1) Portrait

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

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

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

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

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

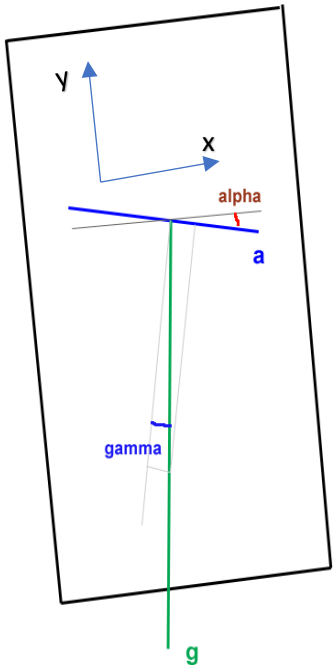
$g_x = s\ cos\ \alpha - t\ \sin\alpha$

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

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

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

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



2) Landscape Positive (Right)

Condition: $g_x > \text{THRESHOLD}$

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

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

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

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

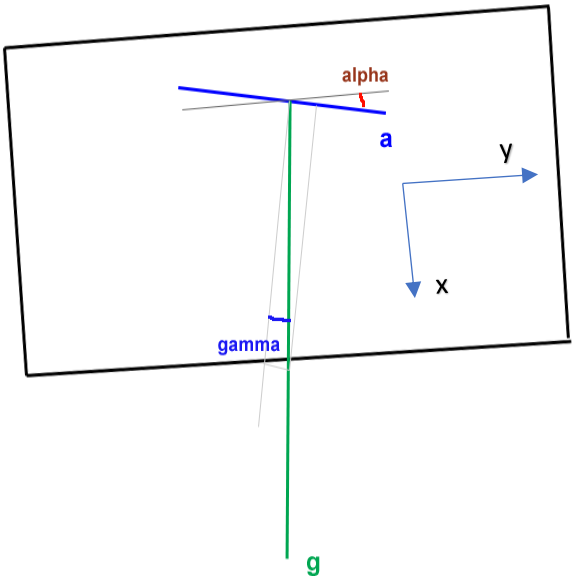
$g_x = s\ sin\ \alpha + t\ \cos\ \alpha$

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

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

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

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



3) Landscape Negative (Left)

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

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

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

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

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

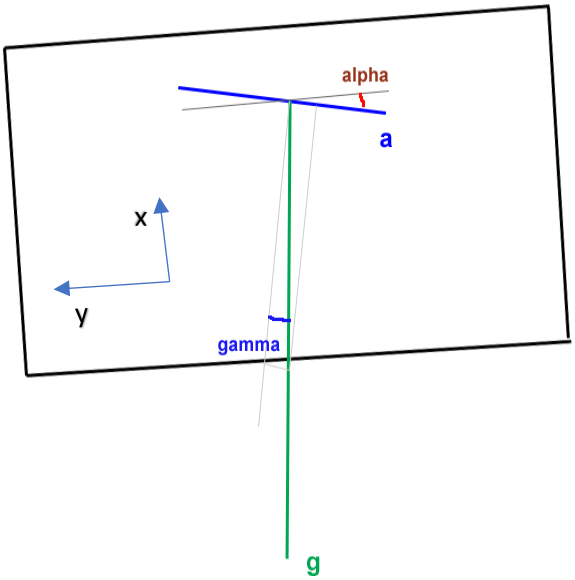
$g_x = -s\ sin\ \alpha - t\ \cos\ \alpha$

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

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

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

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



4) Below Parallel (look at phone from above)

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

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

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

$c = (1, 0, 0)$

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

$g_x = r$

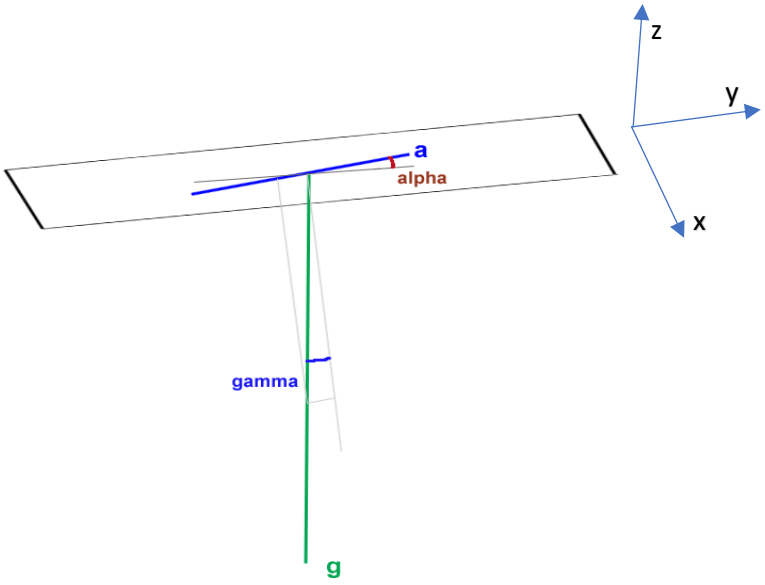
$g_y = s\cos\alpha + t\ sin\ \alpha$

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

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

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

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



5) Below Orthogonal (look at phone from above)

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

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

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

$c = (0, 1, 0)$

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

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

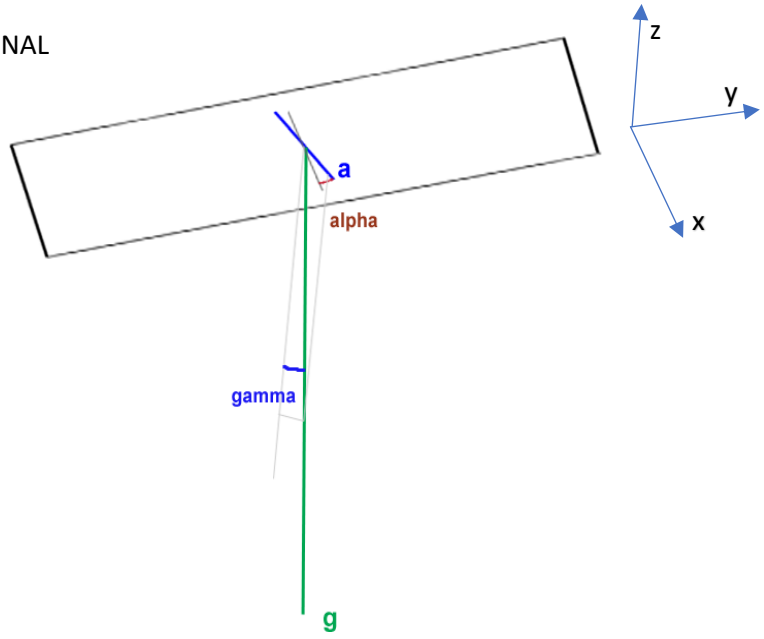
$g_y = r$

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

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

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

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



6) Above Parallel Only (look at phone from below)

Condition: $g_z > \text{THRESHOLD}$

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

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

$c = (1, 0, 0)$

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

$g_x = r$

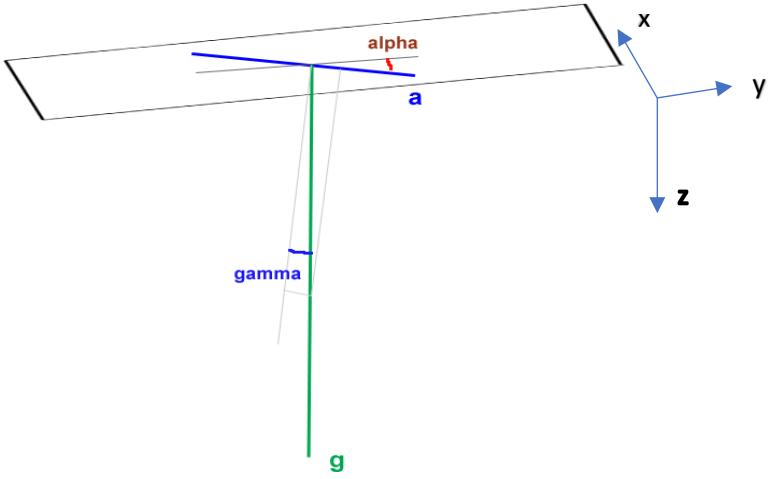
$g_y = s\cos\alpha - t\sin\alpha$

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

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

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

$tan(\gamma) = s / t$



7) Top Down

Condition: $g_y > \text{THRESHOLD}$

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

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

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

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

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

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

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

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

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