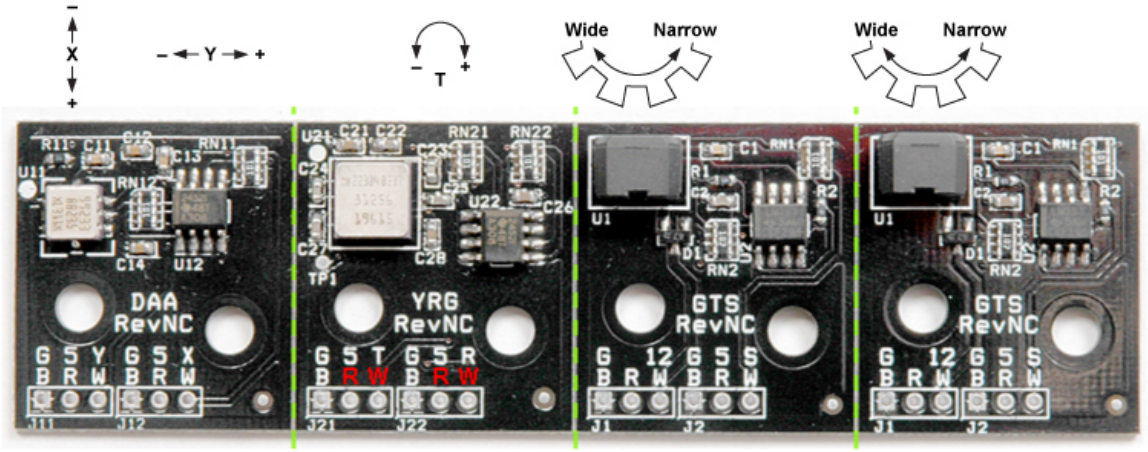
The 2006 FIRST Season sensors from Innovation First, Inc operate per the following information. This document is being provided as a courtesy, and therefore is not guaranteed to be supported by Innovation First, Inc.

1. General:
    a. All voltages and pulse widths are nominal. Refer to the component data sheets for exact part details.
    b. PC Board markings of “G” are ground connections, “5” are +5V connections and “12” is +12v or main battery connections. Modified PWM cables may be used to connect the sensors to the FRC.
    c. Generally, the “B”, “R”, and “W” connections connect to ground, +5V and signal respectively.
        i. EXCEPTION: The YRG (RevNC) sensor’s “W” and “R” silkscreen is reversed. The attached picture shows the CORRECT “R” and “W” in red. Connect +5V to the “R” and signal to the “W” per the picture.



    d. Analog values can be measured with the User Processor’s A/D inputs. Use the Get_Analog_Value routine found in ifi_utilities.c. The result will range from 0 (0.0 volts) to 1023 (5.0 volts).
    e. To break apart the four sensors of the sensor strip, gently grasp one sensor with one hand and the other sensor with the other hand. Gently flex the boards along the score line (green dashed line in above picture) until the two sensors separate.
    f. The two mounting holes for each sensor are 0.165” in diameter. The first hole is centered at 0.230” to the right and 0.440” up from the lower left hand corner. The second hole is centered at 0.770” to the right and 0.360” up from the lower left hand corner. It is recommended to use insulating washers on each side of the mounting holes.

2. Dual-Axis Accelerometer
    a. The Dual Axis Accelerometer (DAA) is intended to connect to two of the FRC Analog inputs to measure X axis and Y axis acceleration. They also detect the acceleration due to gravity, and can therefore be used as static orientation sensors.
    b. For detailed operation of the Analog Devices ADXL311 DAA, refer to the www.analog.com website. The output varies by 290 millivolts per g when given a voltage of 5.0 volts.

c. All of the voltages described below assume the board is stationary.

Board orientation	White dot by U11	X output (volts)	Y output (volts)
Horizontal	Don't care	2.5	2.5
Vertical	Upper Left	2.2	2.5
Vertical	Lower Left	2.5	2.8
Vertical	Lower Right	2.8	2.5
Vertical	Upper Right	2.5	2.2

3. Yaw Rate Gyro
    a. The Yaw Rate Gyro (YRG) is intended to connect to two of the FRC Analog inputs. The "T" output is "Twist" or rotational velocity. The "R" output is "Relative temperature". For detailed operation of the Analog Devices ADXRS150 YRG, refer to the www.analog.com website.
        i. The actual Yaw Rate Gyro chip used on the 2006 YRG is the AD22304. It has a guaranteed dynamic range of +/- 80 degrees per second vs. +/- 150 degrees per second for the ADXRS150. Most other specifications are identical.
    b. The "T" output varies by 12.5 millivolts per degrees per second of rotation. No rotation will give a 2.5 volt output. Accelerating clockwise will provide a voltage above 2.5 volts. The 3 dB bandwidth of the Yaw Rate Gyro is set at 40 Hz.
    c. The "R" output varies by 8.4 millivolts per degree Kelvin. A temperature of 298 K (about 25 Celsius) will give an analog output of 2.5 volts. Higher temperatures will provide higher voltages. Cooler temperatures will provide lower voltages.

4. Gear Tooth Sensor
    a. The Gear Tooth Sensors (GTS) are intended to connect to FRC digital interrupt inputs. They additionally require +12 volts. For detailed operation of the Allegro MicroSystems ATS651 Speed and Direction Sensor, refer to the www.allegromicro.com website.
    b. A ferrous metal clockwise (when looking up from the bottom of the card) rotating gear will provide a 39 microsecond wide rising pulse out of the "S" output when oriented per page 5 of the ATS651 datasheet. The pulse times are shorter than the data sheet due to the buffering circuitry.
    c. A counter-clockwise rotating gear will provide an 83 microsecond wide pulse to the FRC.

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