Duren. Practical Internet of Things Security. Packt Publishing. 2016.