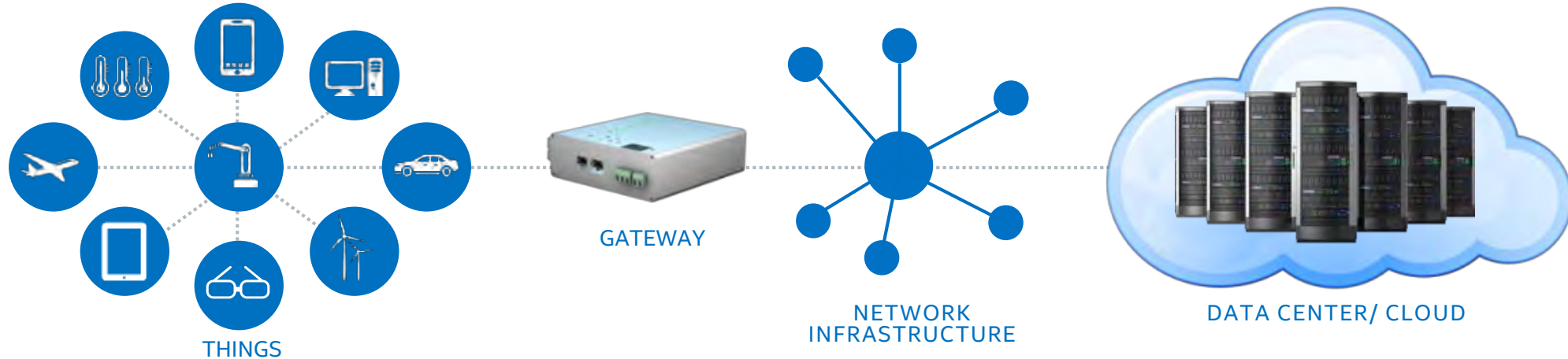


## Internet of Things Group

*Lead the industry in transforming businesses and the way we live by making it simple to create exciting, new IoT solutions*



**THE INTERNET OF THINGS:** *Devices that connect to the Internet integrating greater compute capabilities using data analytics to extract information*

# INTEL LABS

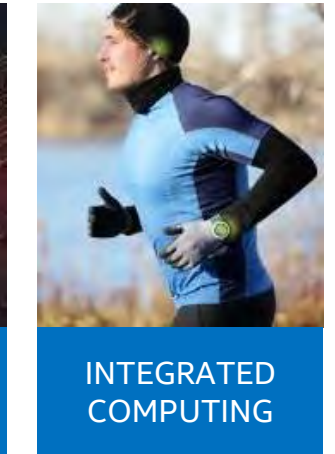
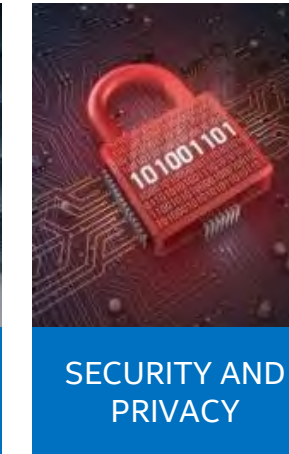
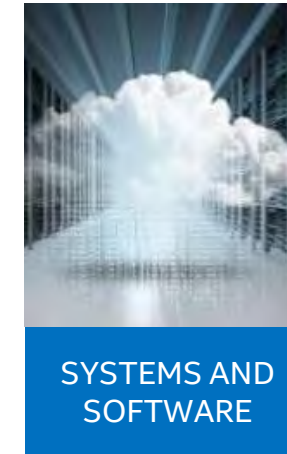
Deliver breakthrough innovations to fuel Intel's growth and technology leadership



## COLLABORATE FOR RESULTS



## KEY RESEARCH FOCUS AREAS

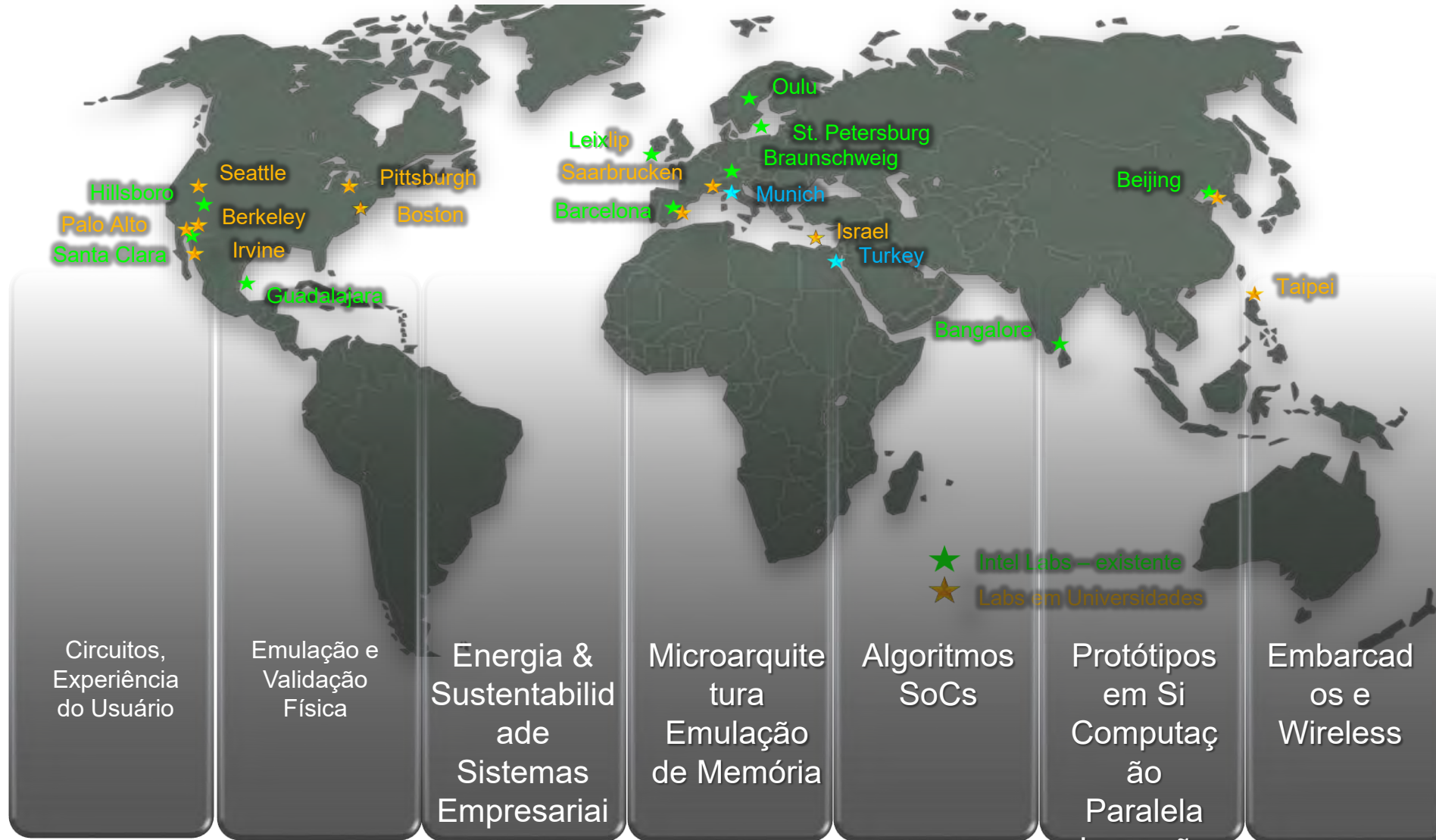


## ADDITIONAL ORGANIZATIONS



# Intel Labs & Conselho de Pesquisa

1.000+ pesquisadores (70% EUA, 30% WW)



# ISRA Brasil – Segurança em SoC com Eficiência Energética

**Tema principal:** Tecnologias que tornarão os dispositivos em um único chip (SoC) significativamente mais seguros do que os mais avançados atualmente, ainda assim evitando um consumo excessivo de bateria.



2013 workshop – 14 people



2014 workshop – 17 people

```

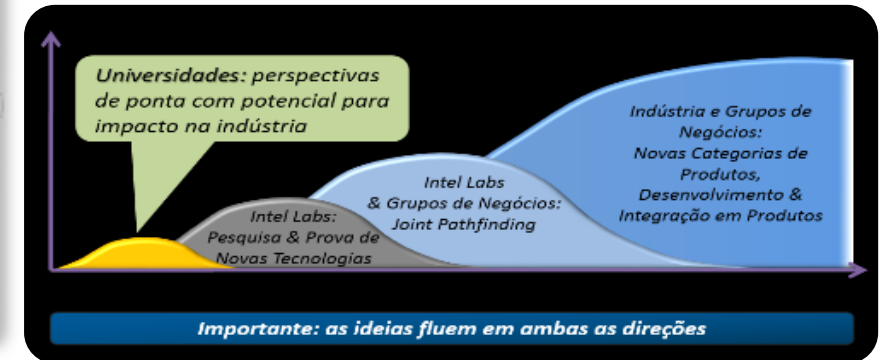

$$r(x) \leftarrow \sqrt{x + 1/s(x)} \bmod g(x)$$


$$F \leftarrow v, G \leftarrow g, B \leftarrow 1, C \leftarrow 0, t \leftarrow \deg(g)$$

while (deg(G) > |t/2|) {
  F  $\leftrightarrow$  G, B  $\leftrightarrow$  C
  while (deg(F)  $\geq$  deg(G)) {
    j  $\leftarrow$  deg(F) - deg(G), h  $\leftarrow$  Fdeg(F)/Gdeg(G)
    F  $\leftarrow$  F - h·xjG, B  $\leftarrow$  B - h·xjC
  }
  r(x)  $\leftarrow$  G(x)2 + xC(x)2
}
return r
    
```

# Grupo de Pesquisas com Universidades

**Missão:** Alimentar o *pipeline* de P&D e o desenvolvimento de novos produtos, por meio de pesquisas de ponta e programas em parceria com a Intel, a academia, governos e indústria.



Software Implementation of Cryptographic Algorithms



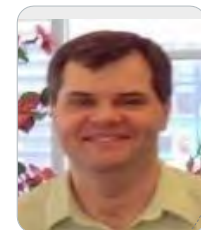
Method and Energy-Efficient FPGA-based SoC Implementation for Anomaly Detection System



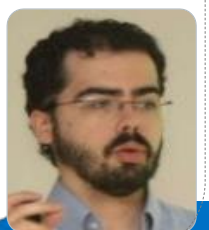
Energy-Efficient Instrumentation to Secure SoC Devices



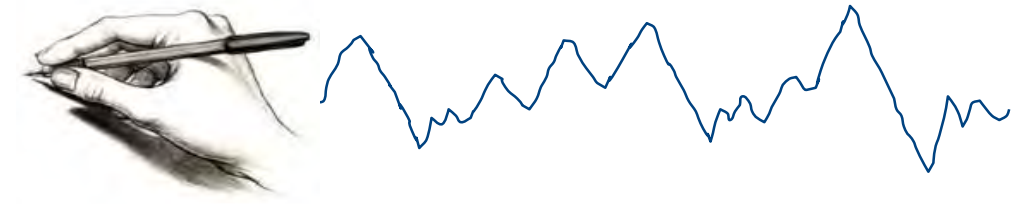
Asymmetric Cryptography for Embedded Systems



Physical Unclonable Functions for SoC Devices

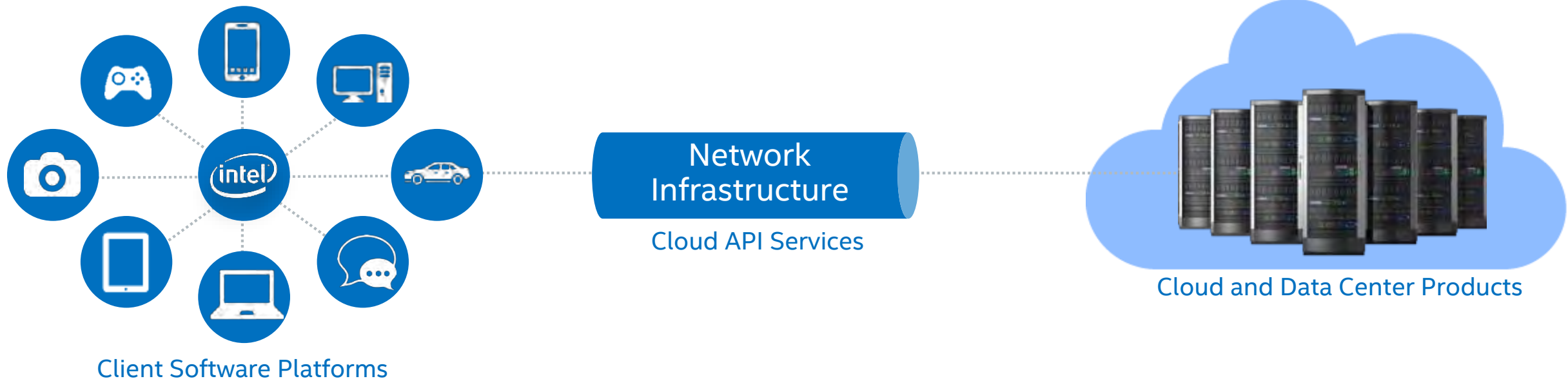


# ISRA Brasil – Alguns Resultados



| Universidade – Escola  | Projeto  | Papers Publicados   |
|--|--|---|
| Universidade de São Paulo (USP) – Laboratório de Arquitetura de Redes de Computadores (LARC)   | Asymmetric Cryptography for Embedded Systems   | <ul style="list-style-type: none"> <li>• A Parallel and Uniform k-Partition Method for Montgomery Multiplication</li> <li>• Optimized and Scalable Quasi-Dyadic Goppa Hardware Encoder and Decoder for Cryptographic Applications</li> <li>• Efficient Construction of Quasi-Dyadic Goppa Codes</li> <li>• Shorter UOV Signatures</li> </ul>  |
| Universidade de Campinas (UNICAMP) – Instituto de Computação   | Software Implementation of Cryptographic Algorithms                                    | <ul style="list-style-type: none"> <li>• Two is the fastest prime: lambda coordinates for binary elliptic curves</li> <li>• Lambda Coordinates for Binary Elliptic Curves</li> </ul>  |
| Universidade Federal de Minas Gerais (UFMG) – Ciência da Computação  | eCoSoc: Energy-Efficient Instrumentation to Secure SoC Devices                         | <ul style="list-style-type: none"> <li>• Aranot - An Array Annotator for C and C++</li> <li>• Tool to Detect Vulnerabilities in Code Protected With Canaries</li> <li>• Static Array Bounds-Checking in C</li> <li>• GreenArrays: Securing Array Access in C</li> <li>• GreenArrays: Speeding up Safe C Code via Static Analyses</li> <li>• Flow Tracking: An Address Leak Detection System</li> <li>• An Intermediary Representation for Implicit Information Leak Detection</li> <li>• Software Security for Embedded Systems: Attacks &amp; Countermeasures</li> <li>• An Energy Evaluation of Security Tools over Embedded Systems</li> </ul> |
| Universidade de Brasília (UNB) – Engenharia Elétrica   | Physical Unclonable Functions for SoC Devices  | <ul style="list-style-type: none"> <li>• A Framework for Assessing the Use of SoC SRAMs as Physically Unclonable Functions.</li> <li>• On the Left-Over Hash Lemma and Smooth Entropies for Infinite Dimensional Distributions</li> <li>• Characterization of SRAM cells and their potential for building challenge-response PUFs</li> </ul>  |
| Pontifícia Universidade Católica do Paraná + Universidade Federal do Paraná + Universidade Técnica Federal do Paraná – Ciência da Computação | Method and Energy-Efficient FPGA-based SoC Implementation for Anomaly Detection System | <ul style="list-style-type: none"> <li>• State-of-the art in Anomaly Detection Techniques and FPGA Implementations</li> <li>• Signature-based Detection Implemented by an Anomaly-detection Technique</li> <li>• Moving Network Protection from Software to Hardware: an Energy Efficiency Analysis.</li> </ul>   |

SSG enhances computing and connectivity for Intel Architecture across the software ecosystem and through our software products and services.



\* Other names and brands may be claimed as the property of others.

**Notícias:**  
**Desafio para aplicativos Intel® RealSense™ de 2014**  
Compita para ganhar sua porção de \$1 milhão



[Inscreva-se agora >](#)

**Notícias:**  
**Desafio para aplicativos**




**Evento:**  
**IDF 14 San Francisco**

**Notícias:**  
**Chrome\***




### Recursos de código para dispositivos com Intel Inside®

-  Android
-  HTML5
-  Windows\* 8
- ou desenvolvimento para... ▾

### Agitação do fórum

-  deadlock during debug
-  DIV com scroll horizontal dentro de um panel
-  WebSQL OK na emulação, no debug, no APP Preview mas não funciona no APK

### Mensagens de blog mais recentes

-  Intel Software Conference 2014 - 26 a 30 de maio (RJ e SP)
-  Sete passos para preparar sua startup para os investidores.
-  12º Android Meetup GDG-SP na

### Ferramentas para o desenvolvedor



Novo! Intel®



Atualizado!

Int

# Soletta Project - [solettaproject.org](https://solettaproject.org)

**Soletta** is a framework for making IoT devices.

It is **cross-platform**, works with **Linux and small OSes, like Zephyr**, over **different boards**.

**Portable**, abstracts information specific to determined HW and OS, requiring **minimum changes to code when flashed to different targets**.

Available now on [github.com/solettaproject](https://github.com/solettaproject)

- multi OS: Zephyr, Riot, Contiki, Linux
- platform abstraction
- uniform event loop
- uniform basic I/O primitives
- used as dynamic library, static library or interpreter runtime
- high level programming apis (C/C++, FBP)
- FBP - flow-based programming (optional)
- supports OIC, CoAP, MQTT, Bluetooth and HTTP (client and server)
- lightweight (f=flash or disk, r=ram):
  - RIOT on Arduino Due f=76Kb, r=8.8Kb
  - Contiki on Intel Curie (CTB) f=65Kb, r=1.8Kb
  - Linux on Minnow (userspace/PID1) f=88Kb, r=38Kb
- easy to use development system

## Soletta Framework

[github.com/solettaproject/soletta](https://github.com/solettaproject/soletta)

The framework itself and core components.

## Soletta Machine Learning

[github.com/solettaproject/soletta-machine-learning](https://github.com/solettaproject/soletta-machine-learning)

Provides APIs to deal with client side AI and an easy to use flow-based Soletta module. Initially supporting neural networks and fuzzy logic learning.

(Linux-only)

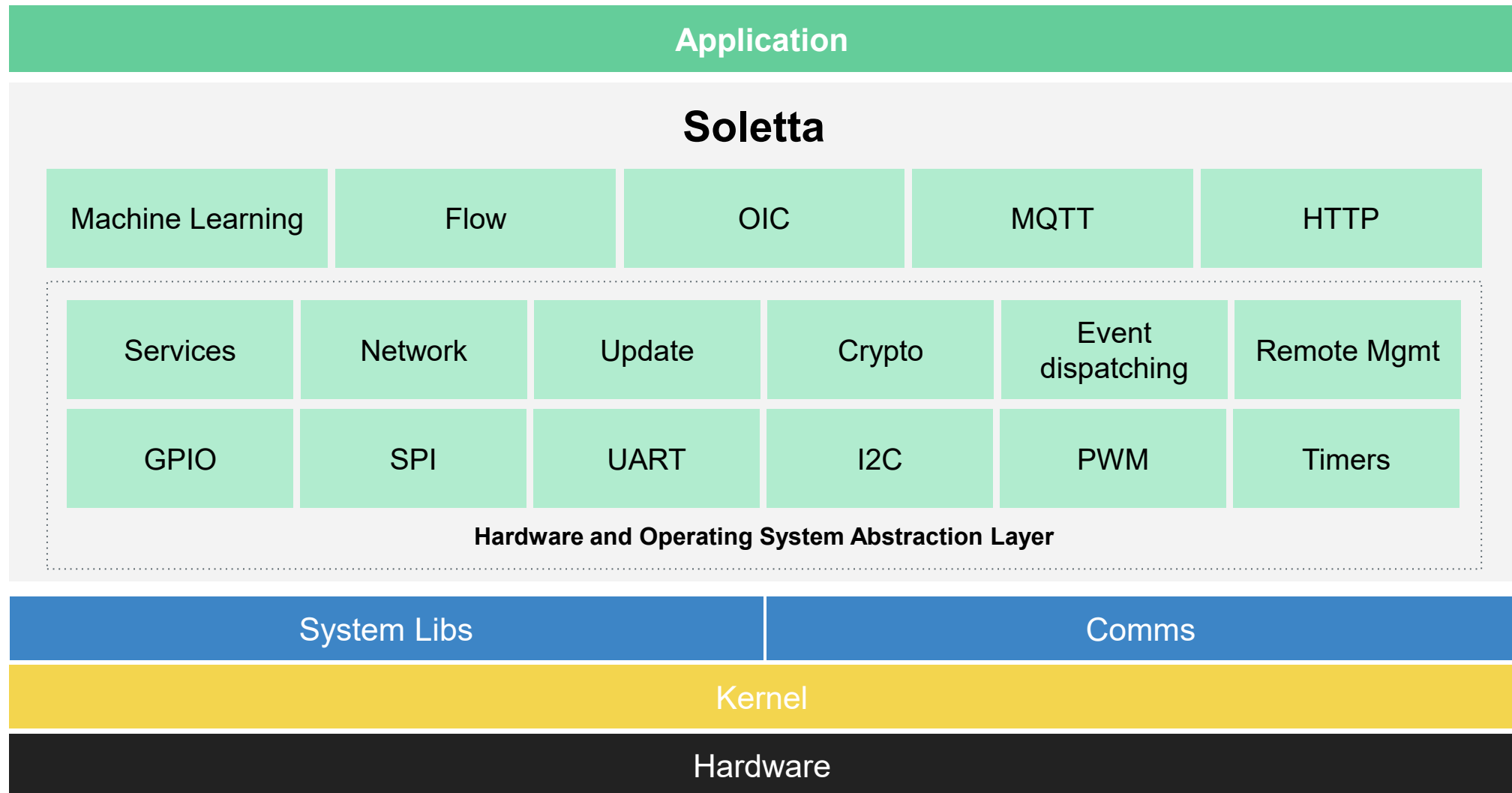
## Soletta Development Application

[github.com/solettaproject/soletta-dev-app](https://github.com/solettaproject/soletta-dev-app)

Web-based environment running on target board where developers can write, visualize, modify, run, test and debug their Soletta FBP programs.



# Soletta Project – Architecture



The screenshot shows the Intel Jobs website interface. At the top, there is a blue navigation bar with the Intel logo on the left, a "Menu" dropdown, a "Find Content" link, a search bar, and "USA (English)" on the right. Below the navigation bar, a white banner area contains the text "Tagged As Jobs, Corporate Information, Apply for Job, Job Seekers" and social media icons for Facebook, LinkedIn, and Twitter. The main content area features a large blue arrow pointing right with the text "You're what's next." overlaid on a background image of two people in an office. To the right of this banner is a vertical sidebar with two tabs: "Experienced Pros" (selected) and "Students / Grads". Below the tabs is the heading "Jobs at Intel" and a list of links under the "Explore" section: "Job Search", "Your Candidate Profile Login", "Candidate Help Desk", "Hiring Process and Tips", "Careers", "Our Locations", "Pay, Stock and Benefits", and "Student Center". At the bottom of the main content area, there are three blue boxes with white text and images: "Accommodation" with a photo of a man and the text "US Disability Accommodation Request", "Cool Jobs" with an American flag and the text "Careers for Military", and "Great Place to Work" with a photo of a woman and the text "Look inside Life at Intel-United States".



## MENU

- Home
- Scope
- Organization
- Paper Submission
- Call for Papers
- Deadlines
- Co-events ▶
- Registration
- Keynote Speakers
- Venue
- Program
- Accommodation
- Proceedings
- Photo Gallery
- Login
- Previous Editions

## Intel® Embedded Systems Competition 2016

The Intel® Embedded Systems Competition 2016 is a competition open to undergraduate and graduate students, providing the opportunity to develop intelligent and innovative Systems and co this segment of Computing in Brazil.

The selected teams will receive Intel® Galileo Gen 2 boards for the project preparation.

During development, each team will have to produce two reports: one "draft" that has to be delivered early and another "final" closer to the end of the project's development. Afterwards, if qualif presented at SBESC, which will be held in João Pessoa, Paraíba - Brazil.

### Competition Regulation

You can find PDF with competition rules here: [Competition Regulation 2016](#)

### Schedule

**Submissions:** Until April 4

**Submission results:** April 30

**First webinars:**

Themes: "About the competition" and "About the board" - [Join](#)

~~March 07 - 10h30~~

~~March 08 - 15h00~~

March 16 - 10h30

March 18 - 15h00

March 28 - 15h00

March 29 - 10h30

*BRT - Brasilia (Standard) Time.*

**Deliver boards to students:** Until May 20

**Technical webinars:**

Themes: "Got the board! What next?" and "Technical Q&A"

June 08 - 10h30

June 09 - 15h00

August 23 - 15h00

August 24 - 10h30

*BRT - Brasilia (Standard) Time.*

**First project reports delivery:** September 20

**Final project reports delivery:** October 30

**SBESC Event:** November 01-04

# About the competition

## General Information:

- Open to undergraduate and graduate students
- Opportunity to develop intelligent and innovative Systems
- Work with Intel® technology
- Teams up to 3 students and 1 teacher
- Contact: [submissaocompeticaointel@gmail.com](mailto:submissaocompeticaointel@gmail.com)

# About the competition

Create an Embedded System contained in at least one of the following areas:

- Smart cars / home / cities
- Health
- Industrial Automation
- Wearables
- Security
- Retail

# About the competition

## Action Plan:

- Phase 1 : submission and evaluation
- Phase 2 : board delivery / first report submission (in Portuguese)
- Phase 3 : final report submission (in English) / presentation at VI Brazilian Symposium on Computing Systems Engineering

# About the competition

## Schedule National Competition:

- April 4<sup>th</sup>: Deadline for submissions
- April 30<sup>th</sup>: Submission results
- March 7<sup>th</sup> to August 24<sup>th</sup>: Webinars\*
- May 20<sup>th</sup>: Deadline for board delivery
- September 20<sup>th</sup>: First project reports delivery
- September 30<sup>th</sup>: Approved groups for phase 3
- October 30<sup>th</sup>: Competitors should deliver the final project report - directly at JEMS
- November 1<sup>st</sup> to November 4<sup>th</sup>: SBESC Event / Final Results

\* Check the website for date, time and theme of webinar



# Intel® Galileo (Gen 2)

- 10/100 Mbps Ethernet\* RJ45 port.
  - 12 V Power-over-Ethernet capable.
- Serial console UART header is compatible with FTDI USB converters.
  - Console UART1 can be redirected to Arduino\* headers in sketches.
- Full-sized mini-PCI Express\* 1x slot.
- Accepts power suppliers from 7V to 15V.

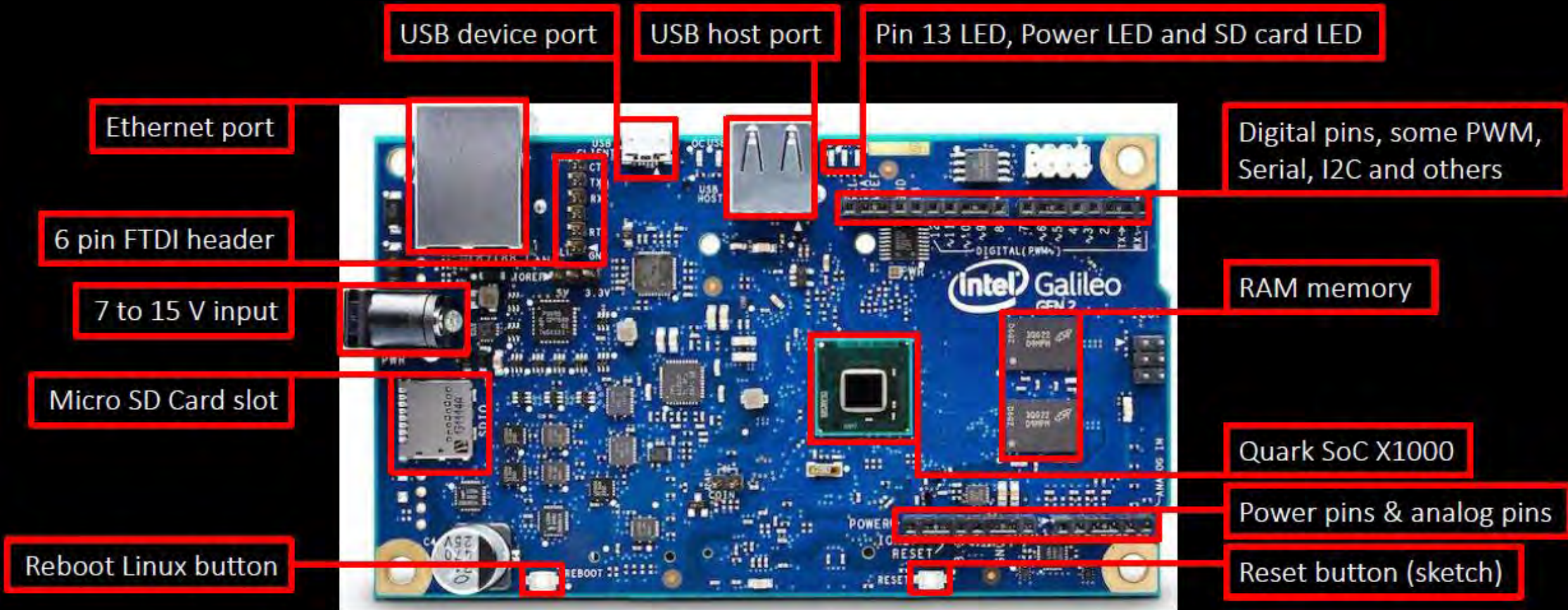


# Intel® Galileo (Gen 2)

- Intel® Quark™ SoC X1000 @ 400MHz
  - 32-bit Intel® Pentium® processor-compatible ISA.
  - 16KB L1 cache, 512KB SRAM.
  - ACPI-compatible with CPU sleep states.
  - RTC with optional 3V coin cell battery.
- 256MB DDR3 DRAM.
- SD Card up to 32GB.
- USB 2.0 host and client ports.



# Intel® Galileo (Gen 2)





## Intel® Higher Education Programs



Investing Over \$670 Million in University Programs Since 2001.

Intel® Higher Education Programs



Investing Over \$670 Million in University Programs Since 2001



Resources for University Professors



University Student Center



Opportunities for University Researchers

## Curricula Development

[Security Curricula >](#)  
[Parallel Programming Curricula >](#)  
[Embedded University Program >](#)  
[Intel® Galileo Curricula >](#)

## Other University Collaborations

[Intel® Software Academic Program >](#)  
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[Intel Collaborative Research Institutes >](#)  
[Focused Research Collaborations >](#)

## Contests and Entrepreneurship

[Break and Make \(Eastern Europe\) >](#)  
[Challenge UP \(Europe\) >](#)  
[The Cornell Cup USA >](#)  
[Innovate Malaysia Design Competition >](#)  
[Intel Cup China >](#)  
[Intel Cup Mexico >](#)  
[Intel® Global Challenge >](#)  
[Intel India Embedded Challenge >](#)  
[National Collegiate Software Innovation Contest \(China\) >](#)  
[Taiwan Embedded Systems Contest >](#)

Intel® Higher Education  
Professor Programs



OVER 115

The number of U.S. technology curricula developed in conjunction with higher education faculty

## Online Video Courses

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[Job Center for Students/Recent Grads >](#)  
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## Contests and Entrepreneurship

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[Challenge UP \(Europe\) >](#)  
[The Cornell Cup USA >](#)  
[Innovate Malaysia Design Competition >](#)  
[Intel Cup China >](#)  
[Intel Cup Mexico >](#)  
[Intel® Global Challenge >](#)  
[Intel India Embedded Challenge 2014 >](#)  
[National Collegiate Software Innovation Contest \(China\) >](#)  
[Taiwan Embedded Systems Contest >](#)

Intel® Higher Education  
Student Programs



OVER \$55 MILLION

Amount of dollars Intel has awarded students for fellowships and scholarships in the U.S. since 2001



<https://software.intel.com/en-us/iot/home>

## Get Started

Select your device and find guides, documentation, downloads, support, and more.



Intel® Edison Board >



Intel® Galileo Board >



Intel® IoT Gateways >



Sensors >



Intel® IoT Developer Kit >



**Shared curriculums from universities on Intel.com**



**Books, of course**

**Internet resources**

**Intel Maker forum**

# Recommended for Getting Started

Welcome to the Intel® Internet of Things. We offer a variety of online resources to help you get started with your [Galileo Boards](#) and [Developer Kits](#). Please visit the links below for more information:

## Getting Started

- <https://software.intel.com/en-us/iot/home>

## Sample Projects

- <http://www.instructables.com/id/intel/>
- <https://www.youtube.com/watch?v=qgWGTKzxYwg> (Instructions on how to post your project)
- <https://www.hackster.io/intel-edison/projects> (Intel® Edison Boards)
- <https://www.hackster.io/intel-galileo/projects> (Intel® Galileo Boards)

## Course Projects and Curriculum

- <https://software.intel.com/en-us/courseware/iot>
- <https://www-ssl.intel.com/content/www/us/en/education/university/galileo-university-curricula.html>

## Recommended Books

- [Intel Galileo and Intel Galileo Gen 2: API Features and Arduino Projects for Linux Programmers](#)
- [Getting Started with Intel Galileo](#)
- [Intel Galileo Gen 2 and Intel Edison for Beginners: A Hands-on Introduction](#)

Any doubts????

Raise your hand!

