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Ray Casting Tutorial – Part 12

May 17, 1996   By fpermadi

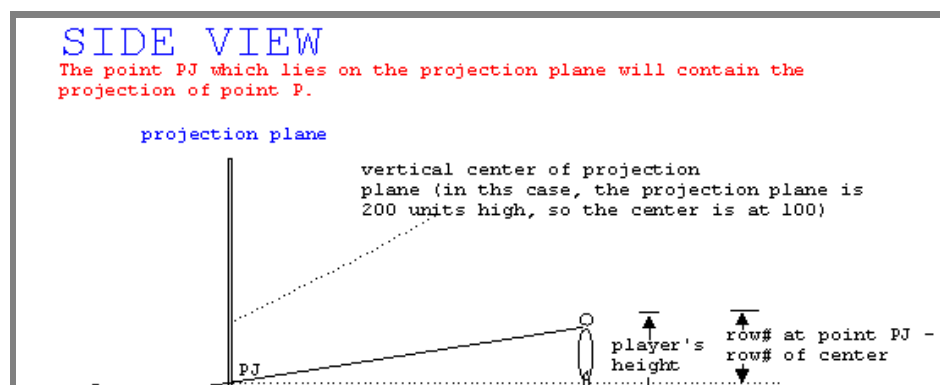💬 0 (http://permadi.com/1996/05/ray-casting-tutorial-12/#comments)

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FLOOR CASTING (Continued)

The math behind floor-casting is explained in the Figure 25 (http://permadi.com/tutorial/raycast/rayc12.html#FIGURE25) below.

Figure 25: The math behind floor-casting.

```
                                                      u        ▼
┌────────────────────────────────────────────────────────────────┐
│                           floor                                 │
└────────────────────────────────────────────────────────────────┘

                       distance of player
                       to projection plane  ──▶│
                    │◀─────────────────────────▶│

              straight distance from
         │◀── player to the intersection ──────▶│
              with the floor (point P)

From similar triangle equation (call this equation F1):

straight distance from player's feet to P        player's height
------------------------------------------   =   ---------------------------------
distance of player to projection plane           (row# at point PJ - row# of center)
```

To reiterate, take a look at the illustration while reading these steps:

* Start from the bottom of the wall slice.

1. Take the pixel position (you have this value when you did the wall casting).
2. Draw a line (a ray) from the pixel to the viewers eye.
3. Extends the line so that it intersect the floor.
4. The point where the line "intersect" the floor is the point on the texture map that is being hit by the ray.
5. Take the pixel value of that point on the texture map (see the next figure to see how this can be done) and draw it on the screen.

* Repeat 1-5 until the bottom of the screen is reached.

```
TOPDOWN VIEW        We can find the straight
                    distance by equation F1 (above),
                    However, this distance is not the
                    distance that we're looking for.
                    The actual distance between the
                    player to P, is the slanted distance
  ┌───┐             as depicted on the left.
  │ P │  floor
  └───┘


        ┌──────────────────────────────┐
        └──────────────────────────────┘
         PJ

                         player's
actual distance          point of view
from player to floor
this is:
straight distance/cos(β)     straight distance
                             from player to P

                       β        α is the viewing angle of the player
                                β is the angle of the ray relative
                         α      to the viewing angle of the player
                       Player
```

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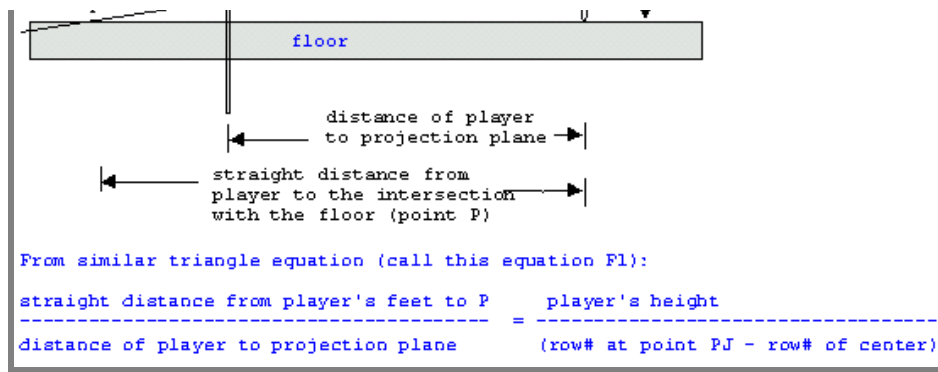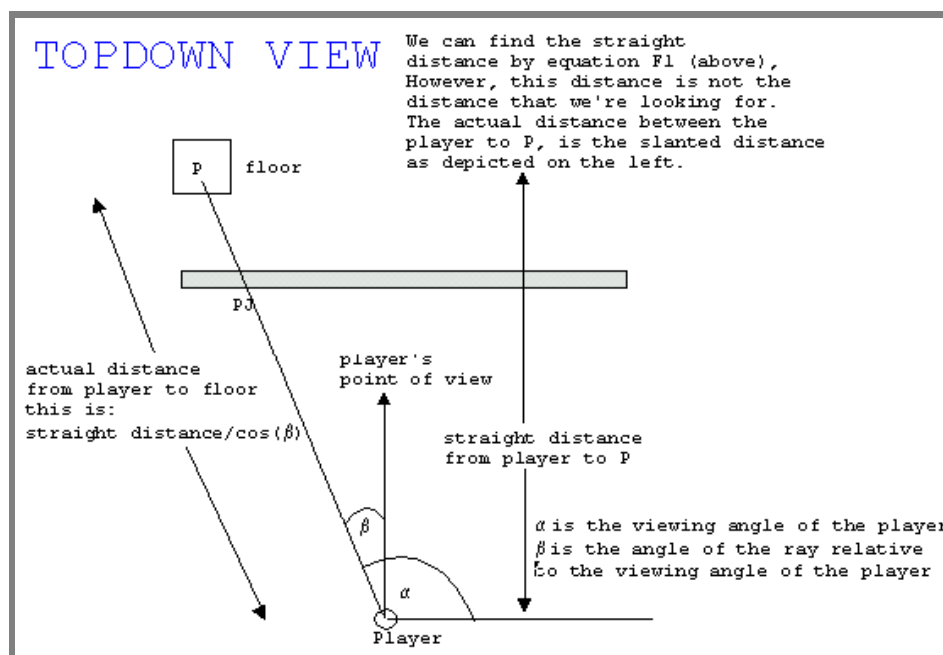
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