Wireless Gamepad for PC

Theory of Operation

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1. Dongle Side Radio

The radio system is mainly composed of three parts: radio modem, frequency synthesizer and baseband microprocessor. The radio is interfaced with PC via a 4-pin connector. PC sends a command to the radio every 16 milliseconds. The radio takes the data from PC, packetize the data by adding preambles, frame information, and error checking bytes. The packetized frame is transmitted to the wireless gamepad. When gamepad replies, this radio receives the data, un-packetize it, and sends to PC. 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 PC. The total average power consumption of the radio system is about 25 mA at 3.3V.

2. Gamepad Side Radio

Gamepad side radio operates in similar way to Dongle 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 gamepad. Similarly, the data is packetized in the same way as Station Side Radio. The joypad radio is powered by 4-AAA size batteries and down regulated to 3.0V. Another provides power for two vibration motors in the gamepad.