

# Cool Microcontroller Projects

## FRS Repeater Controller

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# BACKGROUND

## First Lego League Project

- Amateur Radio Theme
- Using a Balloon with a repeater during emergency
- Presented idea to PARC

Tyler got his ticket (VA3TJR).  
Studying TV Broadcasting

Lost touch with  
Michael

Kyle is studying  
Actuarial Science

Tatum is in 2<sup>nd</sup> Year  
Physics



Isaac is  
started  
Engineering  
this year

Max continues to be a Trump supported – Final year in BioChem



# Noodling

- Use FRS radios to relay in simplex mode
- Transmit from one radio, record message, then play it back
- Need VOX to detect signal
- Decided to use ISD 1760 Multimessage voice recorder and playback chip
  1. Controlled via SPI or Pushbuttons
  2. Easier to use pushbutton (via I/O pins)







# BUILD



# SOFTWARE

## Receive or Transmit

```
if ( !(flags & RECEIVING) ){
    if (!CD && cdctr++ > DEBOUNCE_ON) {
        flags = flags | RECEIVING;
        cdclrcctr = cdctr = 0;
    } else if (CD && cdctr != 0){
        if (cdclrcctr++ > DEBOUNCE_OFF) {
            cdclrcctr = cdctr = 0;
        }
    }
} else {
    if (CD && cdclrcctr++ > DEBOUNCE_OFF){
        cdclrcctr = cdctr = 0;
        flags = flags & ~RECEIVING;
        flags = flags | TRANSMIT;
    }
}
```

If VOX detected carrier. Set to **RECEIVE** mode. **CD = 0** for ON

If no carrier after receiving. Set to **TRANSMIT** mode. **CD = 1** for OFF

## Record or Playback

```
if ( !(flags & RECORDING) && flags & RECEIVING) {
    VcoderFunction (RECORD_START);
    LED = 1;
    flags = flags | RECORDING;
} else if (flags & TRANSMIT) {
    VcoderFunction (RECORD_STOP);
    PTT = 1;
    VcoderFunction (PLAYBACK);
    PTT = 0;
    delay_s(1);
    VcoderFunction (CURRENT_ERASE);
    flags = flags & ~TRANSMIT;
    flags = flags & ~RECORDING;
    LED = 0;
}
```

If receiving voice. Set ISD1760 to record.

If voice recording and CD not present then stop recording and enable PTT and set ISD1760 to playback. When finished erase.



# ISD1750

```
void VcoderFunction (char op)
{
    switch (op) {

        case 'R':                                // Start Recording
            REC = 0;
            delay_ms(30);                          //24 ms Debounce time
            break;

        case 'S':                                // Stop Recording
            REC = 1;
            delay_ms(30);                          //24 ms Debounce time
            break;

        case 'P':                                // Play
            PLAY = 0;
            delay_ms(30);                          //24 ms Debounce time
            PLAY = 1;
            while (!RDY); ←
            break;

        case 'F':                                //Forward - 13 Spots
            FWD = 0;
            delay_ms(30);                          //24 ms Debounce time
            FWD = 1;
            break;

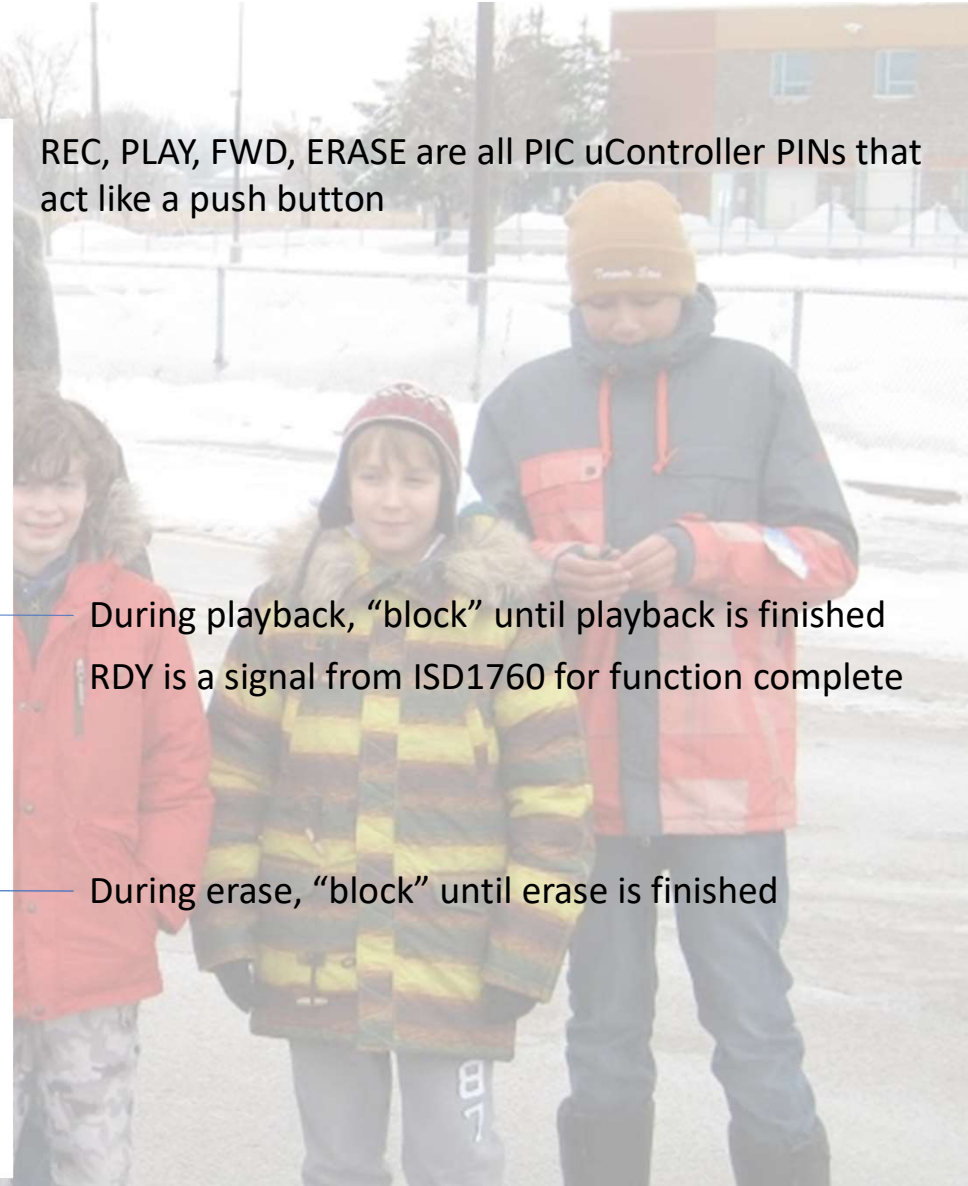
        case 'E':                                //Current Erase
            ERASE = 0;
            delay_ms(30); ←
            ERASE = 1;
            break;

        case 'B':                                //Global Erase - Blank
            ERASE = 0;
            delay_ms(30);
            while (!RDY);
            ERASE = 1;
            break;
    }
}
```

REC, PLAY, FWD, ERASE are all PIC uController PINs that act like a push button

During playback, “block” until playback is finished  
RDY is a signal from ISD1760 for function complete

During erase, “block” until erase is finished



# TESTING





BAD DAY TO GO FLYING



FIN

