Wireless Joypad for Microsoft XBOX

Theory of Operation

3/9/04

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1. Station Side Radio

The radio system is mainly composed of three parts: radio modem, frequency synthesizer and baseband microprocessor. The radio is interfaced with Microsoft XBOX via a 5-pin connector. Microsoft XBOX sends a command to the radio every 4 milliseconds. The radio takes the data from XBOX, packetize the data by adding preambles, frame information, and error checking bytes. The packetized frame is transmitted to the wireless joystick. When joystick replies, this radio receives the data, un-packetize it, and sends to Microsoft XBOX. The radio modem is a FSK modem running at 250 kbps with GFSK encoding to avoid frequency drifting. Frequency is controlled by a frequency synthesizer which adjusts a voltage-controlled RF oscillator dynamically for accurate frequency management. A total of 79 channels can be selected conversing the frequency range of 2.402 – 2.480GHz. The antenna is an embedded PCB antenna matching is done by using lumped inductors and capacitors. The radio is a half-duplex system and is powered by a 5V -> 3.3V regulator, power source provided by Microsoft XBOX. The total average power consumption of the radio system is about 25 mA at 3.3V.

2. Joypad Side Radio

Joypad side radio operates in similar way to Station Side Radio as described in previous section. A total of 79 channels can be selected conversing the frequency range of 2.402 – 2.480GHz.. It scans keystrokes on the joypad. Similarly, the data is packetized in the same way as Station Side Radio. The joypad radio is powered by 3-AA side batteries and down regulated to 3.0V. Another provides power for two vibration motors in the joypad.