

Unmanned Autonomous Vehicle (UAV) Platform

- *Integrated and adaptive systems*
- *Accelerated development time*
- *Ensuring safety and security*



Overview

For unmanned autonomous vehicles (drones), whether in the air or on the ground, to operate effectively, an autopilot function is needed that enables the system to be in a steady-state mode. This then allows high-level commands to be received so that the drone can take 'smart' actions like plotting its course to arrive at its destination at the right time while avoiding obstacles along the way. The role of sensors in drone technology cannot be understated. Sensors establish position, movement, velocity, attitude, altitude, humidity, air pressure – a whole range of essential measurements – to enable unmanned autonomous vehicles to literally 'sense' the where, how and what in relation to their environment at any point in their journey.

Sensing the environment

In order to be aware of its surroundings and act accordingly unmanned autonomous vehicles require a platform whose processing power can ensure that this environmental sensing is both precise and real-time. It is in this aspect that TOPIC Embedded Projects is playing a key role and is co-designing such a platform together with Xilinx, renown system-on-chip silicon vendor. Not only is the TOPIC platform unique in being able to support multiple 4K video streams, but it can also hook up to LIDAR and RADAR systems. Software-defined radio on board allows the use of proprietary data communication channels and phased-array radio communication, technology that is processing-intensive and a task that is perfectly suited to the TOPIC platform. This means that high bandwidth communication is possible to the ground station or to a satellite, which is especially important in applications which involve observations and require low-latency live video feeds.

Best in class

In comparison with other known UAV Platforms, the response time of the TOPIC platform has been found to be significantly better and consume substantially less power. So essentially, the TOPIC processing platform can be characterized as a low-power, high-performance, real-time response system. Furthermore, the UAV Platform is able to operate with multiple sensors so, for example, a normal camera can be combined with LIDAR and/or RADAR to ensure enhanced safety of a flight or drive in foggy conditions. In the event of a fierce wind, for example, rapid motor drive corrections can be made. The platform is suitable to withstand industrial environmental conditions.

Key features

Typical functionality supported by the UAV Platform.

- **Engines:** (Air (3D), Ground (2D)).
- **Motion control:** Autopilot, Inertial sensory, BLDC commutation.
- **Power distribution & management:** batteries, solar, petrol, hydrogen.
- **Communication:** air-to-ground and visa-versa, air-to-air.
- **Localization/navigation:** GPS, GLONASS, Galileo, Tercom, inertial navigation.
- **Payload:** application specific.

Applications

Applications for the TOPIC platform range from unmanned vehicles – driving or flying – to robotics, for instance an industrial robotic arm with 6 or 7 axes of motion whereby the vision and motion systems can be coupled. Real-time object recognition in the loop allows various machinery along a production line, such as a vegetable selection, where real-time (milliseconds) adjustments can be made so that the product output is always uniform despite variations in the raw material input. In terms of vehicles, the UAV Platform is very suitable for use in car manufacturing for the automated applications e.g. adaptive cruise control and in both civil and military aviation for UAV and drones as central computer, communications and control.

Benefits

The benefits of the TOPIC unmanned autonomous vehicles UAV Platform can be characterized up as a comprehensive solution that is both adaptable, reliable and powerful, contains options that go beyond many existing solutions. The combined knowledge and expertise of TOPIC with Xilinx has produced a low-power, high-performance platform for a range of applications that require very precise, real-time operation. Apart from the processing board itself, the TOPIC platform offers clients the software that runs on the board, the reference design of the board and assistance as a service with the customization of the board.

- Onboard hosting of autopilot in real-time processing cores.
- Reliable high-speed motor control solution.
- High bandwidth, robust, secure SDR solution for wireless communication.
- Beyond line-of-sight communication for 10-20km+.
- Fully integrated high performance navigation sensors.
- High-Performance DSP infrastructure.
- HLS tools for rapid algorithm development.
- H.265 Codec supporting 4K60fps.
- Multi-camera and sensor fusion.
- High-Bandwidth connectivity.



About TOPIC

We make the world a little better, healthier & smarter every day!
It is literally in our DNA.

Business focused and with a family spirit we offer high qualified consultants with excellent technical skills. TOPIC develops software (C, C ++, C #, Java, Python), hardware and FPGA based on projects and secondment. From board design, low-level driver development to applications for desktop, web, mobile, cloud. With TOPIC Healthcare Solutions we introduce solutions for clinical workflows

using advanced digital technologies. And TOPIC's self-developed products Dyplo (operating system for FPGAs and processors), Miami (application processor module based on System-on-Chip) & customization services frame our knowledge. In more than 20 years, TOPIC has built up a considerable track record. With a team of more than 150 engineers, TOPIC builds on innovative product development.

Our daily expertise, embedded in your future!