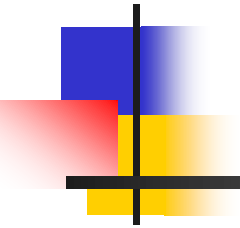
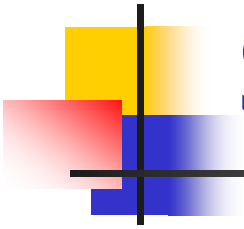


IR Communication among Arduinos

Silicon Valley Forth Interest Group

July 23, 2011

Chen-Hanson Ting



Summary

- Arduino Uno Board
- Arduino Tao Boards
- IR LED Emitter
- IR Receiver
- Communication between Arduinos
- Demonstrations

Arduino Uno Board

- ATmega328P
- 32KB Flash, 2 KB RAM
- USART0 at 19200 baud
- Soft USART at 2400 baud for IR
- TCNT0 for 36 kHz Carrier
- 23 Programmable I/O lines

Arduino Tao Board

- Minimal components
- 2 AA batteries for power
- 8 MHz Resonator
- USART0 at 2400 baud
- TSOP31236 output drives RX port
- TX port may be connected to soft USART on Uno
- Running Traffic Controller for verification and demonstration

Variations of 328eForth

- V2.20 Bug fixes
- V3.10 Auto baud rate detection, half duplex
- V4.10 Soft USART at 2400 baud for IR communication
- V5.10 2400 baud to receive commands through IR communication

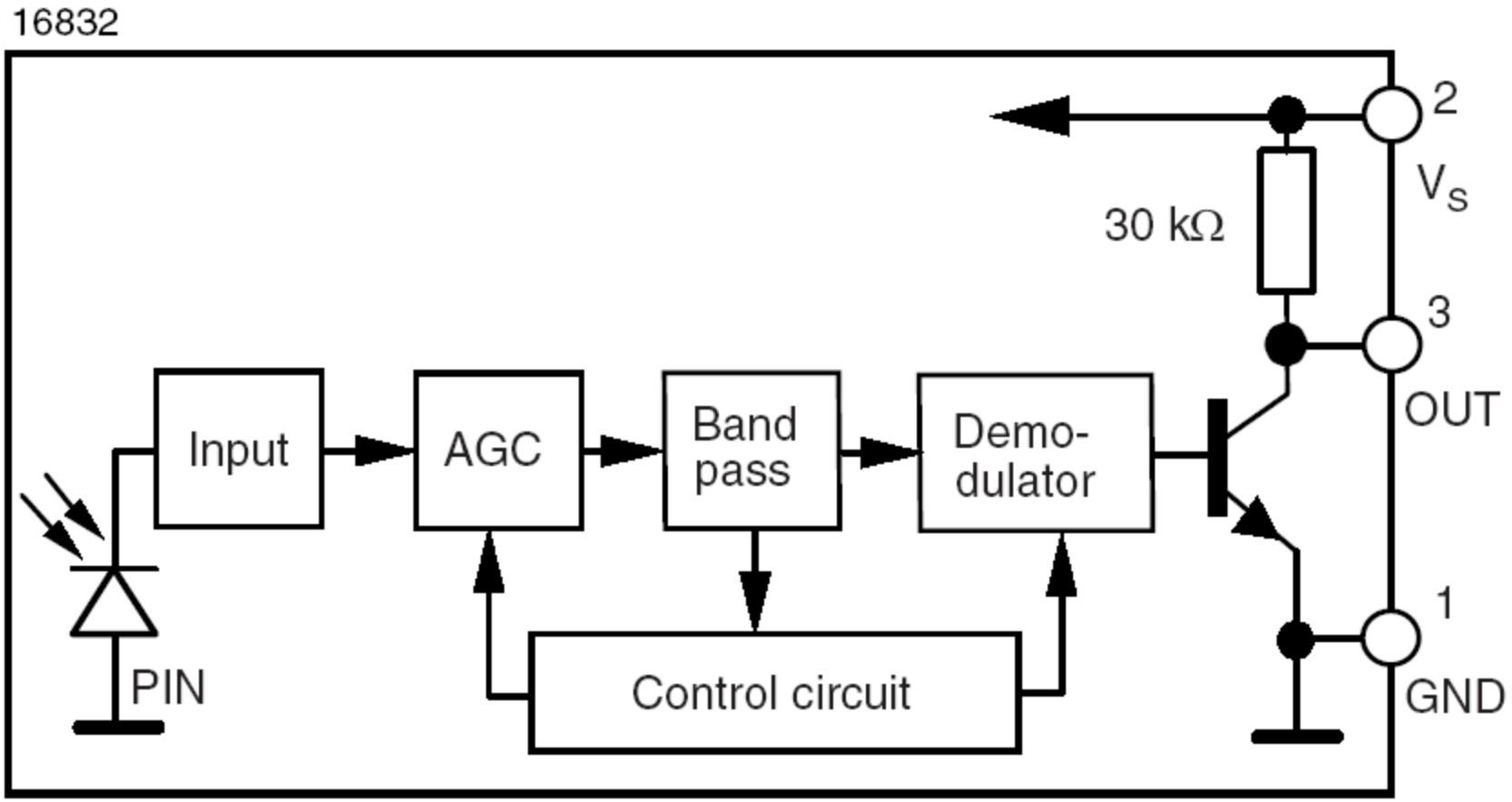
IR LED Emitter

- LEDTECH UT1893-45-0125, 950 nm
- Carrier frequency 36 KHz
- OC0A output is turned on and off by controlling DDR6 of PD6 port
- OC0A is used as TX of soft USART

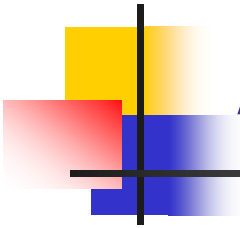
IR Receiver

- Vishay TSOP31236 IR receiver
- Carrier frequency 36 kHz
- Low power, 2.5-5.5V
- PIN diode, preamp, AGC, bandpass filter, demodulator, output transistor
- 950 nm color filter

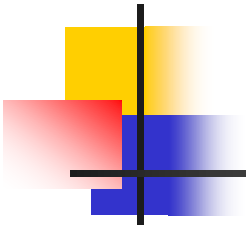
IR Receiver


16832
2
V_S
30 kΩ
3
OUT
Input
AGC
Band pass
Demo-dulator
1
GND
PIN
Control circuit

Communication Between Arduinos



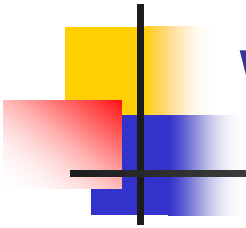
- Arduino Uno Board
  - 328eForth410
  - USART0: terminal interface at 19200 baud
  - PD6: Soft USART TX output, 2400 baud modulated at 36 KHz
  - PD7: Soft USART RX input, 2400 baud
- Arduino Tao Board
  - 328eForth510
  - USART0: Uno interface at 2400 baud, through TSOP31236



Demonstrations

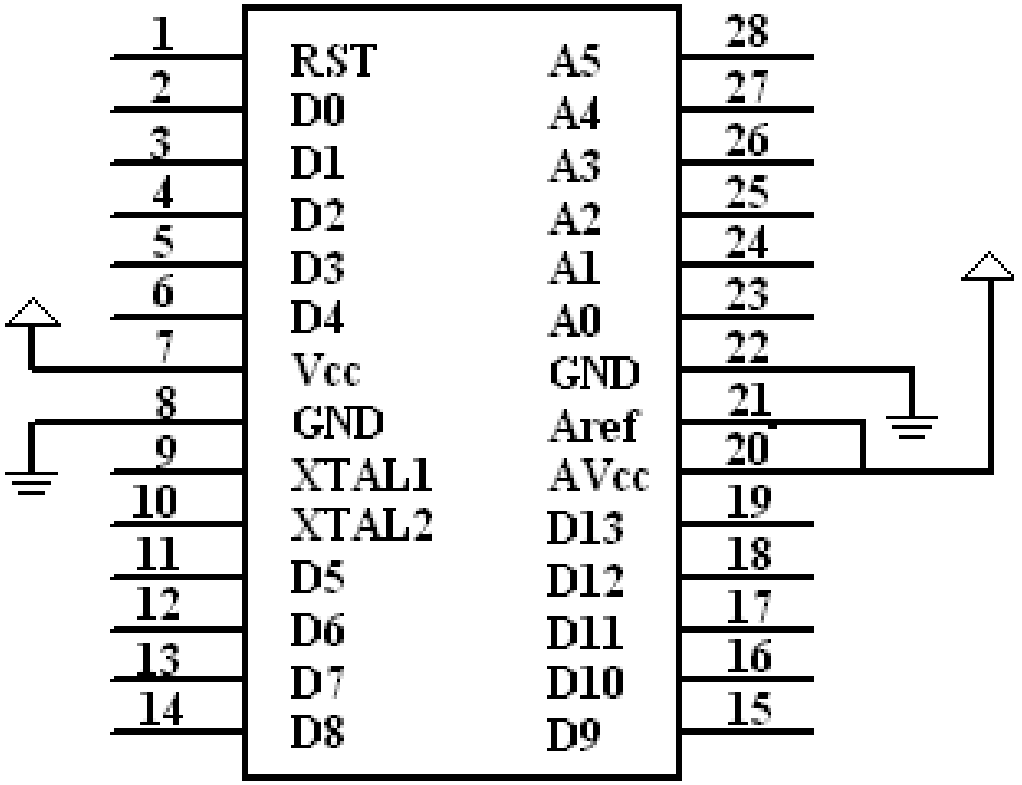
- Power up Arduino Uno Board
- Load IR_TSOP.txt to Uno
- Power up Arduino Tao Board
- Waveforms from Uno, TSOP, and Tao
- Interactive control over Tao Board

Direct Communication with Arduino Tao Board

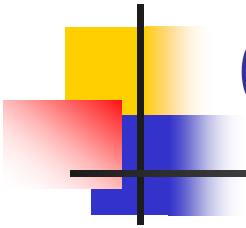


- Arduino Uno Board
  - Remove ATmega328P chip
  - HyperTerminal set at 19200 baud
  - PD0: RX from terminal connects to Pin 2 on ATmega328P
  - PD1: TX to terminal connects to Pin 3 on ATmega328P
- Arduino Tao Board
  - 328eForth410
  - USART0: 19200 baud

Tao of Arduino

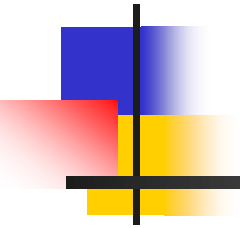


ATmega328P



Conclusions

- Arduino Boards can communicate through an IR communication link.
- ATmega328P can be removed from Arduino Uno Board and programmed through a wired USART link.



Thank You