REPUBLIK INDONESIA
KEMENTERIAN HUKUM DAN HAK ASASI MANUSIA

SURAT PENCATATAN
CIPTAAN

Dalam rangka pelindungan ciptaan di bidang ilmu pengetahuan, seni dan sastra berdasarkan Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta, dengan ini menerangkan:

Nomor dan tanggal permohonan	:	EC00202169796, 26 November 2021
Pencipta		
Nama	:	**Ir. Sirmayanti, S.T., M.Eng., Ph.D, IPM**
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Kewarganegaraan	:	Indonesia
Pemegang Hak Cipta		
Nama	:	**P3M Politeknik Negeri Ujung Pandang**
Alamat	:	Jl.Perintis Kemerdekaan Km 10 Makassar, Makassar, SULAWESI SELATAN, 90245
Kewarganegaraan	:	Indonesia
Jenis Ciptaan	:	**Kompilasi Ciptaan / Data**
Judul Ciptaan	:	**CDMA Signal Generation & Recovery**
Tanggal dan tempat diumumkan untuk pertama kali di wilayah Indonesia atau di luar wilayah Indonesia	:	21 November 2021, di Makassar
Jangka waktu pelindungan	:	Berlaku selama 50 (lima puluh) tahun sejak Ciptaan tersebut pertama kali dilakukan Pengumuman.
Nomor pencatatan	:	000293952

adalah benar berdasarkan keterangan yang diberikan oleh Pemohon.
Surat Pencatatan Hak Cipta atau produk Hak terkait ini sesuai dengan Pasal 72 Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta.

a.n Menteri Hukum dan Hak Asasi Manusia
Direktur Jenderal Kekayaan Intelektual
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Disclaimer:
Dalam hal pemohon memberikan keterangan tidak sesuai dengan surat pernyataan, Menteri berwenang untuk mencabut surat pencatatan permohonan.

DOKUMEN CIPTAAN

JENIS: KOMPILASI DATA

JUDUL:

CDMA SIGNAL GENERATION & RECOVERY

PENCIPTA/INVENTOR:

SIRMAYANTI, S.T., M.Eng., P.hD

DATA BASE COMPILE:

CDMA SIGNAL GENERATION & RECOVERY

Sirmayanti Ph.D.

The use of code division multiple access (CDMA) system channels distinguishes signals from one another through different codes. Each signal will be generated using Pseudonoise (PN) in a different code, but in the same frequency. This method utilizes a spread spectrum technique, where a number of users can use the frequency band width at the same time, and the coded signal channel width is greater than the carrier signal channel width.

PROJECT 1&2

Condition

- Number of user N = 10, consist of D1 – D10
- Each user D has 8-bits of data stream
- Users are in the same cell (different Walsh Code, same PN Code)
- Using 16-bit for 10 different Walsh code
- Using an 16-bit Pseudo Noise (PN) code

Figures

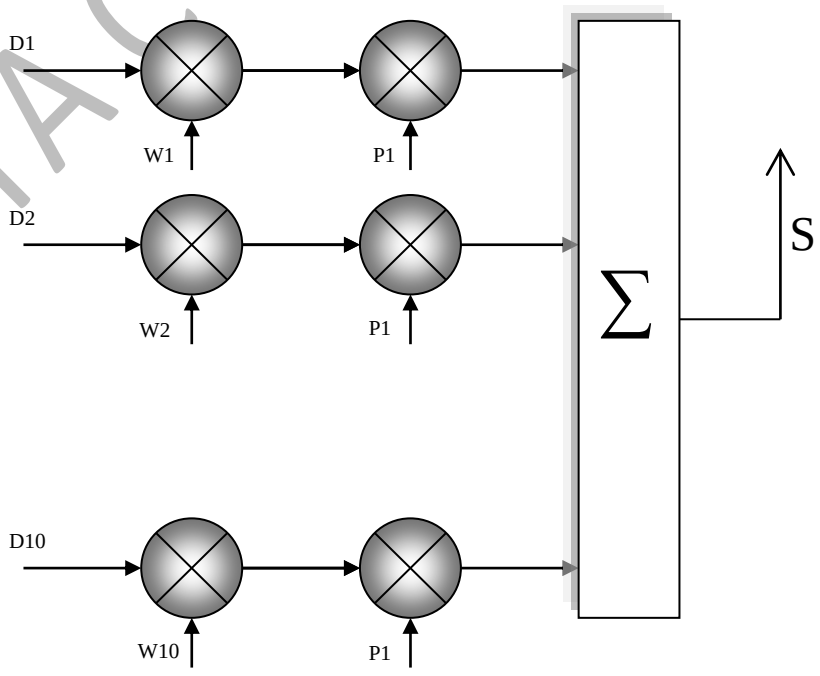


Figure 1: Input of 10 different users in one cell

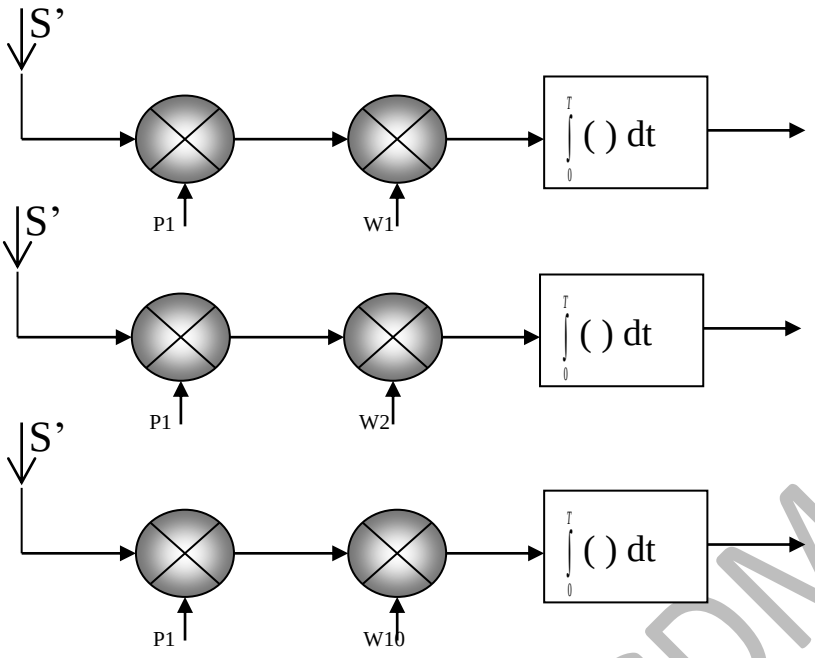


Figure 2: Output of 10 different users in one cell

Data Input

- 8-bit data stream of 10 different users (random data)

D1	1	1	-1	1	1	1	1	-1
D2	1	-1	1	-1	1	-1	1	-1
D3	1	1	1	-1	-1	-1	-1	1
D4	-1	1	1	1	-1	-1	1	-1
D5	1	1	-1	1	-1	-1	1	-1
D6	1	1	1	1	1	1	1	1
D7	-1	-1	1	-1	-1	1	-1	1
D8	1	-1	1	-1	1	1	1	1
D9	-1	1	-1	1	-1	-1	1	1
D10	-1	1	-1	1	1	-1	-1	1

- 16-bit Walsh code of 10 different users

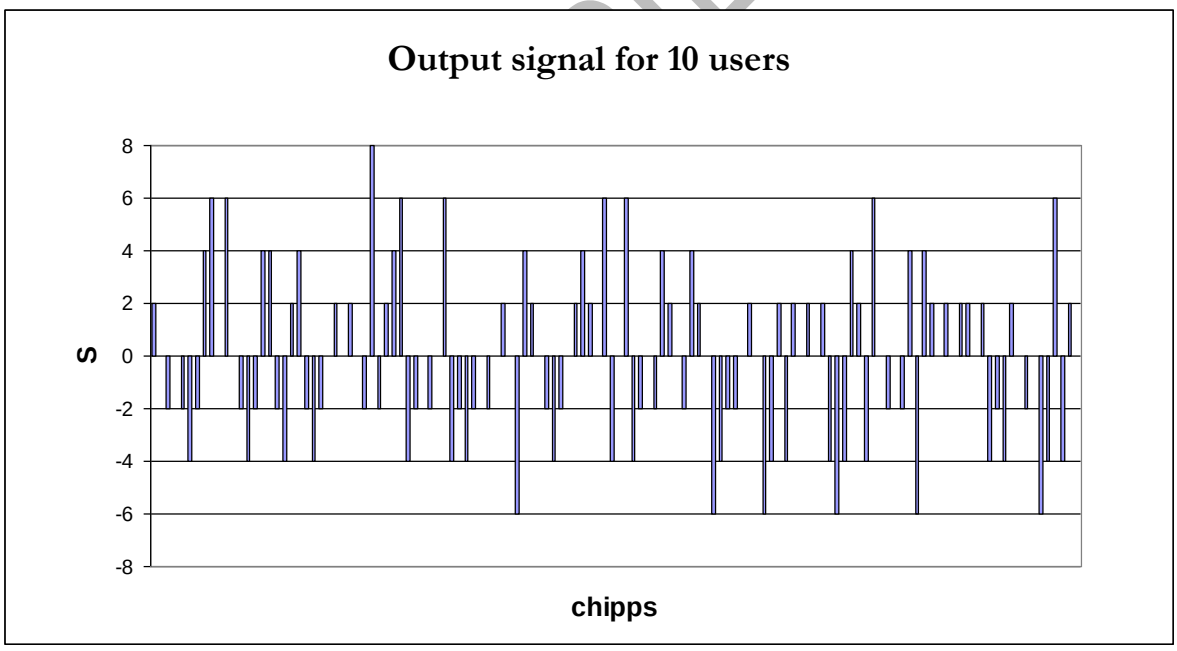
W1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W2	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1
W3	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1
W4	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1
W5	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1
W6	1	-1	1	-1	-1	1	-1	1	1	-1	1	-1	-1	1	-1	1
W7	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1
W8	1	-1	-1	1	-1	1	1	-1	1	-1	-1	1	-1	1	1	-1
W9	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1
W10	1	-1	1	-1	1	-1	1	-1	-1	1	-1	1	-1	1	-1	1

- 16 bit Pseudo Noise (PN) code, for task 1 & 2, we use PN1

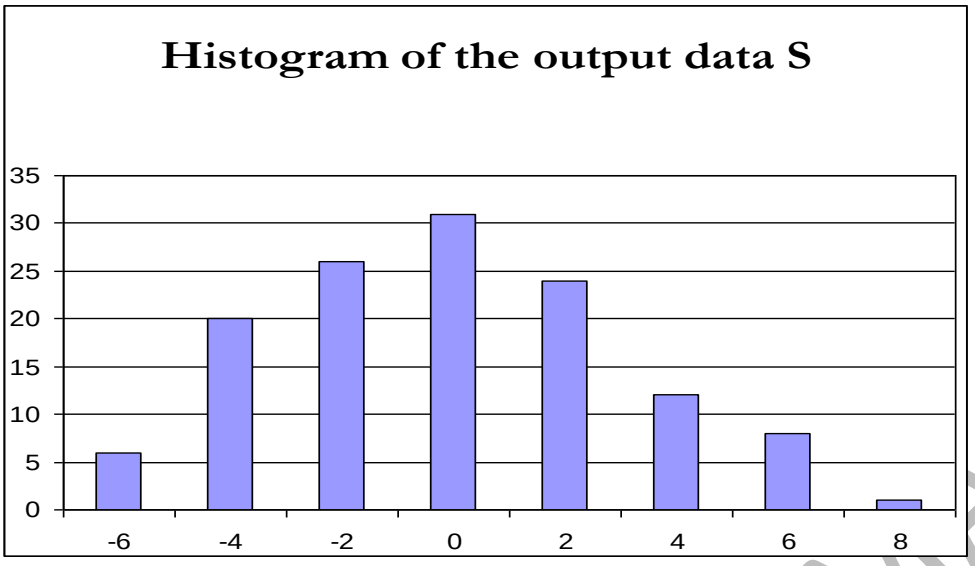
PN1	PN2	PN3	PN4
1	-1	-1	-1
-1	1	-1	-1
-1	-1	1	-1
1	-1	-1	1
1	1	-1	-1
-1	1	1	-1
1	-1	1	1
-1	1	-1	1
1	-1	1	-1
1	1	-1	1
1	1	1	-1
1	1	1	1
-1	1	1	1
-1	-1	1	1
-1	-1	-1	1

Data Output of S

- Output S of 10 users



Graph 1: Chipped data S



Graph 2: Histogram of data S

- Statistical properties

Mean	-0.125
Standard Error	0.280387457
Median	0
Standard Deviation	3.172221954
Sample Variance (σ)	10.06299213
Range	14
Minimum	-6
Maximum	8
Count	128
Largest(1)	8
Smallest(1)	-6

- PDF of the output signal magnitude

Numbers	*Frequency*	PDF
-6	6	4.69%
-4	20	15.63%
-2	26	20.31%
0	31	31.00%
2	24	18.75%
4	12	9.38%
6	8	6.25%
8	1	0.78%

- Find E_b/N_o

Assume that the data rate of 1200 bps for 128 chips.
Bandwidth (Bw) = 1200 bps * 128 chips = 153600 bps*chips

Noise Power (N_o) = $\frac{\sigma^2}{Bw}$ = 6.551x10^{-5}

The energy per bit (E_b) = $\frac{1}{Bw} = \frac{1}{1200bps}$ = 8.333x10^{-4}

The resulting E_b/N_o = 12.72 dB

Received Data Output

Receiver D1	16	16	-16	16	16	16	16	-16
Receiver D2	16	-16	16	-16	16	-16	16	-16
Receiver D3	16	16	16	-16	-16	-16	-16	16
Receiver D4	-16	16	16	16	-16	-16	16	-16
Receiver D5	16	16	-16	16	-16	-16	16	-16
Receiver D6	16	16	16	16	16	16	16	16
Receiver D7	-16	-16	16	-16	-16	16	-16	16
Receiver D8	16	-16	16	-16	16	16	16	16
Receiver D9	-16	16	-16	16	-16	-16	16	16
Receiver D10	-16	16	-16	16	16	-16	-16	16

PROJECT 3&4

Condition

- Number of user N = 4, consist of D1 – D4
- Each user D has 8-bits of data stream
- Users are in the different cell (same Walsh Code, different PN Code)
- Using an 16-bit Walsh code
- Using an 16-bit for 4 different PN code

Figures

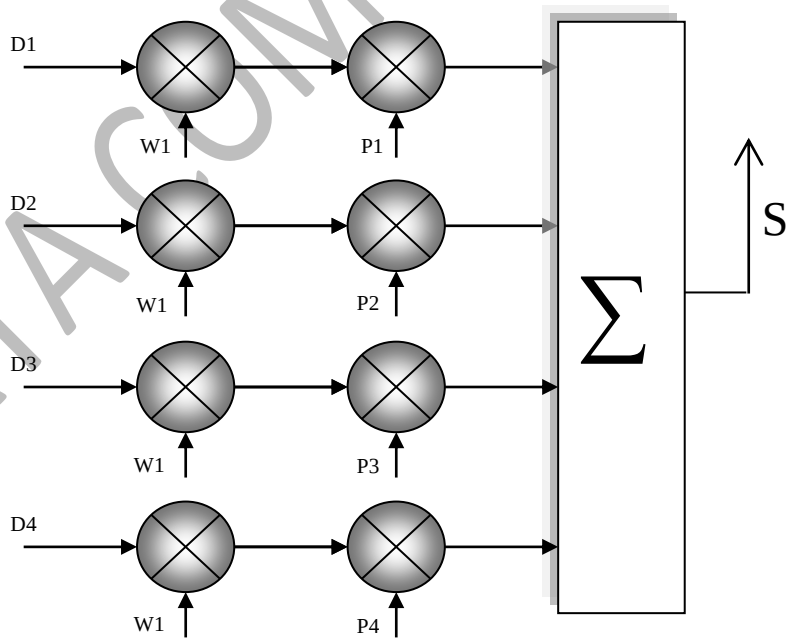


Figure 3: Input of 4 different users in different cell

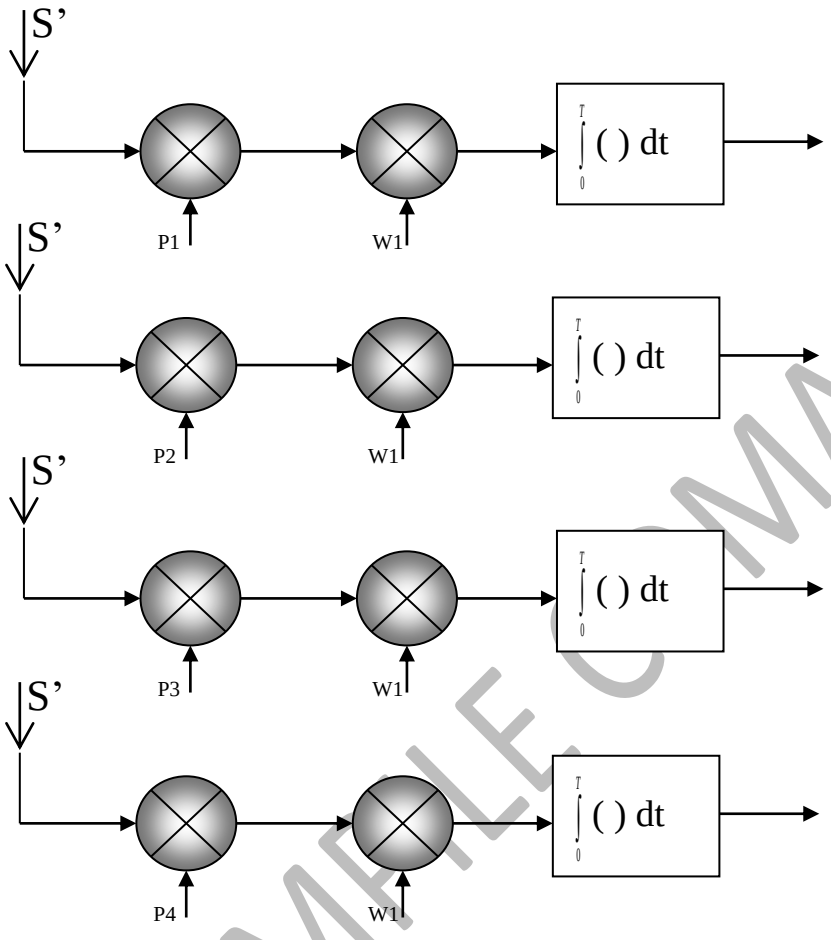


Figure 4: Output of 4 different users in different cell

Data Input

- 8-bit data stream of 4 different users (random data)

D1	1	1	-1	1	1	1	1	-1
D2	1	-1	1	-1	1	-1	1	-1
D3	1	1	1	-1	-1	-1	-1	1
D4	-1	1	1	1	-1	-1	1	-1

- 16-bit Walsh code of 4 different users, for task 3 & 4, we use W1

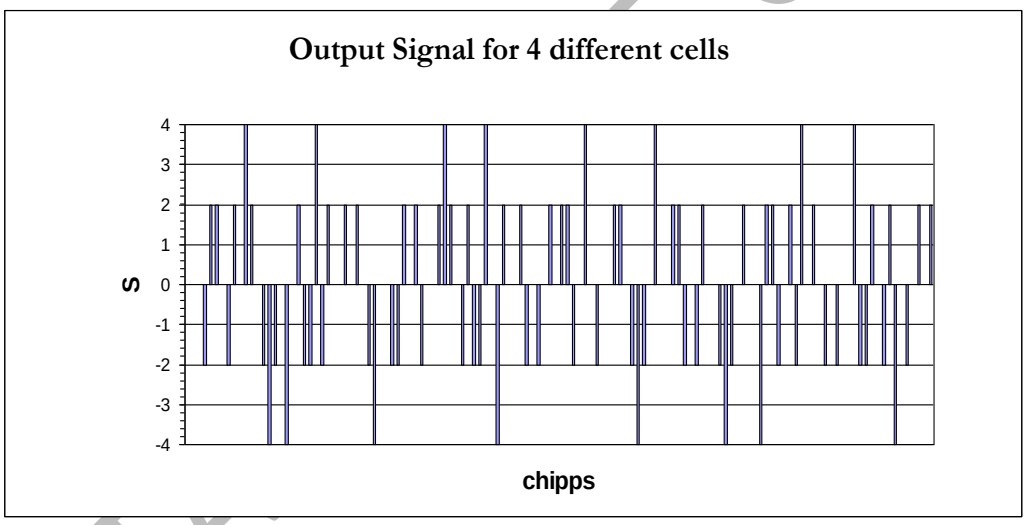
W1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W2	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1
W3	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1
W4	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1
W5	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1
W6	1	-1	1	-1	-1	1	-1	1	1	-1	1	-1	-1	1	-1	1
W7	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1
W8	1	-1	-1	1	-1	1	1	-1	1	-1	-1	1	-1	1	1	-1
W9	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1
W10	1	-1	1	-1	1	-1	1	-1	-1	1	-1	1	-1	1	-1	1

- 16 bit Pseudo Noise (PN) code of 4 different users

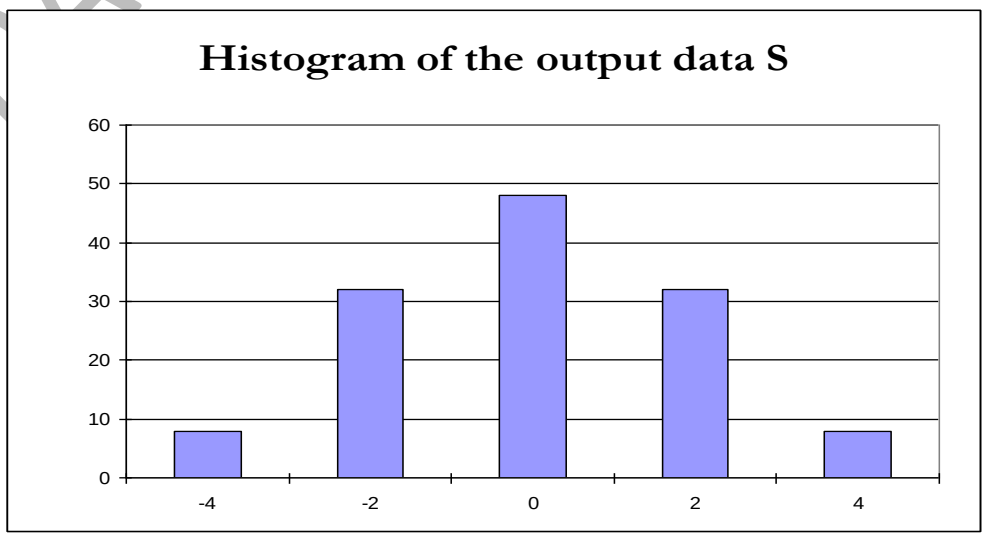
PN1	PN2	PN3	PN4
1	-1	-1	-1
-1	1	-1	-1
-1	-1	1	-1
1	-1	-1	1
1	1	-1	-1
-1	1	1	-1
1	-1	1	1
-1	1	-1	1
1	-1	1	-1
1	1	-1	1
1	1	1	-1
1	1	1	1
-1	1	1	1
-1	-1	1	1
-1	-1	-1	1

Data Output of S

- Output S of 4 users



Graph 3: Chipped data S



Graph 4: Histogram of data S

- Statistical properties

Mean	0
Standard Error	0.177471302
Median	0
Standard Deviation	2.007858576
Sample Variance (σ)	4.031496063
Range	8
Minimum	-4
Maximum	4
Count	128
Largest(1)	4
Smallest(1)	-4

- PDF of the output signal magnitude

Numbers	*Frequency*	PDF
-4	8	6.25%
-2	32	25.00%
0	48	37.50%
2	32	25.00%
4	8	6.25%

- Find E_b/N_o

  Assume that the data rate of 1200 bps for 128 chips.

  Bandwidth (Bw) = 1200 bps * 128 chips = 153600 bps*chips

  Noise Power (N_o) = $\frac{\sigma^2}{Bw}$ = 2.625x10^{-5}

  The energy per bit (E_b) = $\frac{1}{Bw} = \frac{1}{1200bps}$ = 8.333x10^{-4}

  The resulting E_b/N_o = 31.74 dB

Received Data Output

Receiver D1	16	16	-16	16	16	16	16	-16
Receiver D2	16	-16	16	-16	16	-16	16	-16
Receiver D3	16	16	16	-16	-16	-16	-16	16
Receiver D4	-16	16	16	16	-16	-16	16	-16

CONCLUSION

As we can see from the table above, the output received signal has a magnitude value of 16 that has the same signs of the input data user. The 16 is a chipped data since this system use 16-bit length of the Walsh code. While the Base Station transmits 1 bit of data user, it means that the 16-chipped data are transmitted which already multiplied by the PN code. Therefore, this method of transmitting is secure and the received signal has no error.

APPPENDIX

- Calculation method and Compile Data

CDMA SIGNAL GENERATION & RECOVERY

DATA INPUT

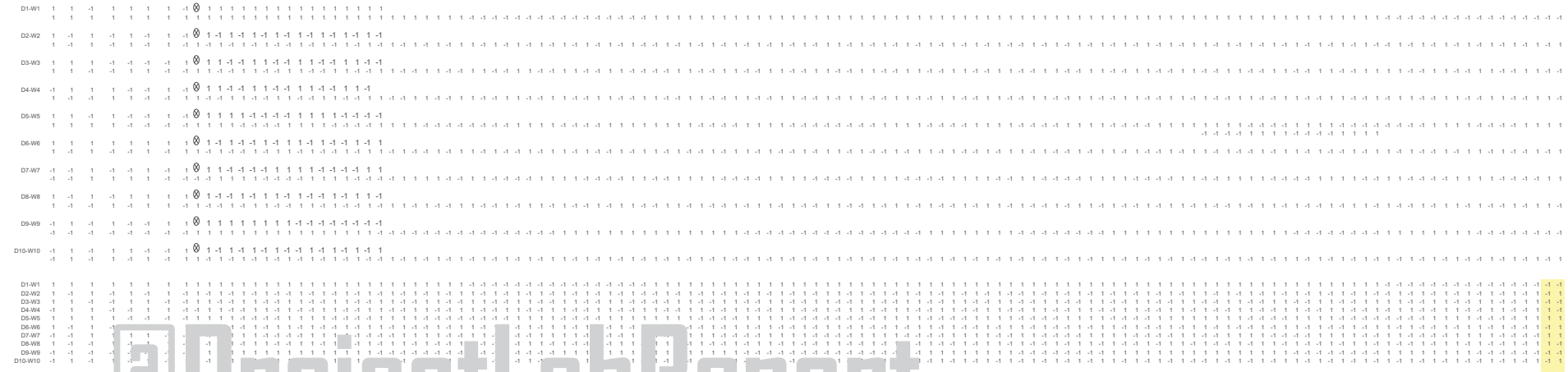
D1	1	1	-1	1	1	1	1	-1
D2	1	-1	1	-1	1	-1	1	-1
D3	1	1	1	-1	-1	-1	-1	1
D4	-1	1	1	1	-1	-1	1	-1
D5	1	1	-1	1	-1	-1	1	-1
D6	1	1	1	1	1	1	1	1
D7	-1	-1	1	-1	-1	1	-1	1
D8	1	-1	1	-1	1	1	1	1
D9	-1	1	-1	1	-1	-1	1	1
D10	-1	1	-1	1	1	-1	-1	1

W1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
W2	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1
W3	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1
W4	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	1
W5	1	1	1	1	-1	-1	-1	-1	1	1	1	-1	-1	-1	-1
W6	1	-1	1	-1	-1	1	-1	1	1	-1	1	-1	-1	1	-1
W7	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	1	1
W8	1	-1	-1	1	-1	1	1	-1	1	-1	-1	1	-1	1	1
W9	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1
W10	1	-1	1	-1	1	-1	1	-1	-1	1	-1	1	-1	1	1

PN	1	-1	-1	-1
	-1	1	-1	-1
	-1	-1	1	-1
	1	-1	-1	1
	1	1	-1	-1
	-1	1	1	-1
	1	-1	1	1
	-1	1	-1	1
	1	-1	1	-1
	1	1	-1	1
	1	1	1	-1
	1	1	1	1
	-1	1	1	1
	-1	-1	1	1
	-1	-1	-1	1
	-1	-1	-1	-1

PROJECT 1&2

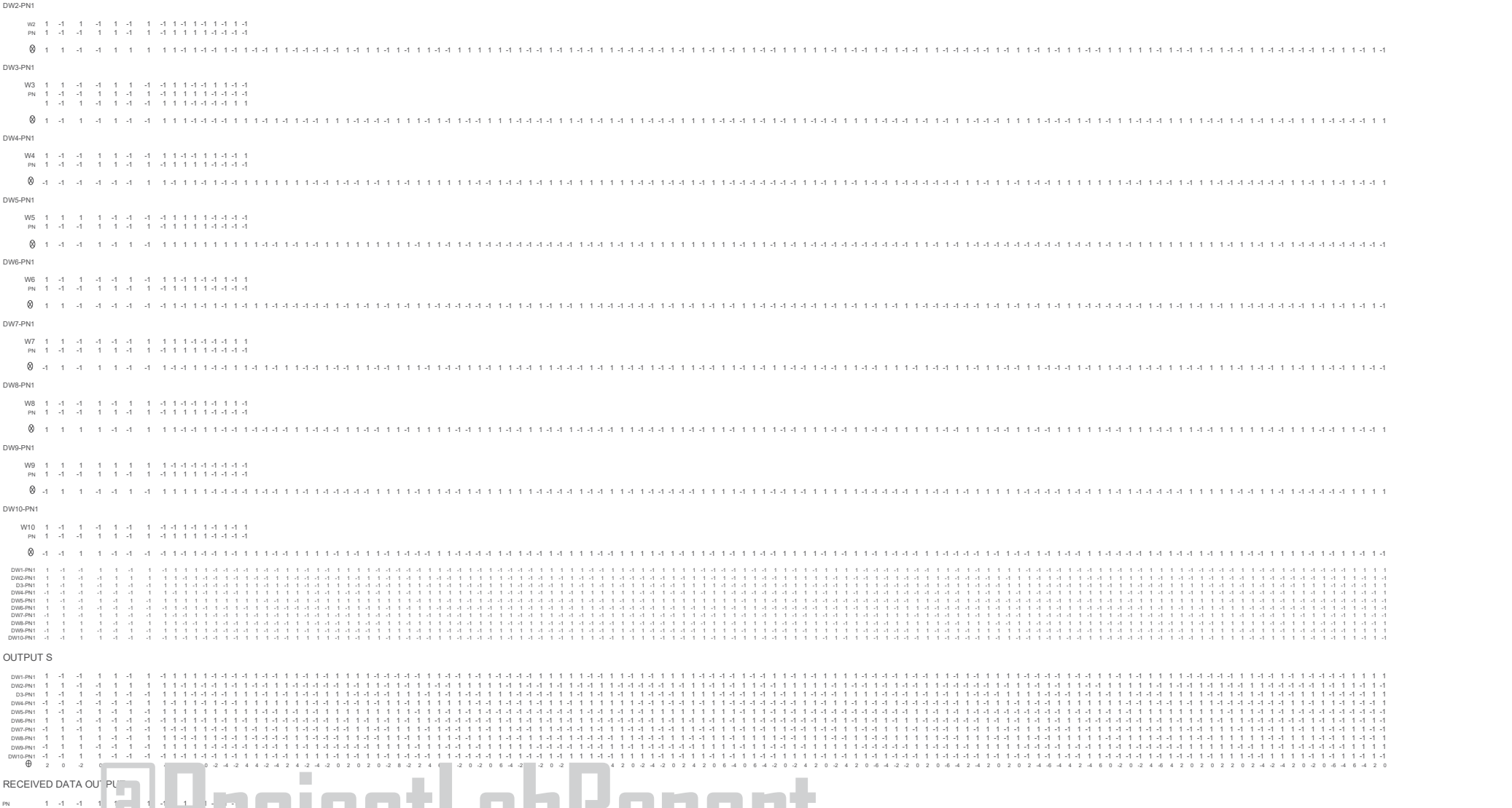
OUTPUT AFTER WALSH CODE



OUTPUT AFTER PN CODE

DW1-PN1

W1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PN	1	-1	-1	1	1	-1	1	-1	1	1	1	-1	-1	-1	-1
	1	-1	-1	1	1	-1	1	-1	1	1	1	-1	-1	-1	-1
0	1	-1	-1	1	1	-1	1	-1	1	1	1	-1	-1	-1	-1



D1	16	16	-16	16	16	16	16	-16	
D2	16	-16	16	-16	16	-16	16	-16	
D3	16	16	16	-16	-16	-16	-16	16	
D4	##	16	16	16	-16	16	-16	16	
D5	16	16	-16	16	-16	-16	16	-16	
D6	16	16	16	16	16	16	16	16	
D7	##	-16	16	-16	-16	16	-16	16	
D8	16	-16	16	-16	16	16	16	16	
D9	##	16	-16	16	-16	-16	16	16	
D10	##	16	-16	16	16	-16	-16	16	

PROJECT 3&4

OUTPUT AFTER WALSH CODE W1

D1W1

D1 1 1 -1 1 1 1 1 -1
W1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

⊗ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1

D2W1

D2 1 -1 1 -1 1 -1 1 -1
W1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

⊗ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1

D3W1

D3 1 1 1 -1 -1 -1 -1 1
W1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

⊗ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

D4W1

D4 -1 1 1 1 -1 -1 1 -1
W1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

⊗ -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1

D1-W1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
D2W1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
D3W1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
D4W1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1

OUTPUT AFTER PN CODE

D1W1-P1

W1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
pn1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1
1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1

⊗ 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1

D2W1-P2

W1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
pn2 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1
-1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1

⊗ -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1

D3W1-P3

W1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
pn3 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1
-1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1

⊗ -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1

D4W1-P4

W1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
pn4 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1
-1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1

⊗ 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1

D1W1-P1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1
D2W1-P2 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1
D3W1-P3 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1
D4W1-P4 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1

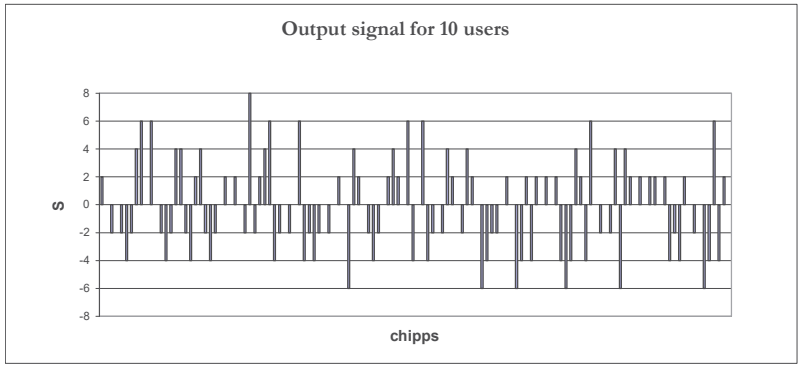
OUTPUT S

D1W1-P1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1
D2W1-P2 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1
D3W1-P3 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1
D4W1-P4 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1 -1 -1 -1 1 -1 -1 1 1 -1 1 -1 1 1 1 1 -1 1 1 1 -1 1 1 -1 -1 1 -1 1 -1 -1 -1 -1 1
⊕ 0 0 0 -2 2 2 0 -2 2 0 4 2 0 -2 -4 -2 0 -4 0 2 -2 -2 4 -2 2 0 0 2 0 2 0 -2 -4 0 0 -2 -2 2 0 2 -2 0 0 2 4 2 0 -2 2 -2 -2 4 0 -4 2 0 0 2 -2 0 -2 0 2 0 2 2 -2 0 4 0 -2 0 0 2 2 0 -2 -4 -2 0 4 0 0 2 2 -2 0 -2 2 0 0 -2 -4 -2 0 2 0 0 -4 2 2 -2 0 2 -2 4 0 2 0 -2 0 -2 0 0 4 -2 -2 2 0 -2 2 -4 0 -2 0 2 0 2

RECEIVED OUTPUT DATA

D1	16	16	-16	16	16	16	16	-16
D2	16	-16	16	-16	16	-16	16	-16
D3	16	16	16	-16	-16	-16	-16	16
D4	##	16	16	16	-16	-16	16	-16

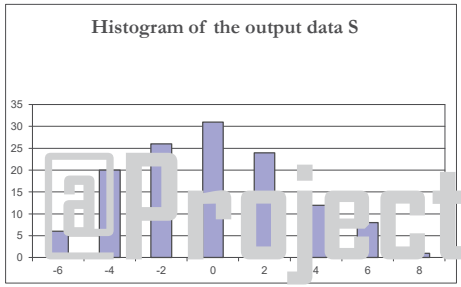
OUTPUT SIGNAL S



STATISTICAL PROPERTIES

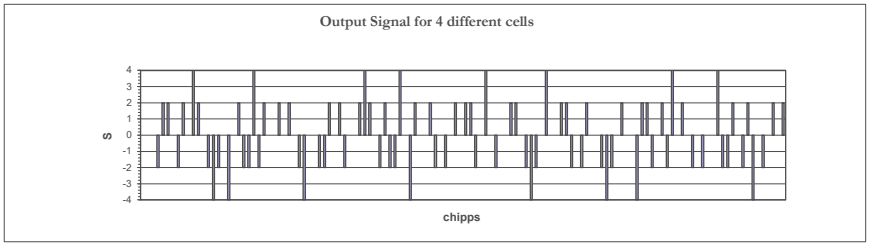
OUTPUT S	
Mean	-0,125
Standard Error	0,280387457
Median	0
Mode	0
Standard Deviation	3,172221954
Sample Variance	10,06299213
Kurtosis	-0,4994449
Skewness	0,224393666
Range	14
Minimum	-6
Maximum	8
Sum	-16
Count	128
Largest(1)	8
Smallest(1)	-6
Confidence Level(95.0%)	0,55483617

HISTOGRAM OUTPUT S



Bin	*Frequency*	PDF
-6	6	4,69%
-4	20	15,63%
-2	26	20,31%
0	31	31,00%
2	24	18,75%
4	12	9,38%
6	8	6,25%
8	1	0,78%

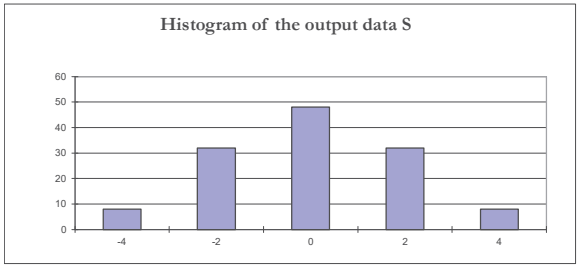
OUTPUT SIGNAL S



STATISTICAL PROPERTIES

OUTPUT S	
Mode	0
Standard Deviation	2,007858576
Sample Variance	4,031496063
Kurtosis	-0,471714286
Skewness	-1,77613E-17
Range	8
Minimum	-4
Maximum	4
Sum	0
Count	128
Largest(1)	4
Smallest(1)	-4
Confidence Level(95.0%)	0,351183674

HISTOGRAM OUTPUT S



	8	25
-2	32	2 00
0	48	3 00
2	32	00
4	8	6,25
	128	100,0

LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : KARYA ILMIAH YANG TELAH MEMILIKI SERTIFIKAT DARI KEMENKUMHAM

Judul Ciptaan	:	CDMA Signal Generation & Recovery		
Jumlah Penulis	:	1 (satu) orang		
Status Pengusul	:	**penulis pertama**/~~Penulis kedua/penulis korespondensi~~ **		
Identitas Ciptaan	:	a. Jenis Ciptaan	:	Kompilasi Ciptaan/Data
		b. Nomor Pencatatan	:	EC00202169796 / 000293952
		c. Tanggal Pencatatan	:	21-Nov-21

Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Maksimal Ciptaan			Nilai Akhir Yang Diperoleh
	Internasional /Internasional bereputasi** ☐	Nasional Terakreditasi ☐	Nasional *** ☐	
a. Kelengkapan unsur isi artikel (10%)				10
b. Ruang lingkup dan kedalaman pembahasan (30%)				30
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)				30
d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)				30
Total = (100%)				
Nilai Pengusul = 100 x 100 % =				100

Catatan Reviewer :

*) Karya ini sudah Aman dari plagiat

Makassar, 2 Agt 2022
Reviewer 2,

Dr. Ir. Satriani Said Akhmad, M.T.
NIP. 19670904 199303 2 001