# 1) Portrait

Condition: $g_y < -\text{THRESHOLD}$

$a = (cos\ \alpha, -\sin\alpha, 0)$

$b = (-\sin\alpha, -cos\ \alpha, 0)$

$c = (0, 0, -1)$

$g = s \cdot a + t \cdot b + r \cdot c$

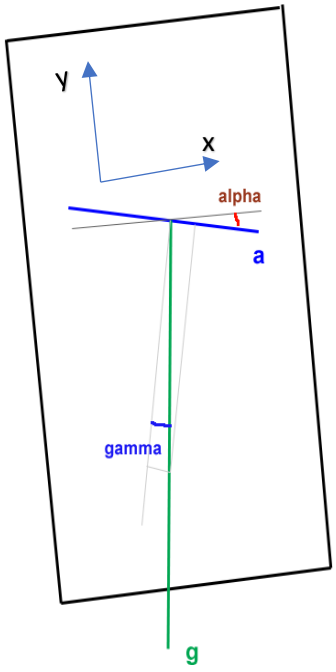
$g_x = s\ cos\ \alpha - t\ \sin\alpha$

$g_y = -s\ \sin\alpha - t\ cos\ \alpha$

$-t = g_x\ sin\ \alpha + g_y \cos\alpha$

$s = g_x\ cos\ \alpha - g_y\ \sin\alpha$

$tan\ (-\gamma) = s\ /\ t$



## 2) Landscape Positive (Right)

Condition: $g_x > \text{THRESHOLD}$

$a = (sin\ \alpha, \cos\ \alpha, 0)$

$b = (\cos\ \alpha, -sin\ \alpha, 0)$

$c = (0, 0, -1)$

$g = s \cdot a + t \cdot b + r \cdot c$

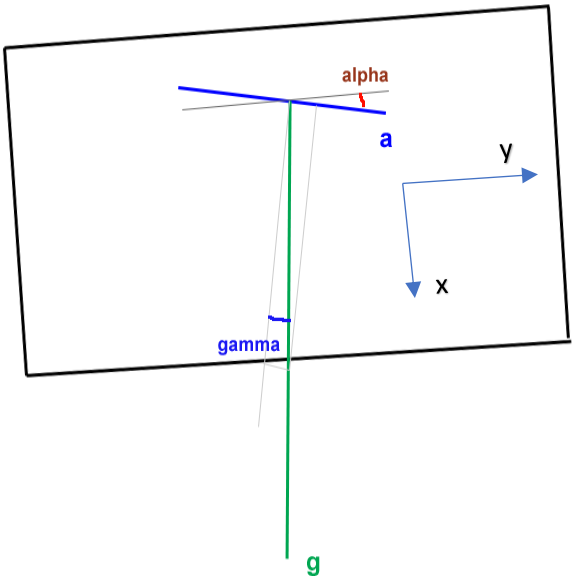
$g_x = s\ sin\ \alpha + t\ \cos\ \alpha$

$g_y = s\ \cos\ \alpha - t\ sin\ \alpha$

$s = g_x\ sin\ \alpha + g_y\ \cos\ \alpha$

$t = g_x\ cos\ \alpha - g_y\ \sin\ \alpha$

$tan\ (-\gamma) = s\ /\ t$



## 3) Landscape Negative (Left)

Condition: $g_x < -\text{THRESHOLD}$

$a = (-sin\ \alpha, -\cos\ \alpha, 0)$

$b = (-\cos\ \alpha, sin\ \alpha, 0)$

$c = (0, 0, -1)$

$g = s \cdot a + t \cdot b + r \cdot c$

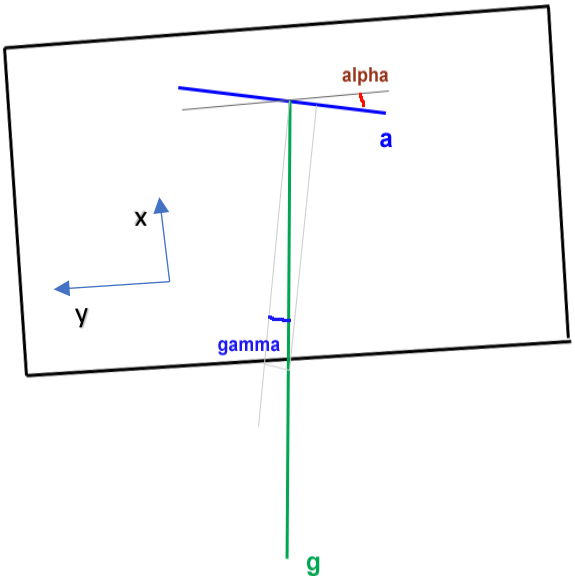
$g_x = -s\ sin\ \alpha - t\ \cos\ \alpha$

$g_y = -s\ \cos\ \alpha + t\ sin\ \alpha$

$-s = g_x\ sin\ \alpha + g_y\ \cos\ \alpha$

$-t = g_x\ cos\ \alpha - g_y\ \sin\ \alpha$

$tan\ (-\gamma) = s\ /\ t$



## 4) Below (look at phone from above)

Condition: $g_z < -\text{THRESHOLD}$

$a = (sin\ \alpha, \cos\ \alpha, 0)$

$b = (\cos\ \alpha, -sin\ \alpha, 0)$

$c = (0, 0, -1)$

$g = s \cdot a + t \cdot b + r \cdot c$

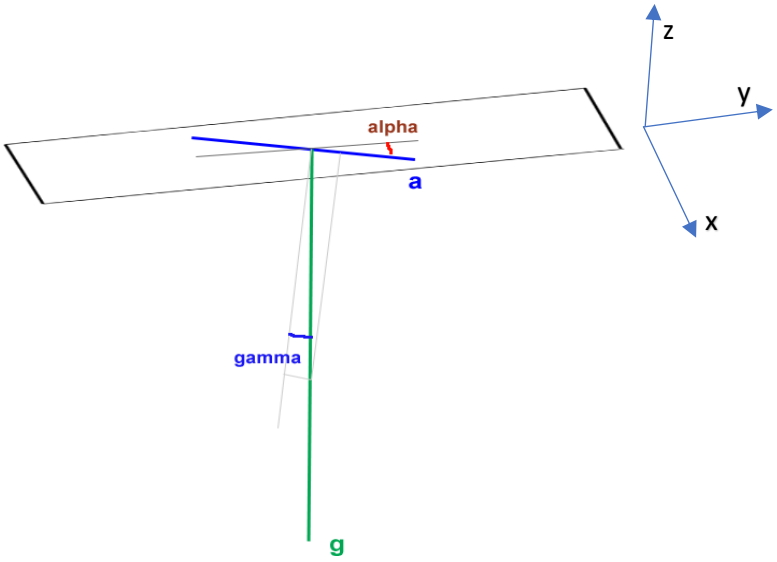
$g_x = s\ sin\ \alpha + t\ \cos\ \alpha$

$g_y = s\ \cos\ \alpha - t\ sin\ \alpha$

$g_z = -r$

$s = g_x\ sin\ \alpha + g_y\ \cos\ \alpha$

$tan\ (-\gamma) = s\ /\ r$



## 5) Above (look at phone from below)

Condition: $g_z > \text{THRESHOLD}$

$a = (-sin\ \alpha, \cos\ \alpha, 0)$

$b = (-\cos\ \alpha, -sin\ \alpha, 0)$

$c = (0, 0, 1)$

$g = s \cdot a + t \cdot b + r \cdot c$

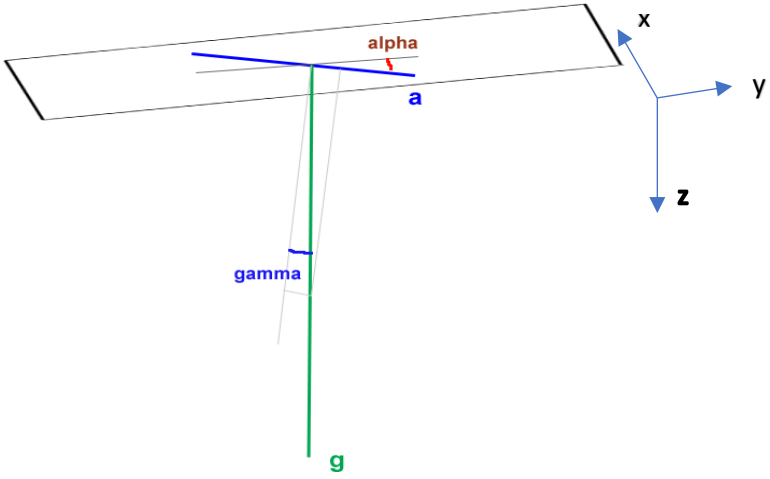
$g_x = -s\ sin\ \alpha + t\ \cos\ \alpha$

$g_y = -s\ \cos\ \alpha - t\ sin\ \alpha$

$g_z = r$

$-s = g_x\ sin\ \alpha + g_y\ \cos\ \alpha$

$tan\ (-\gamma) = s\ /\ r$



## 6) Top Down

Condition: $g_y > \text{THRESHOLD}$

$a = (-cos\ \alpha,\ \sin \alpha, 0)$

$b = (\sin \alpha, cos\ \alpha, 0)$

$c = (0, 0, -1)$

$g = s \cdot a + t \cdot b + r \cdot c$

$g_x = -s\ cos\ \alpha\ + t \sin \alpha$

$g_y = \ \ s \sin \alpha\ + t\ cos\ \alpha$

$t = g_x\ sin\ \alpha + g_y \cos \alpha$

$-s = g_x\ cos\ \alpha - \ g_y \sin \alpha$

$tan\ (-\gamma) = s\ /\ t$