ADSP final

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(i) Orthogonal Frequency-Division Multiplexing

- ref: https://dspillustrations.com/pages/posts/misc/python-ofdm-example.html
- Command
  - Compile `gcc OFDM.c -o OFDM`
  - Run `./OFDM.exe`
- Input Format
  - S: Number of subcarriers, which should be power of 2
  - Input bitstream: bitstream of length S*4

```
S
<Input bitstream>
```

- Sample Input

```
16
1100100000111111101010010010011010101110110110111010011111100100
```

- Sample Output

```
Received bits: 1100100000111111101010010010011010101110110110111010011111100100
Bit Error Rate: 0.000000
```

(ii) Modulation and Demodulation by CDMA Using Walsh Bases

- Command
  - Compile `gcc CDMA.c -o CDMA`
  - Run `./CDMA.exe`
- Input format
  - N: Walsh code length (must be power of 2)
  - C: Number of channel used, C <= N, the program will use 1 ~ Cth Walsh bases to modulate
  - L: Length of input bitstream

```
N C L
<C lines of input bitstream>
```

- Sample Input

```
4 2 4
1010
0110
```

- Sample Output

```
Received Signal: 0 0 2 2 0 0 -2 -2 2 2 0 0 -2 -2 0 0
Demodulated Data for Channel 1: 1010
Demodulated Data for Channel 2: 0110
```