Introduction

Updates to driver electronics of TERMES robot for the autonomous construction of 3D-user specified structures. dsPIC33F microcontroller as the main processing unit. Updates include:
- Digital filters
- Lower Signal-to-Noise ratio (SNR)
- More sensitive detection of black/white patterns
- Better navigation performance
- Reduced package volume
- Wireless communication

Sensing

- Infra-Red sensors used for navigation
- Six pairs of IR sensors placed on bottom of robot
- Driven by a PWM signal with 20% duty cycle
- Sensitive to black/white

Digital Signal Processing

- FIR Filter Specifications
  - Sampling Frequency: 10 kHz
  - Passband Frequencies: 1100 Hz 1200 Hz
  - Passband Ripple: 1 (dB)
  - Stopband Frequencies: 950 Hz 1350 Hz
  - Stopband Ripple: 3 (dB)

Actuation

- Dual motor driver
- 2.7-5.5V logic supply
- Up to 15V motor supply
- Up to 1.2A constant current
- 3.2A stall current
- 3 Brushed DC Gearmotors
- 100:37:1 metal gearbox
- Up to 320 RPM at 6V
- 120 mA with no load
- 1.6A stall current at 6V

Power circuit

- Two 7.2V batteries power motors-IR circuits and MCU
- Buck converters regulate down voltage to 3.3V and 5V

Communication

- 40 MIPS 16-bit dsPIC33F CPU
- 10-bit ADC with 6 ADC input channels
- Six-hardware channel DMA with no CPU stalls
- Two UART modules (10 Mbps) – RS-232
- Five 16-bit and two 32-bit Timers
- Four PWM generators

Printed Circuit Board

- Board Dimensions: 1.749 x 2.332 in

References


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