

Re: newbie: rotating meshes

Source:

<http://www.tech-archive.net/Archive/Development/microsoft.public.win32.programmer.directx.graphics/2004-07/053>

From: Callum Winter (*callum_at_REMOVE_THISwinter9999.fsnet.co.uk*)

Date: 07/23/04

Date: Fri, 23 Jul 2004 13:58:54 +0100

Ok after reviewing the code you sent me I am now as stumped as you are.

I have tried all sorts to get the effect you want.

In addition, I even used code from 2 different books I have, and the rotation code that uses quaternions in the DX Water sample, but none work perfectly.

It seems, the methods work to an extent but at certain angles it seems to no longer know which way is up or left.

The problems I noticed, were if you for example rolled the ship, then tried to pitch, it would still pitch on the x axis as it was before the roll and not the rolled x axis, which says to me that the math for matrix concatenation doesnt rotate the values of the matrix correctly in some cases.

However if you rotated the ship around y then pitched, the pitch worked which meant the y rotation rotated the models x axis whereas the z rotation did not.

This does not make any sense to me, its going beyond my knowledge and into the realms of the mathematician.

For example here was the quaternion method, which failed miserably, and this was used in the DX water sample

```
void Rotate1( D3DXMATRIX *mLocal, D3DXVECTOR3 *vRotation, float x, float y, float z)
```

```
{  
    vRotation->x += x;  
    vRotation->y += y;  
    vRotation->z += z;
```

```
    D3DXMATRIX mRot;  
    D3DXQUATERNION qRot;  
    D3DXQuaternionRotationYawPitchRoll(&qRot, vRotation->y, vRotation->x, vRotation->z);  
    D3DXMatrixRotationQuaternion(&mRot, &qRot);
```

```
D3DXMatrixIdentity(mLocal);
D3DXMatrixMultiply(mLocal, mLocal, &mRot);
}
```

I normally used the code I provided for the camera, and I guess with a cam you only ever turn left or right or look up and down (unless your making a flight sim or space sim which im not). So I guess these problems were not apparent in this situation.

It must be possible somehow as a flight sim would need this kind of control, but i can honestly say I have exhausted everything I know, and my resources know, to try and get this to work.

You are really going to need a math boffin, or someone with tried and tested code to give you the correct procedure on this, as Im all out of ideas now, plus I have my own things to do, but if you work it out please let me know.

Sorry I couldnt solve this problem for you.
Hope someone else can.
Callum.

"Callum Winter" <callum@REMOVE_THISwinter9999.fsnet.co.uk> wrote in message news:OInIMb%23bEHA.3804@TK2MSFTNGP10.phx.gbl...

> *Hi zodiaq,*

>

> *Ok I now see.... you want to know how to rotate about an arbitrary axis so if the ship isnt pointing exactly down the z axis and you role it, it roles*

> *about its own local z instead of the world z, the same going for x and y axis.*

> *OK there are 2 methods, the second i personally prefer using.*

>

> *Method 1)*

> *First your model should store its own local matrix, and each time you update*

> *this matrix you should extract its orientation vectors.*

> *Heres a quick function i wrote to make this easy,*

> *NOTE: m_mLocal should be substituted for your models local matrix.*

>

> *void GetOrientation(D3DXVECTOR3 *vRight, D3DXVECTOR3 *vUp, D3DXVECTOR3 *vDir)*

> {

> **vRight = D3DXVECTOR3(m_mLocal._11, m_mLocal._21, m_mLocal._31);*

> **vUp = D3DXVECTOR3(m_mLocal._12, m_mLocal._22, m_mLocal._32);*

> **vDir = D3DXVECTOR3(m_mLocal._13, m_mLocal._23, m_mLocal._33);*

> }

>

> *You can then pass any of these vectors to D3DXMatrixRotationAxis, so you can*

> *rotate about each one.*

>

```
--
> -----
> Method 2)
> Your model should keep a local model matrix and a rotation vector i.e.
> D3DXMATRIX m_mLocal, D3DXVECTOR3 m_vRotation.
> Make sure to id the local matrix and zero the vector to begin with.
>
> Here are the calls to rotate your ship about its local axis
> Rotate(0.0f, 0.0f, -fAngle); // Roll Left
> Rotate(0.0f, 0.0f, fAngle); // Roll Right
> Rotate(0.0f, -fAngle, 0.0f) // Yaw Left
> Rotate(0.0f, fAngle, 0.0f) // Yaw Right
> Rotate(-fAngle, 0.0f, 0.0f) // Pitch Up
> Rotate(fAngle, 0.0f, 0.0f) // Pitch Down
>
> // Heres the actual function to build the local ships matrix
> void Rotate(float x, float y, float z)
> {
>     m_vRotation.x += x;
>     m_vRotation.y += y;
>     m_vRotation.z += z;
>
>     D3DXMATRIX mRotX, mRotY, mRotZ, mRotation;
>     D3DXMatrixRotationX(&mRotX, -m_vRotation.x);
>     D3DXMatrixRotationY(&mRotY, -m_vRotation.y);
>     D3DXMatrixRotationZ(&mRotZ, -m_vRotation.z);
>     mRotation = mRotZ * mRotY * mRotX;
>
>     // OK here if you are only using rotation do this
>     D3DXMatrixIdentity(m_mLocal);
>     D3DXMatrixMultiply(&m_mLocal, &m_mLocal, &mRotation);
>
>     // If you also wanted to incorporate translation do this instead,
>     //plugging in your translation matrix.
>     // D3DXMatrixMultiply(&m_mLocal, &m_mTrans, &mRotation);
> }
>
> You will notice in this method the model keeps track of its last rotation
> vector, so you can simply tell it to rotate n degrees around its own x y
or
> z and it will know how to build the correct matrix, this gives you the
> effect of rotating the model on its local axis that you want.
>
> Something else you need to know is that rotations in DX are in radians not
> degrees.
> 2PI Radians is equal to 360Degrass.,which means 360 degrees in radians is
> roughly 6.28. because PI is 3.14.
> If you divide 6.28 by 360 the resulting value can be multiplied by a
number
> in degrees to convert it to a number in radians.
>
> See if that helps.
> Callum.
>
> "Bryce Bangerter" <BryceBangerter@discussions.microsoft.com> wrote in
> message news:3A3B09B1-3570-47FD-8ACC-6DFE55FFAEC8@microsoft.com...
> > If I understand what you are trying to do correctly, what you want is to
> use quaternions. Quaternions allow you to do a rotation about an
arbitrary
> axis in 3d space.
```

microsoft.public.win32.programmer.directx.graphics: Re: newbie: rotating meshes

```
> >
> > "Zodiaq" wrote:
> >
> > > Dnia Wed, 21 Jul 2004 17:12:49 +0100, Callum Winter popelnil(a):
> > >
> > > > First position your object in world space at 0,0,0 then rotate it
then
> > > > translate to its appropriate position.
> > > >
> > > > Trying to rotate after a translation will stop the effect where it
> looks
> > > > like its rotating around its local axis as in reality every rotates
> around
> > > > the origin of the world.
> > > >
> > > > In this case positioning at the origin to rotate allows the effect
the
> > > > object is rotating about its own axis, then you just have to shift
it
> to its
> > > > new position with a translation matrix, after the rotation has been
> > > > performed.
> > >
> > > Damn! I knew I haven't explain this as I should... first: I'm only
using
> > > rotation - no translation (moving) or scaling, and object is located
in
> > > center of world. Second let's say I have some kind of ship, it looks
> like
> > > this:
> > >   ^
> > >  /|
> > > <- +
> > >  \|
> > >   v
> > >
> > > where <- is nose (front), ^ and V are wings, and + is engine... Nose
is
> > > pointed toward negative Z-axis, left wing exactly toward positive
> x-axis, Y
> > > is up...
> > >
> > > Now rotation... using keyboard I rotate this ship, but the it is
> imporatanant
> > > order in which I make rotations... in my app first comes rotation
around
> Z,
> > > so my ship always rolls as it should... but others rotations doesn't
> work as
> > > I want... I made graphical examples because I find this hard to
> explain...
> > >
> > > first how rotation are done in DirectX:
> > > http://www.astercity.net/~piotreg/dx\_rotations.jpg 8.6kB
> > > now what I currently have:
> > > http://www.astercity.net/~piotreg/dx\_what\_I\_have.jpg 6.9kB
> > > and what I want to have:
> > > http://www.astercity.net/~piotreg/dx\_what\_I\_want.jpg 6.1kB
> > > so my main goal is this:
> > > http://www.astercity.net/~piotreg/dx\_what\_I\_really\_want.jpg 6.3kB
> > >
> > > help help help! :>
```

microsoft.public.win32.programmer.directx.graphics: Re: newbie: rotating meshes

```
> > > --
> > > ..:-Dad, do you think there's people on other planets?
> :.
> > > ..:-I don't know, Sparks. But I guess I'd say if it is just us...seems
> like:.
> > > ..: an awful waste of space. : O2: zodiac@o2.pl W3:
> http://www.zodiac.w.pl :.
> > >
>
>
```