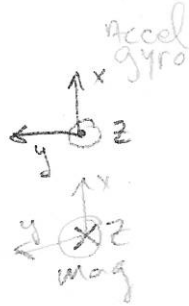
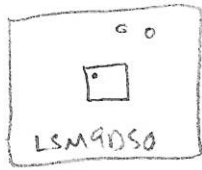


$\equiv N \uparrow$



$$\begin{bmatrix} N \\ E \\ D \end{bmatrix} = \begin{bmatrix} 3 \times 3 \\ \text{Calibration} \\ \text{Matrix} \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

LSM9DS0 + EM7180
Gyro

$$N = g_x, E = -g_y, D = -g_z \Rightarrow \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

Accel

$$N = a_x, E = -a_y, D = -a_z$$

Invert (multiply by -1)

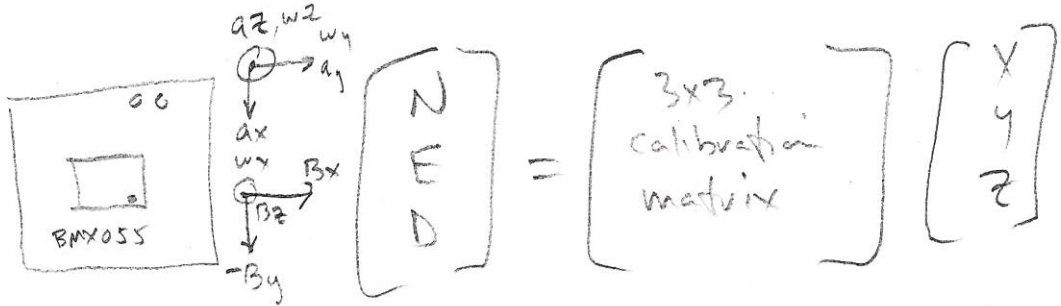
$$N = -a_x, E = a_y, D = a_z \Rightarrow \begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Mag

$$N = B_x, E = -B_y, D = +B_z \Rightarrow \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & +1 \end{bmatrix}$$

DEVICE	(HEX) I2C ADDRESS	SERIAL GPIO
ACC	0x1E	GPIO 1
MAG	0x1E	GPIO 0
gyro	0x6A	GPIO 2

$\equiv N \uparrow$



BMX055 + EM7180

Gyro

$N = -g_x, E = g_y, D = -g_z \Rightarrow$

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

Accel

$N = -a_x, E = a_y, D = -a_z$
invert (multiply by -1)

$N = a_x, E = -a_y, D = a_z \Rightarrow$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

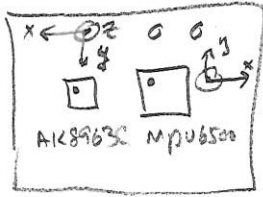
Mag

$N = B_y, E = B_x, D = -B_z \Rightarrow$

$$\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

(HEX) I2C Address	SERIAL GPIO	DEVICE
0x18	GPIO1	Accel
0x68	GPIO2	Gyro
0x10	GPIO0	Mag

$\equiv N$ ↑



$$\begin{bmatrix} N \\ E \\ D \end{bmatrix} = \begin{bmatrix} 3 \times 3 \\ \text{calibration} \\ \text{matrix} \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

MPU6500 + AK8963C + EM7180

Gyro

$$N = g_y, E = g_x, D = -g_z \Rightarrow$$

calibration matrices

$$\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

Accel

$$N = a_y, E = a_x, D = -a_z$$

invert (multiply by -1)

$$N = -a_y, E = -a_x, D = a_z \Rightarrow$$

$$\begin{bmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Mag

$$N = -B_y, E = -B_x, D = -B_z \Rightarrow$$

$$\begin{bmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

(HEX) I ² C Address	SERIAL GPIO	DEVICE
0x0C	1	AK8963C MAG
0x68	0	MPU6500 Accel
0x68	0	MPU6500 Gyro