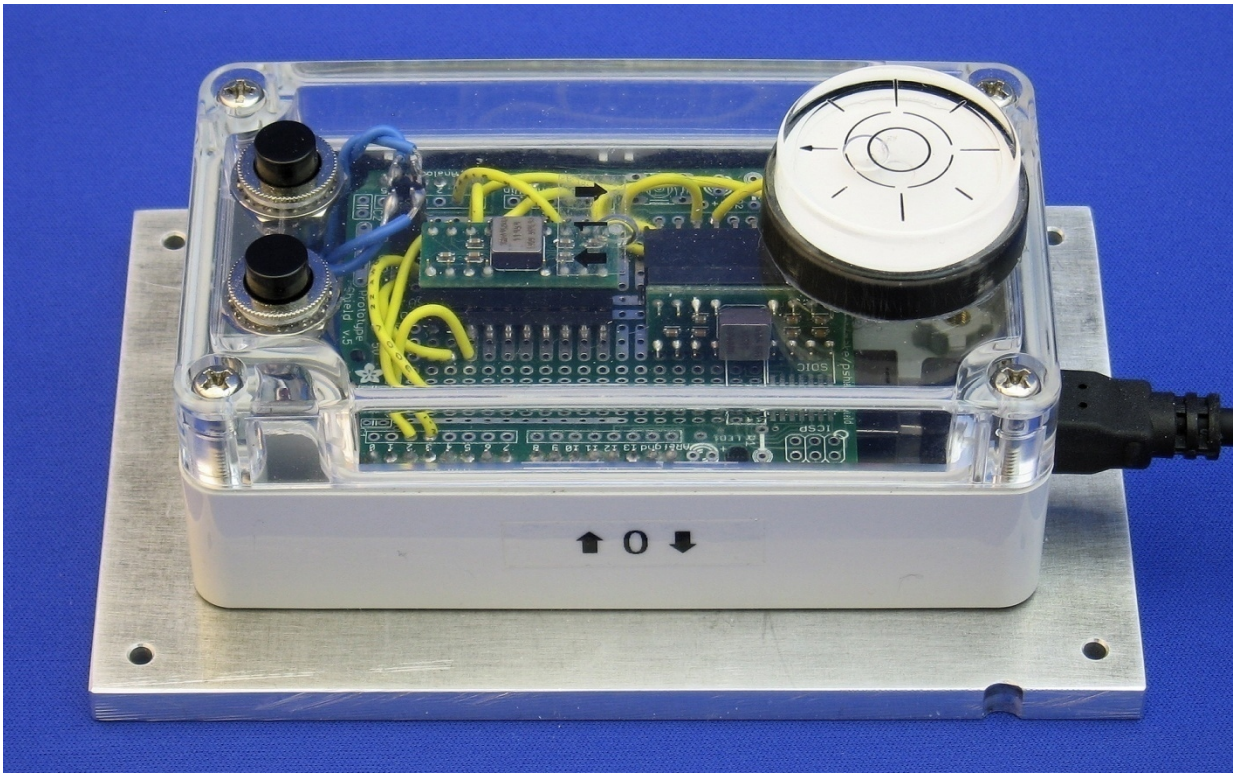
Angular Rate Sensor for Measurement and Control



- Two MEMS angular rate sensors (Analog Devices ADXRS614, +/-50°/s range);
- Each sensor acquired as a PCB-mounted standalone 20-pin DIP module;
- Each Module mounted to solder breadboard (Arduino "Shield"), at orthogonal angles, for 2-axis sensing;
- Breadboard mounted on top of mating microcontroller board (Arduino Duemilanove, ATmega168-based);
- Assembly within small enclosure for portability and for use as a hand controller;
- Pushbuttons on enclosure for various manual control functions;
- Bulls-eye bubble level attached to enclosure for general alignment in vehicle motion data collection;
- Enclosure attached on top of optional larger aluminum plate for increased mounting flexibility.

- Power to sensor modules provided by microcontroller board;
- Analog signals from sensors read by two 10-bit ADC input ports on the microcontroller board;
- Momentary switch button contacts read by digital inputs on microcontroller;
- External serial communications using (FTDI brand) USB interface on Arduino board;
- FTDI Driver running on external Window/Linux host; unit appears as RS232 COM/TTY serial device;
- External communications via exchange of ASCII text, with optional XML tagged data.

- Microcontroller code written in the Arduino language (like C/C++), using the Arduino IDE;
- Code downloaded to the microcontroller using the IDE and an integrated boot-loader system;
- External interface using serial communications; ASCII console/terminal or other external program;
- Console/Terminal operation via updating display of text with keystroke command inputs;
- Angular Rate Sensor Interface (ARSI) program created in the Python language.

- ARSI program running in Windows or Linux, providing further data, control, and analysis functions;
- Providing for additional data display and data logging for vehicle motion data acquisition;
- Providing hand controller interface functions and button functions;
- Providing signal processing and command output (serial com) for various Pan-Tilt Directors;
- Driving a Pan-Tilt Director based on hand controller motion (real time), or recorded velocity data;
- Driving a Pan-Tilt Director using the angular rate sensor in a motion stabilization feedback process.