

Aiming Model

OVERVIEW

WEAPON SYSTEM

Bloom

(Note: This system is currently in the game and fully functioning.)

Reticule accuracy cones are defined by:

- Minimum cone radius – the highest possible accuracy state for the weapon
- Maximum cone radius – the most inaccurate possible state for the weapon

Reticule bloom cone increases based on:

- velocity – how fast the player's character is moving, the faster you go the quicker the cone increases in size up to its maximum setting
 - velocity for max radius – ensure the accuracy cone will be at max by a specified velocity
- yaw and pitch rate
 - delta look for max radius – ensures the accuracy cone will be at max by specified rate of look deflection
- delta per weapon shot - each successive shot increase the cone radius up to its maximum setting

Bloom decreases at a specified return rate controlled by a spring. If the weapon is being fired at a high rate and the delta cone increase per weapon shot is higher than the value for spring return then the cone will eventually reach its maximum radius making the weapon inaccurate.

Another feature is that all of the values listed above can be tuned for stand, crouch and kneel. This allows the weapon accuracy to be improved when crouching and superior while kneeling.

Lastly, all shots have a weighted distribution towards the center of the cone accuracy cone. Example, a maximum cone could take up half the visible screen, but a majority of the bullets will still fire near towards the middle of the screen accuracy cone.

Recoil

(Note: the new recoil system below is not in the game)

Primary Recoil system

- Recoil is weapon specific
- The amount of recoil is calculated per round fired from the weapon
- Recoil can move the camera (aim vector) along the X and Y axis in either a positive or negative value
- Once the weapon has finished firing it does not center the weapon
- The amount of recoil can be scaled per stance for standing, crouching, kneel
- Auto return option eats active player input compensation and returns the reticule to the start position

Secondary Camera recoil system

- Uses camera shake system
- 6 axis of control
- Min\Max range value for each axis
- Min\Max spring
- Min\Max Dampening

Together the system yields an authentic feel since the camera (the players head) and the weapon can recoil as two independent systems but together off the same event.

Zoom

(Note: This system is in game and fully functioning)

Unlike real life, in games there isn't an optics simulation allowing targets to be magnified. Zooming in typically decreases the field of view making targets in the distance easier to see. A side effect of this is that the bloom cone size is constant resulting in a huge cone on screen. For game play reasons we also allow the amount of bloom in each stance to be scaled per zoom setting. Technically this allows the weapons to become even more accurate while zoomed.

Per zoom state, the bloom accuracy can be scaled for:

- Standing
- Crouching
- Kneeling

Additionally, the left stick yaw and pitch sensitivity is scaled dynamically down (less sensitive) based on the fov. This prevents the stick from being over sensitive in very small fov settings.

CAMERA

Idle Bob, Pitch, & Roll

(Note: This system is implemented and is supposed to affect accuracy but currently does not)

The idle bob system for should is only in action while the player is not moving. Idle bob, pitch, & roll basically combine to form a breathing simulation. The idle bob system has many degrees of movement:

- Pitch up and down
- Yaw left and right
- Bob up and down
- Bob left and right
- Roll left and right

The amount of idle bob can be scaled per stance:

- Stand
- Crouch
- Kneel

Idle Bob scaling & decay

(Note this system is not currently implemented)

This system adds to the concept of breathing. At its core, it controls the amount of sprinting the player can do by making it more difficult to aim. The system:

- Scales the amount of idle bob based on the maximum player velocity reached before becoming idle
 - Threshold being anything faster than walk
- Increase the cool down (the amount of time it takes to return to normal idle bob) based on the duration the player was moving at speeds faster than walk.
- Cap the maximum cool down time so the system isn't annoying

Idle Bob while zoomed

(Note: This system is in game and fully functioning)

- The amount idle bob can be scaled per zoom state by holding the left analog trigger to simulate controlled breathing.
- Holding the left trigger in for too long and the control kicks off dramatically moving the camera

Camera Shake

(Note: This system is implemented and functioning but there are a few requested enhancements listed in track)

The amount of camera shake obviously affects the aim vector. Camera shake is triggered by the left or right foot (they each affect the camera differently) and is scaled by velocity. The faster the player moves the more intense the camera shakes. The only time the camera doesn't shake is when the player is standing still, but that is when the idle

bob. The player can still shoot on the move but combined with bloom and recoil this system can make it very difficult to hit any thing on purpose while running.

AIM ASSISTANCE

(Note: This system is implemented and functioning but there are a few requested enhancements listed in track)

Aim assistance works by scaling down yaw and pitch output. The yawing is slowed in the vicinity of a vertical line segment placed in a human target's torso. It slows pitching in the vicinity of a horizontal line segment in the shoulders. (Basically forming a cross) The lines are sized per stance (standing, crouching, kneeling) this ensures that while a target is crouched that aim assist cross matches the size of the target. The amount of scaling can be configured per axis (yaw, pitch) and is turned on within a specified distance to the horizontal and vertical line segments. The closer the reticule gets to either line segments the more the yaw and pitch are scaled down.

Things that must be done to make this system work better:

- Turn off the fast yaw / pitch acceleration curve while aim assist is active
- Scale the size of the of the aim assist cross based on distance.

- Document History

Date	Authors	Description	Rev.
10/18/07	CRoby	Finished first rough draft of the document	0.02
10/17/07	CRoby	Started document. Porting the camera and weapon system track tickets to this document.	0.01