Multi-copter “from toys to tools”

Infineon provides a demo board for designing professional multi-copters. It comes with a CAN port to control a video camera.

In the beginning, drones and multi-copters were regarded as toys. Of course, there were initially also some military drones developed professionally. Now, there is a second professional application: multi-copters for delivery services. Recently, Amazon tested multi-copters. German and French postage services are also using them for package deliveries.

The terms “drones” and “multi-copters” are often used interchangeably, but there are differences. “Drones can trace their origin back to fixed-wing military applications as unmanned aerial vehicles (UAVs) originally conceived as a low-cost, low-risk surveillance solution,” explained Siegfried Krainer and Michael Thomas from Infineon in a white paper. “Multi-copter literally means ‘many wings’ and usually refers to an airborne rotorcraft with more than one rotor.”

“While traditional aircraft designers devote a lot of effort to solving aerodynamic and mechanical challenges, the rapid development of MEMS-based microelectronics has focused multi-copter design efforts on the electronics portion. Model-based electronic control allows the reduction of aerodynamic instability, which leads to increased flight performance and maneuverability,” wrote the authors of the above-mentioned white paper. Ronald Staerz from MCI is the third author.

The shown block diagram of Infineon’s kit illustrates the main electronic sub-systems for a professional multi-copter. The major difference to ‘toy drones’ is that useful functions are integrated. Most often this is a vision system that requires video processing, gimbal control, and other functionality to be integrated into the control system. In order to control a video camera a CAN port is provided.

At the heart of the kit is the flight controller, which is built around the XMC4500 ARM Cortex-M4 32-bit micro-controller. IR2301 drivers, low-voltage Mosfets and MPU9250 inertial measurement unit (IMU) are the additional components that make up the electronic powertrain, motor control, and flight sensing functional blocks. Either 6- or 9-axis modes can be implemented using the demo board.

Utilizing the XMC4500 demo board and the Dave platform for micro-controller programming, project development time and cost can be reduced by as much as 30 percent claims the provider. Furthermore, flight times are assured by the onboard authentication hardware. The DPS310 pressure sensor allows sensing the altitude sensing, while a 24-GHz radar can be incorporated to measure both the presence and proximity of objects and their velocities. An interface for a GPS breakout board offers the option for more sophisticated route mapping. The on-board XMC1400 micro-controller is the basis of a closed-loop control system for a gimbal camera along with the angle sensors and the motor drivers, allowing development of professional-grade aerial surveillance systems. This MCU comprises also the CAN controller.