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# PHASE I DELIVERABLE

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## BUILDING A MULTIROTOR AERIAL VEHICLE BASED ON THE PX4- PIXHAWK AUTOPILOT

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Nowadays, drones are becoming part of rapidly-evolving industries that are producing applications that go far beyond military and government use. As autonomy and collision-avoidance technologies improve, so too will the ability of drones to perform increasingly complex tasks.

Proprietary drones come with a lot of advantages: very cheap, high-quality and well-integrated platforms. Nevertheless, they lack the versatility to add new hardware components and their autopilots are black boxes that cannot be accessed. These limitations suppose an important challenge when doing research and developing novel algorithms for aerial robotics.

**The main objective** of this Bachelor Semester Project is to design, develop, build and configure from scratch a multirotor aerial vehicle using a PX4-Pixhawk and a Raspberry Pi. The Pixhawk is an open-hardware autopilot and the PX4 is an open source flight stack. The Raspberry Pi is a single board computer, it can run an OS which can then run programs.

Finally, the aerial platform will be evaluated with the performing of a real flight.

Considering that the technological knowledge will be better developed during the Bachelor Semester Project, **the main required competences** necessary to work will be to have at least a basic knowledge as a starting point of electronics in order to properly select and mount the required parts for building the drone (frame, propellers, motors, batteries, etc), considering the weight the drone could lift and the weight of the chosen parts.

It is important to have knowledge on digital and analog sensors and actuators to be able to connect them to the Raspberry Pi platform and on the Pixhawk board.

It is required the understanding of Linux system administration to configure and install the drivers of the sensors and actuators. It is highly recommended to have knowledge of programming in order to develop the programs for the use of the components.

**The scientific aspect** covered by this Bachelor Semester Project is to understand the important components of the drone in order to proceed to the technical part and in the end to deliver a report in which the performance and optimizations are described.

**The technological aspects** covered by this project are to select the right frame, motors, propellers, connectors, etc in order to construct a well-integrated platform.

Then to develop and build from scratch a multirotor aerial vehicle with an open source autopilot on board, to install and configure the required components to interact with the necessary parts. The sensors, camera and other actuators which increase the capabilities of the drone in making it more interactive will be controlled with the Raspberry Pi platform.

Raspberry Pi is the name of a series of single-board computers which are very suitable platforms for this kind of robots due to its reduced cost, small size and weight, and hardware interaction possibilities.