

Drone at Irisa

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Introduction

- **Technology is moving very fast**
 - (Low power) computing capabilities (e.g. GPUs)
 - Cyber-physical systems such as drones
 - Many kinds of sensors
 - Big data technologies, data analytics, ...

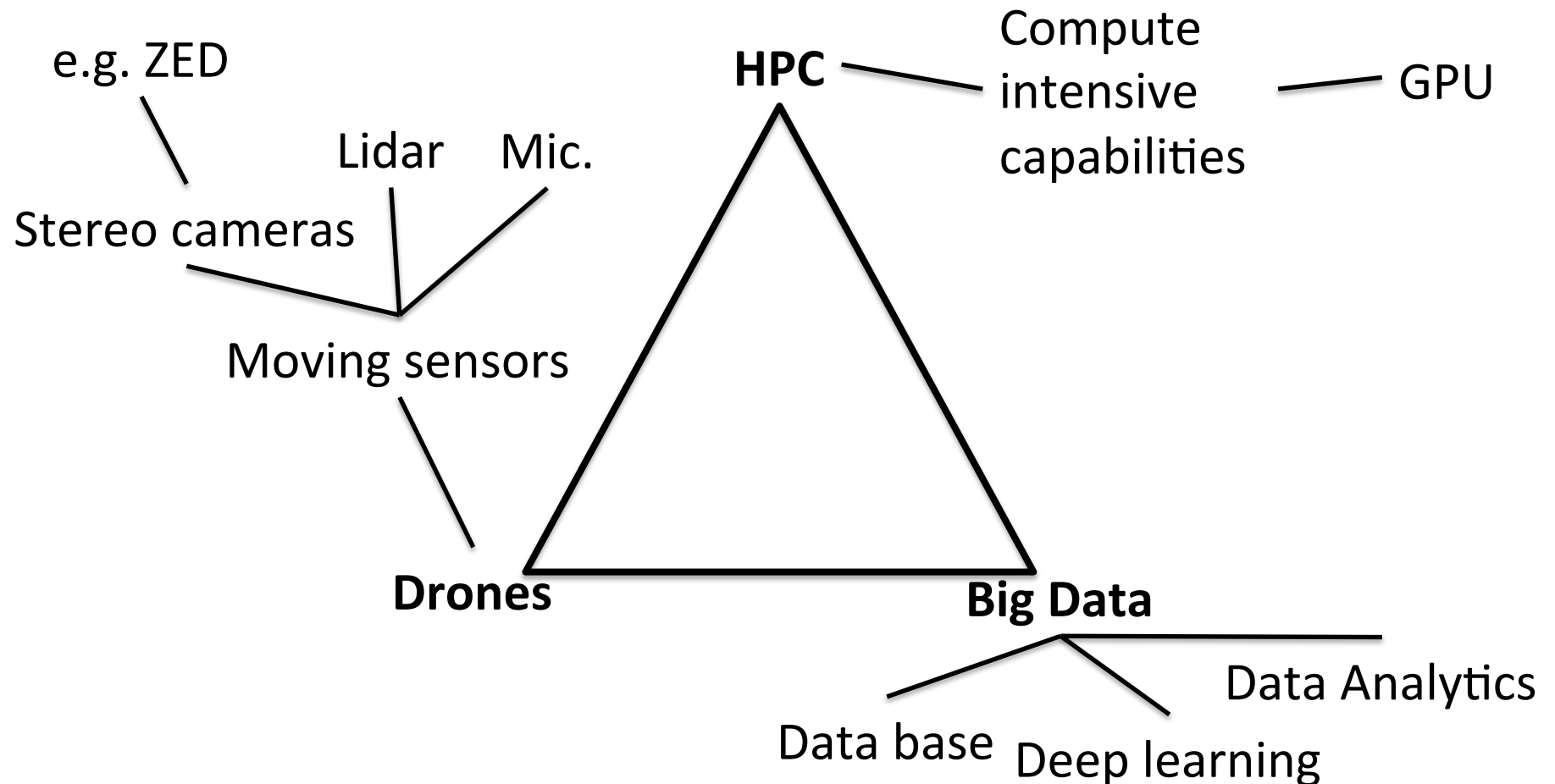
- **Open research opportunities for new applications in many domains**
 - Robotics
 - Computer science
 - Especially in combining both domains

Agenda of the presentation

- 1. Combining Big Data, High Performance Computing and Drones by François Bodin**
- 2. Empowering drones with cinematographic capabilities by Marc Christie**
- 3. Formation control and cooperative localization by Riccardo Spica**

Combining Big Data, High Performance Computing and Drones

- **A computer science approach to cyber-physical systems**



Scientific Challenges

- **Software challenges issues**
 - How to combine efficiently the entire (distributed) software stack
 - Software architecture design
- **API design**
 - To control the drone
 - To combine BD and HPC
 - ...
- **Portability and flexibility**
 - Exploit various kinds of drones and sensors
 - Various kinds of systems (e.g. Cloud, GPU based, ...)

Jakopter, a Simple Platform for Mission Control

- Lua based drone control platform
 - Initially design for teaching
- Can interface leap motion, joystick, keyboard, Kinect, ...

3DRobotics



Mavlink



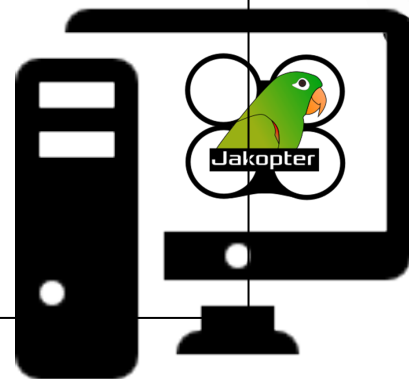
Wifi



Parrot ARDrone 2.0

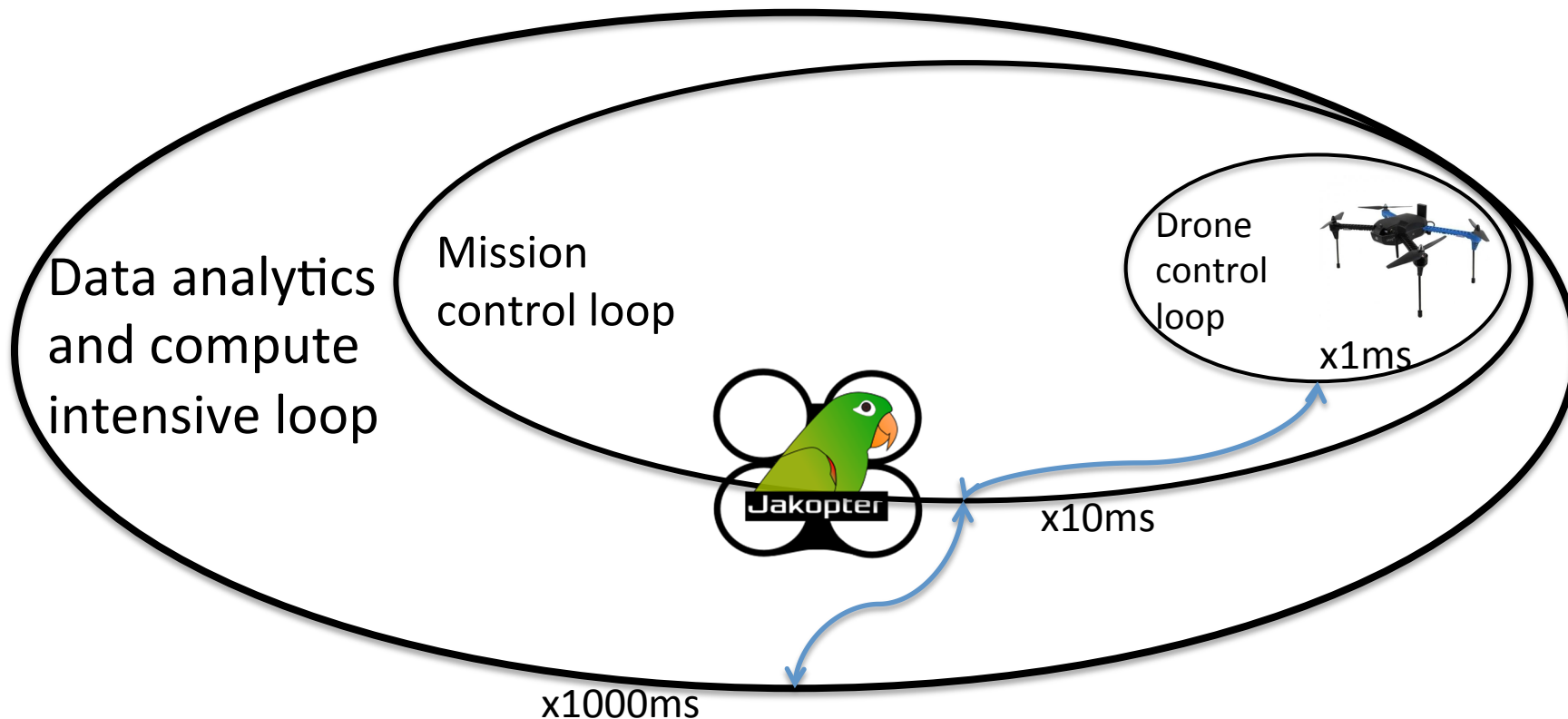
```
l = require("libjakopter")
l.connect()
l.takeoff()
l.forward(0.5)
l.up(0.5)
...
```

Lua script



Drone for Search and Rescue

- *Big Data in the loop* for search and rescue systems



- **First milestone coming soon, the software integration**

Rennes Open Access to Data

- **A software engineering oriented project**
 - How can open-data help flying drone safely in cities?
 - How drones can contribute to collecting data in real-time in cities?
 - What underlying software technologies to use?
- **Many data to consider**
 - Weather conditions
 - Topography
 - Roadwork, ...
 - No flying zones (temporary and permanent)
 - Public events, ...
- **Starting in September 2016**

Archeological Land Survey

- **Use drones to discover new archeological artifacts**
 - Combine data analytics, image processing and Big Data technology
 - Automate survey flying missions

- **In collaboration with the archeological association Cerapar (<http://cerapar.free.fr/>)**

- **Starting in September 2016**