National Aeronautics and Space Administration

NASA Langley's
Lightweight Sensing and Control System
for unmanned aerial vehicle monitoring capabilities

NASA Langley Research Center has developed a new sensing and control system for unmanned aerial vehicles (UAVs) that allows for semi-autonomous flight. With this technology, pilots need not leave the ground to conduct routine monitoring and surveillance quickly and cost-effectively. Such systems are particularly useful during long flight segments or over remote locations, or for scientific applications such as atmospheric monitoring or crop monitoring, which might require long and repeated sampling in a specific pattern. The small, lightweight technology can be quickly adapted to your specific configuration.

Benefits

- Lightweight
- Less power used than with current systems
- Useful for both small and large UAVs
- Able to run off solar power
- Inexpensive
- Easily modifiable for different sensor configurations
- Capable of acquiring up to 16 channels of flight and navigational data (e.g., inertial gyro data, airspeed, pressure, accelerometers, air temperature, GPS)

partnership opportunity

Applications

The easily modifiable system can be used for various surveillance assignments using sensors and monitoring devices including, but not limited to:

- Humidity sensor
- Microphone
- Magnetic sensor
- Magnetic compass
- Temperature sensor
- Light sensor
- Camera
- Ultraviolet sensor

These monitoring devices can store information in flash memory on the UAV, which can be easily downloaded at the end of its objective.

Commercial Opportunities

- Research and scientific investigations
- Environment - forest fire monitoring, ocean and atmospheric conditions in advance of approaching hurricanes
- Agriculture - monitoring large-scale farms to identify fields ready for harvesting
- Law enforcement
- Homeland Security

For More Information

If your company is interested in licensing or joint development opportunities associated with this technology, or if you would like additional information on partnering with NASA, please contact:

The Technology Gateway

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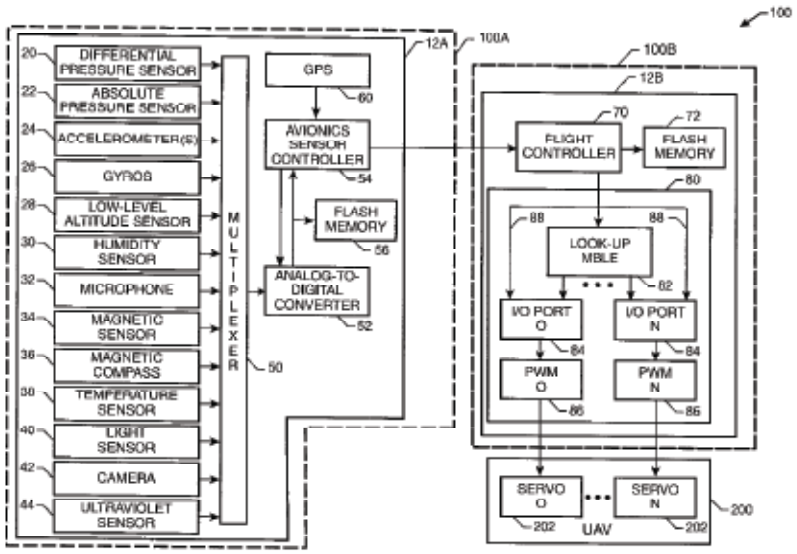
The Technology

Increasing demand for smaller UAVs (e.g., sometimes with wingspans on the order of six inches and weighing less than one pound) generated a need for much smaller flight and sensing equipment. NASA Langley's new sensing and flight control system for small UAVs includes both an active flight control board and and an avionics sensor board. Together, these compare the status of the UAV's position, heading, and orientation with the pre-programmed data to determine and apply the flight control inputs needed to maintain the desired course.

To satisfy the small form-factor system requirements, micro-electro-mechanical systems (MEMS) are used to realize the various flight control sensing devices. MEMS-based devices are commercially available single-chip devices that lend themselves to easy integration onto a circuit board. The system uses less energy than current systems, allowing solar panels planted on the vehicle to generate the system's power. While the lightweight technology was designed for smaller UAVs, the sensors could be distributed throughout larger UAVs, depending on the application.



A block diagram of an avionics sensing and flight control system for a UAV

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