

24th June 2006

Integration of Crossbow MNav and MaxStream 9xtend onto Yard Stik

1. Overview

The MNav sensor and the MaxStream data modem have been integrated onto the Yard Stik and we are able to get the sensor data from the plane transmitted to the computer using the wireless modem. Figure 1 shows the Yard Stik with the sensor and modem integrated

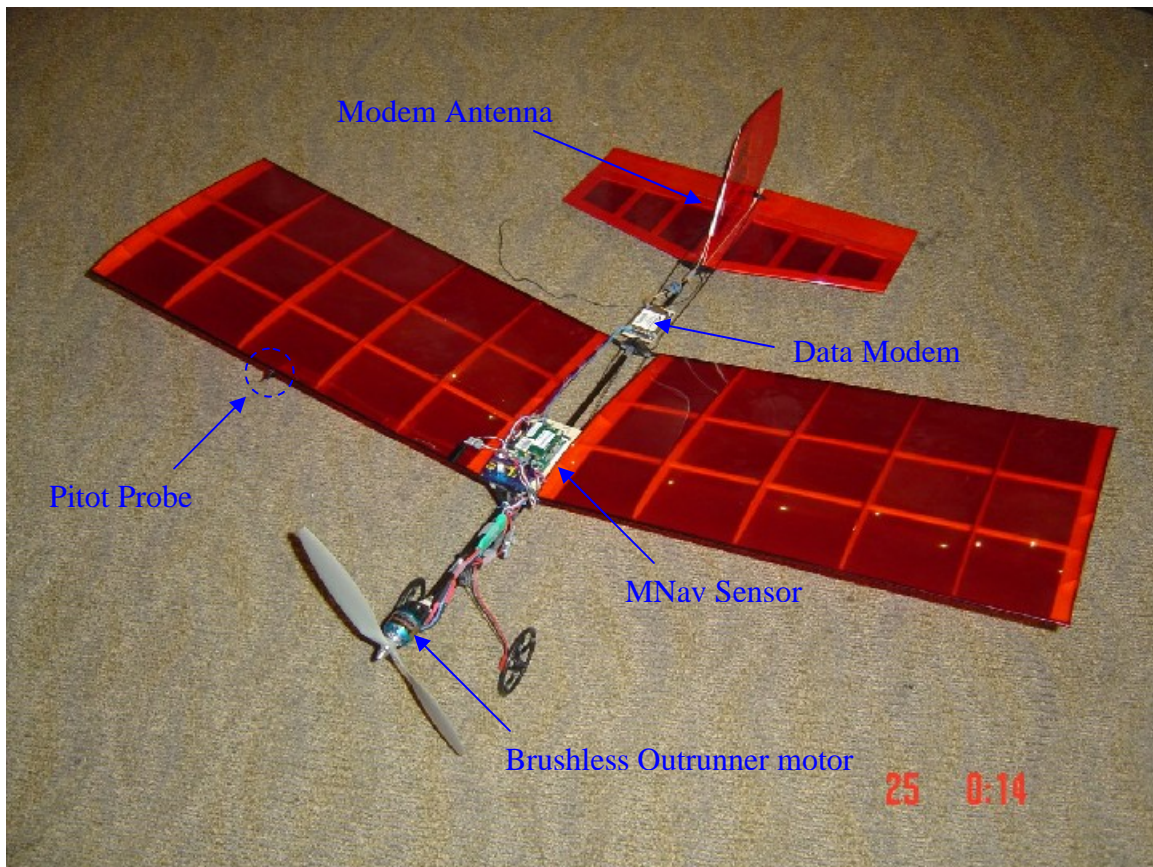


Figure 1 Yard Stik with integrated avionics

The MNav is mounted near to the CG of the plane (about 2.5 cm away). The data modem and its antenna are mounted at the rear of the plane so that this will help to reduce the

RFI (Radio Frequency Interference) using physical separation of the components. A pitot probe is placed on the right hand side of the wing with a distance of more than a diameter of propeller length from the centre line of the plane so that the air speed measured will not be affect by the propeller wash.

2. MNav Integration Details

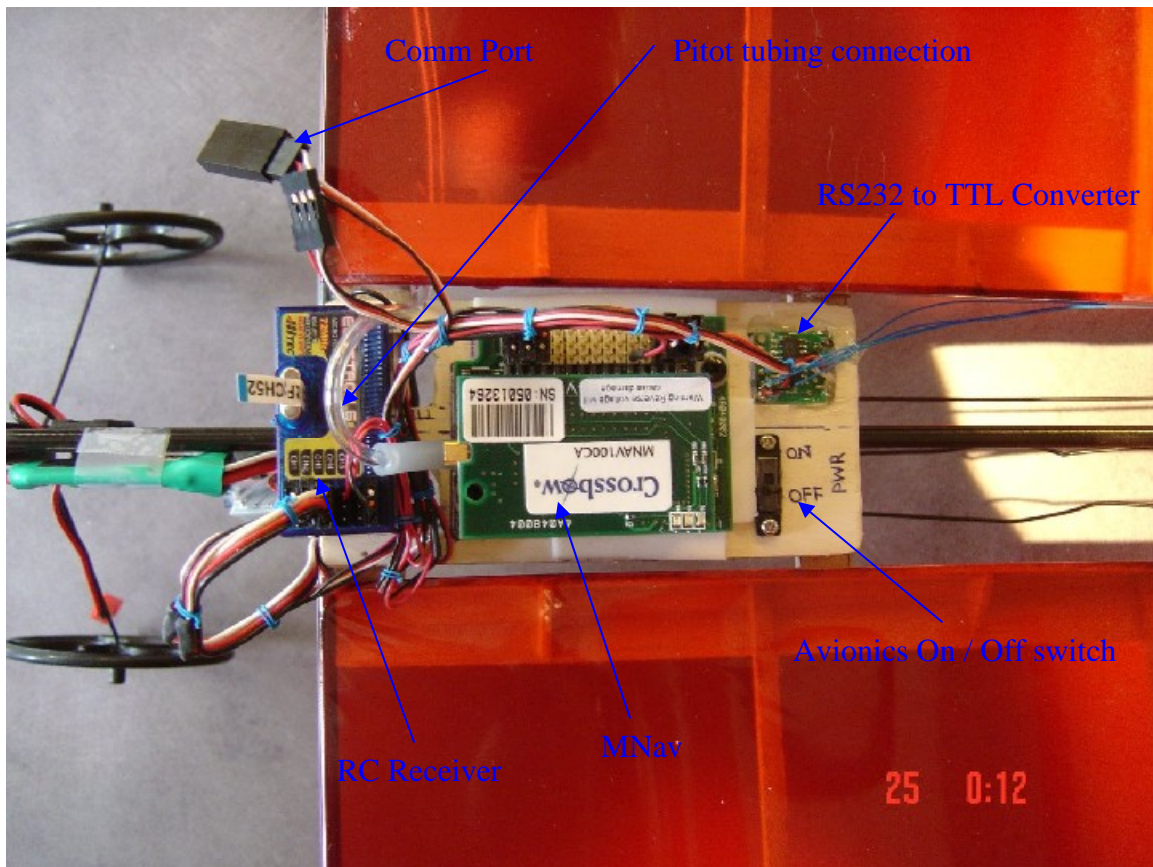


Figure 2 Details of components layout at CG of the plane

Figure 2 shows the top view of components that are mounted at the CG of the plane. The RC receiver output PWM signal to control the servo actuators and at the same time, a signal line has been hacked into the receiver to provide the PPM control signal that the MNav needs for the servo commands signal.

The power to the avionics system, controlled by the on/off switch, is provided by a 5 volt regulator which takes in 11.1 volts from the main battery pack (It can provide current up to 2.5 amps)

A RS232 to TTL converter is used to interface with the data modem as the OEM modem takes in TTL signal and the output from MNav is RS232 signal. In future, when the FCS is integrated, this converter is not required as the MPC has the UART signal that can communicate directly with the modem.

A communication port connector access is available onboard so that we can reprogram the data modem for different setup and also we can have a direct access to the MNav without going through the data modem if we need to recalibrate or change setting for the sensor.

3. Data Modem

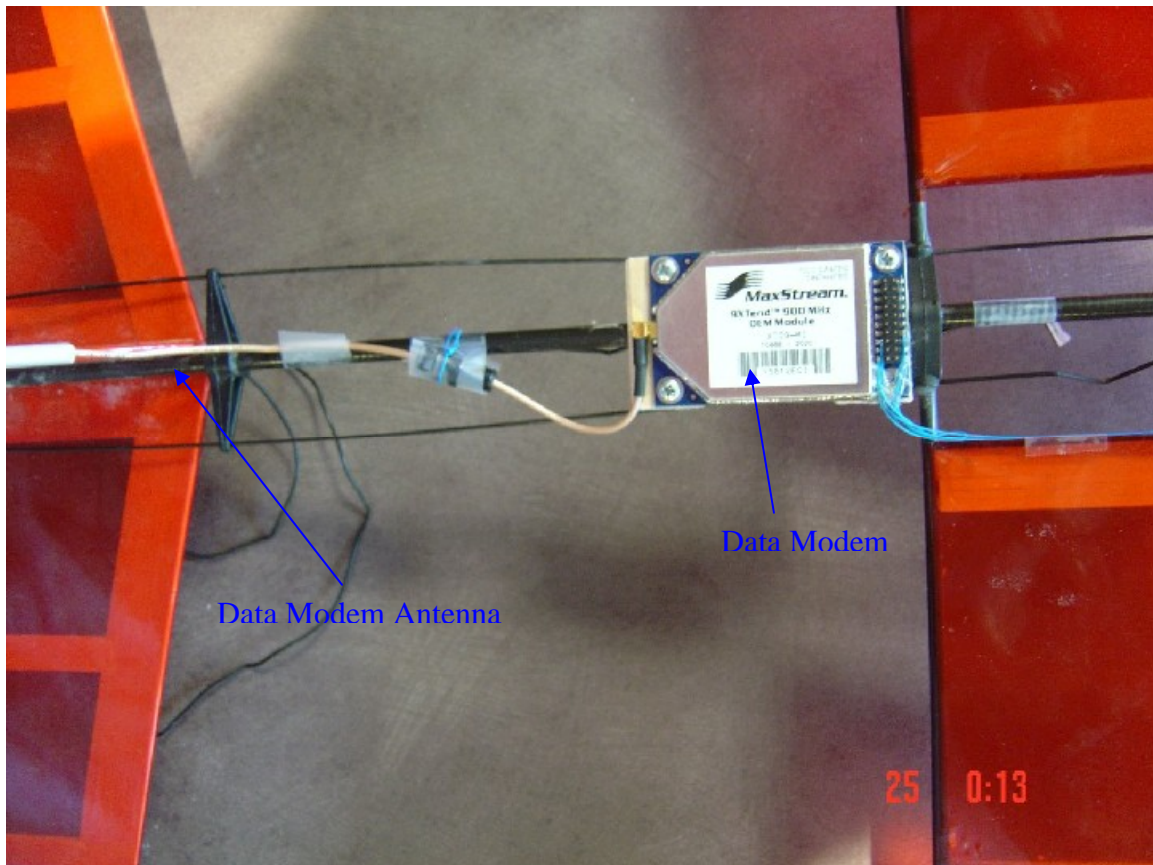


Figure 3 Mounting of data modem

The MaxStream data modem is mounted near the tail of the plane and its antenna is mounted on the vertical tail so that it will give the right RF propagation waveform when the modem is communicating with the ground modem. For this data collection task, the modem has been set to 10mW transmission power with a serial data interface rate of 38.4Kbps and a RF throughput of 115Kbps.

4. Ground Station

The ground station has a data modem in the development board and they are powered by a 9v battery. The interface of the ground modem and the laptop computer is through a RS232 connection at 38.4Kbps.

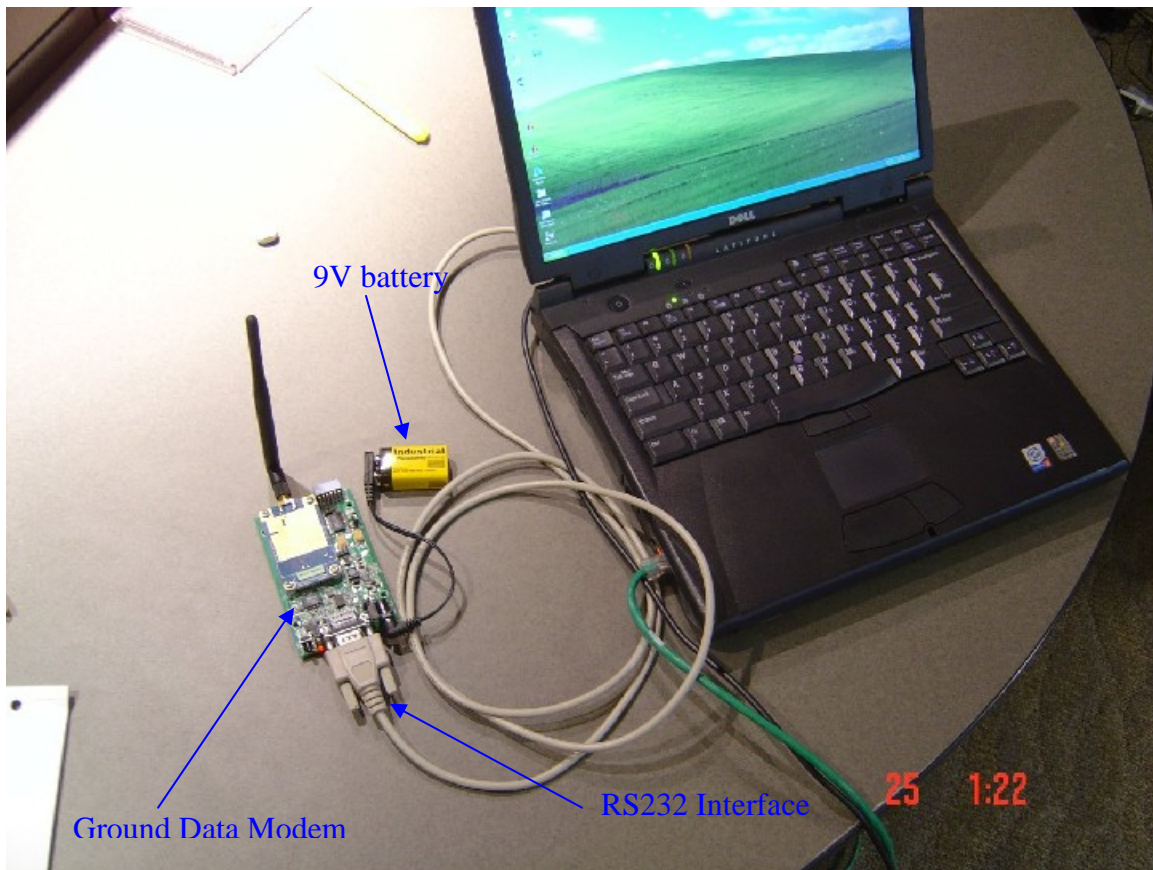


Figure 4 Ground station

5. MPC 555 Computer

When the MPC 555 FCS is ready, it will be mounted on the plane as shown in figure 5.

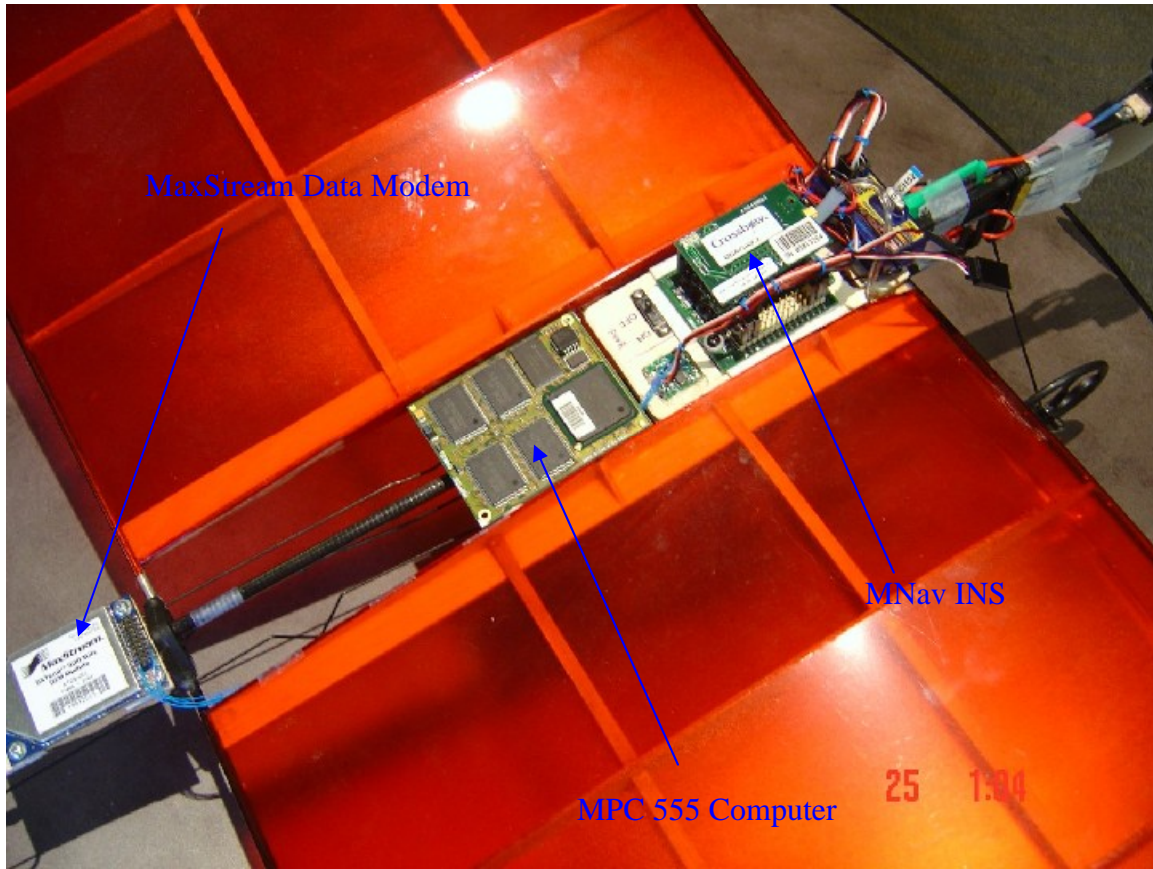


Figure 5 Integrate with MPC 555 computer

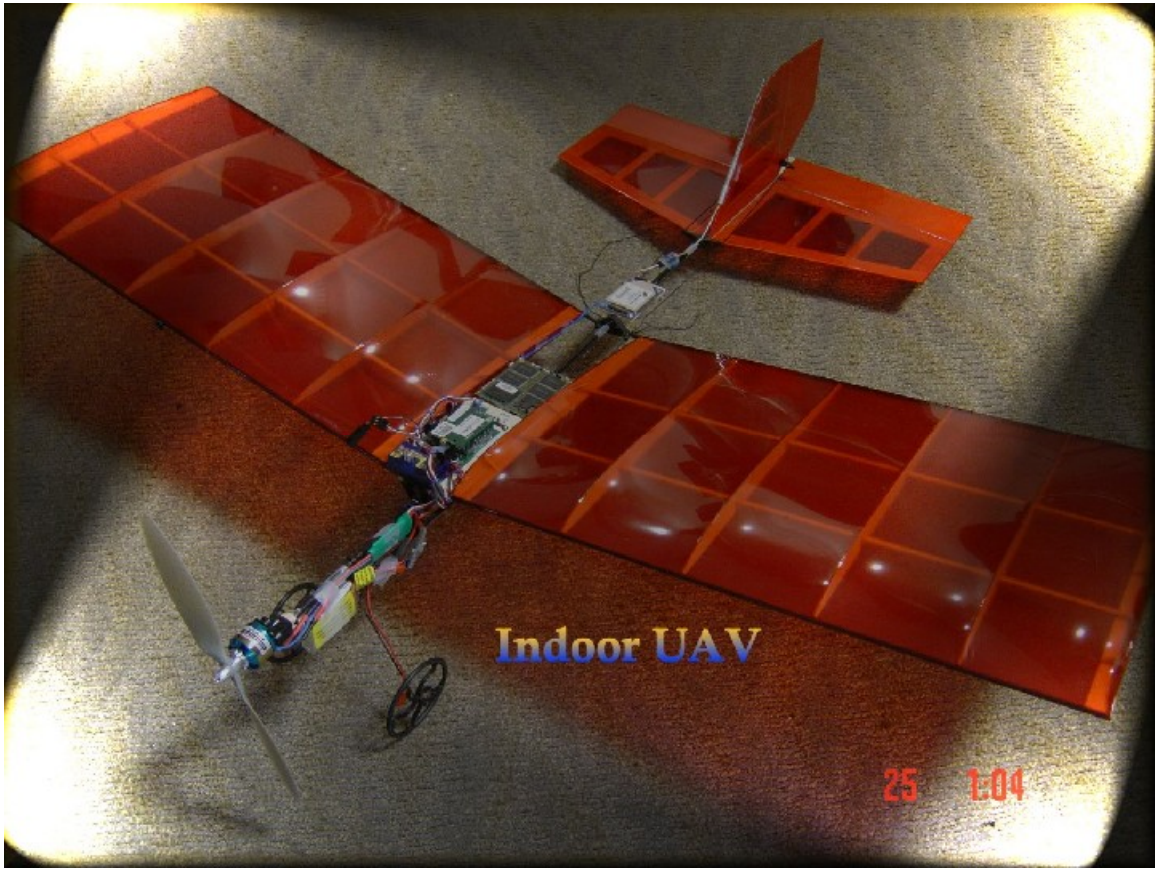


Figure 6 Complete Indoor UAV