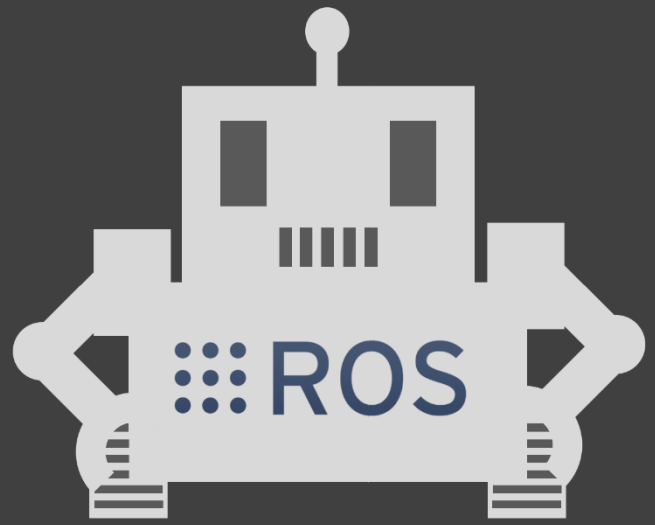
파이썬 물리 코딩

Chapter 1. 기초 물리 코딩

구선생 로보틱스



Update 20240610

강의 자료 다운로드

파이썬 물리학 강의 자료

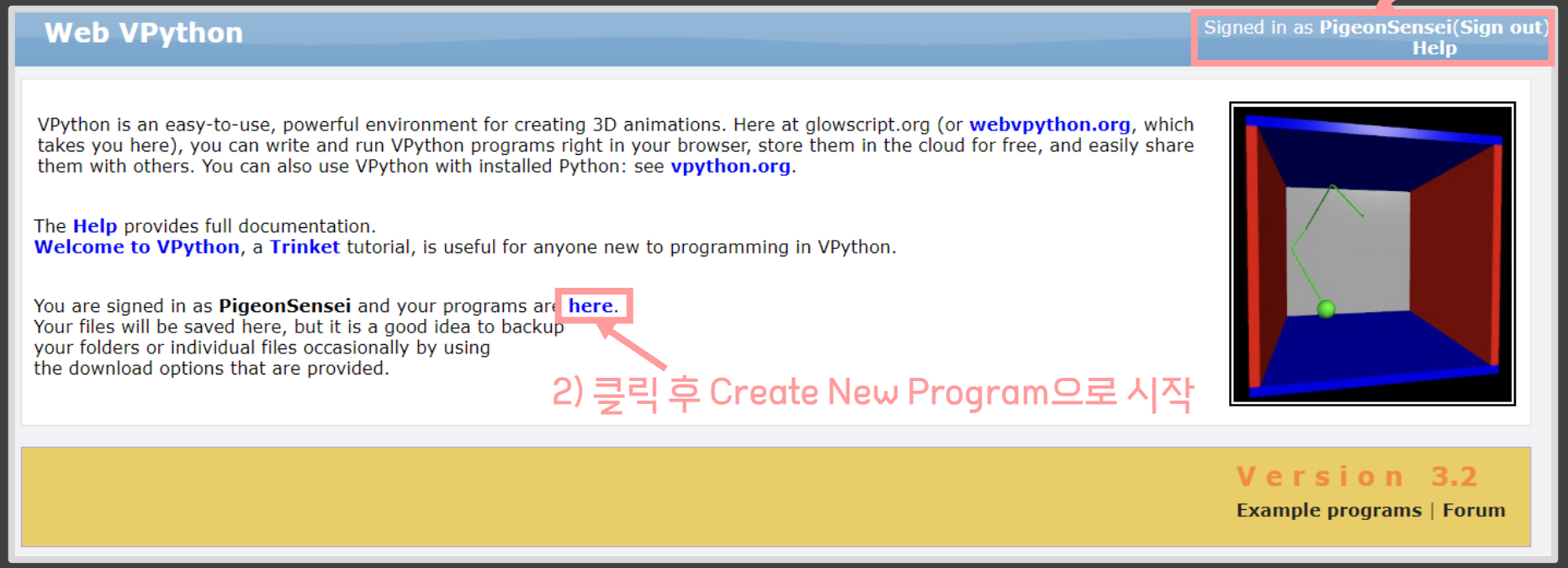
https://github.com/PigeonSensei/PythonPhysics

개발 환경

GlowScript

파이썬 코딩 웹 사이트

1) 로그인



파이썬 물리 코딩 기초

물체의 표현

공 만들기

```
Web VPython 3.2
myBall = sphere()
```

박스 만들기

```
Web VPython 3.2
myBox = box()
```

물체의 크기 변경

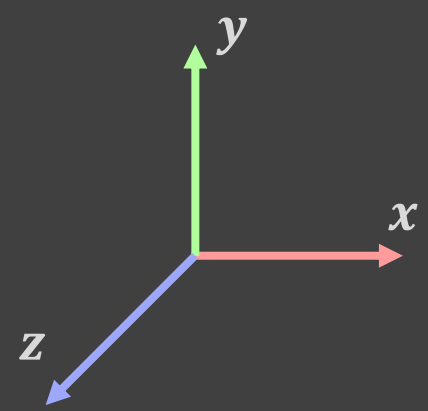
```
Web VPython 3.2
myBox = box()
myBox.size.x = 1
```

물체의 색상 변경

```
Web VPython 3.2
myBall = sphere()
myBall.color = color.green
```

물체의 좌표 변경

```
Web VPython 3.2
myBall = sphere()
myBall.pos.x = 10
```

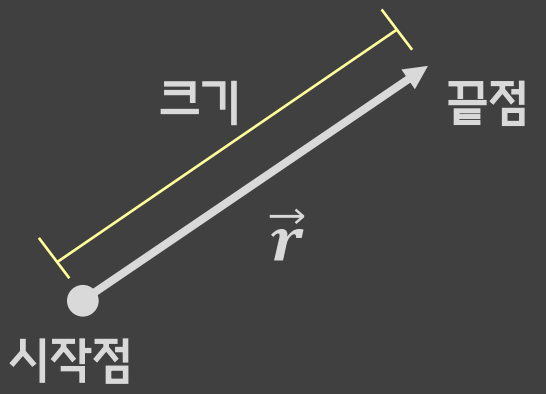


파이썬 물리 코딩 기초

벡터

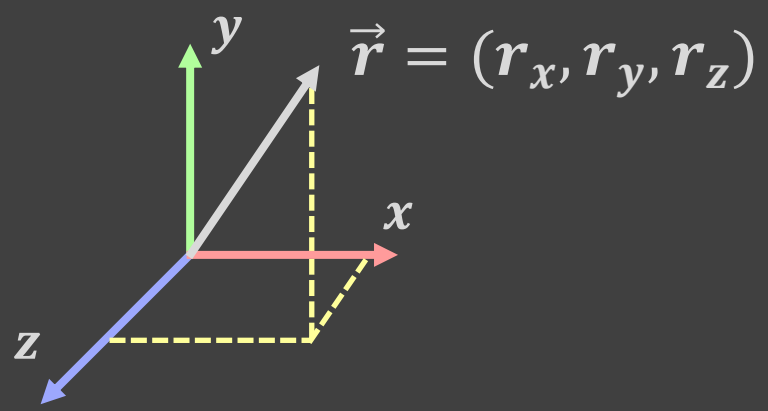
스칼라 – 크기만 있는 값 (거리, 속력, 가속력, 질량, 에너지 등)

벡터 – 크기와 방향을 가지는 값(힘, 위치, 속도, 가속도 등)



벡터 생성

```
Web VPython 3.2
r = vector(3, 4, 5)
```



벡터 시각화

```
Web VPython 3.2
r = vector(3, 4, 5)
r_arrow = arrow(axis=r, shaftwidth=0.2)
```

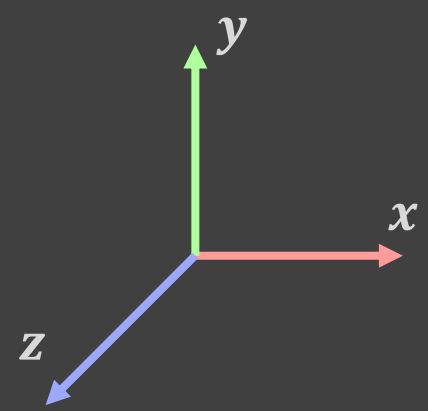
파이썬 물리 코딩 기초

벡터

3차원 좌표축 표현

Web VPython 3.2

```
x_arrow = arrow(axis = vec(10,0,0), color = color.red, shaftwidth=0.2)
y_arrow = arrow(axis = vec(0,10,0), color = color.green, shaftwidth=0.2)
z_arrow = arrow(axis = vec(0,0,10), color = color.blue, shaftwidth=0.2)
```

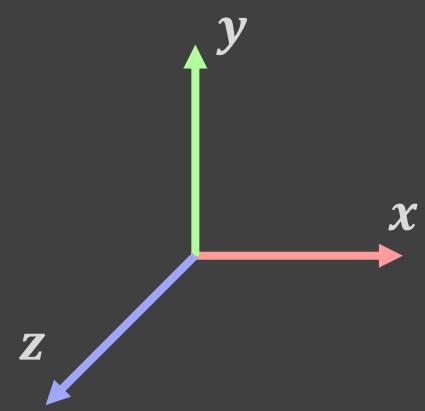


파이썬 물리 코딩 기초

벡터

벡터의 합 $\vec{a} + \vec{b} = (a_x, a_y, a_z) + (b_x, b_y, b_z) = (a_x + b_x,\ a_y + b_y,\ a_z + b_z)$

```
Web VPython 3.2

a = vector(3, 4, 5)

b = vector(-3, 0, -5)

c = a+b

c_arrow = arrow(axis=c, shaftwidth=0.2)
```

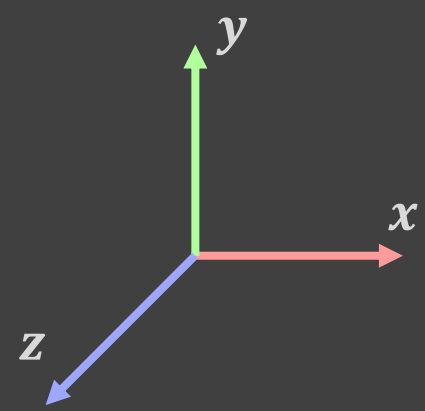


파이썬 물리 코딩 기초

벡터

벡터의 스칼라 곱 $3\vec{r} = 3(r_x, r_y, r_z) = (3r_x, 3r_y, 3r_z)$

```
Web VPython 3.2
r = 3 * vector(3, 4, 5)
r_arrow = arrow(axis=r, shaftwidth=0.2)
```

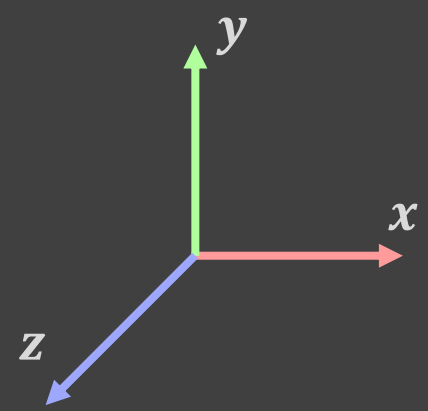


파이썬 물리 코딩 기초

벡터

벡터의 크기 $|\vec{r}| = \sqrt{r_x^2 + r_y^2 + r_z^2}$

```
Web VPython 3.2

r = vector(3, 4, 5)
mag_r = sqrt( r.x**2 + r.y**2 + r.z**2 )
print(mag_r)
```

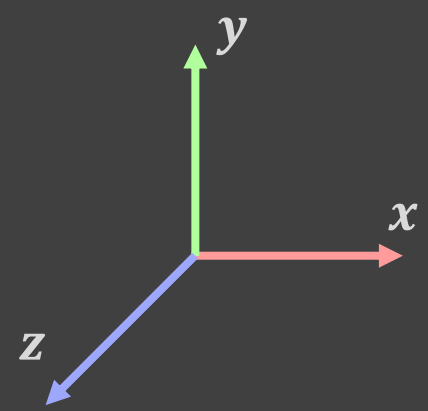


파이썬 물리 코딩 기초

벡터

단위 벡터 $\vec{r} = |\vec{r}|\hat{r}$

```
Web VPython 3.2

r = vector(3, 4, 5)

mag_r = sqrt( r.x**2 + r.y**2 + r.z**2 )

norm_r = r / mag_r

print(norm_r)

r_arrow = arrow(axis=r, color = color.red, shaftwidth=0.2)

norm_r_arrow = arrow(axis= norm_r, color = color.green, shaftwidth=0.2)
```

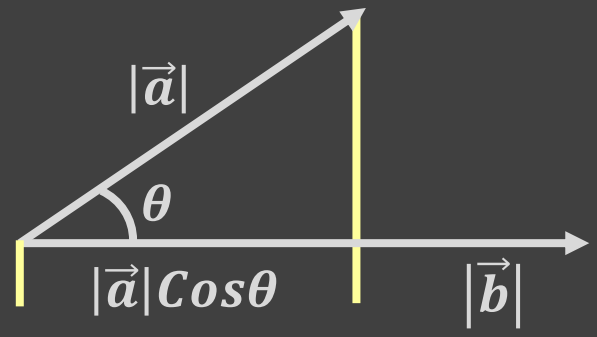


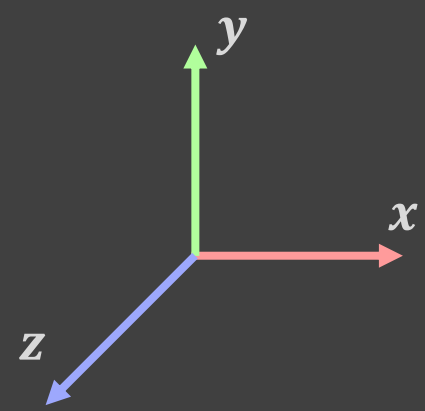
파이썬 물리 코딩 기초

벡터

벡터의 내적 $\vec{a} \cdot \vec{b} = a_x b_x + a_y b_y + a_z b_z = |\vec{a}||\vec{b}|Cos\theta$

```
Web VPython 3.2
a = vector(3, 4, 5)
b = vector(5, 6, 7)
c = dot(a,b)
print(c)
```





파이썬 물리 코딩 기초

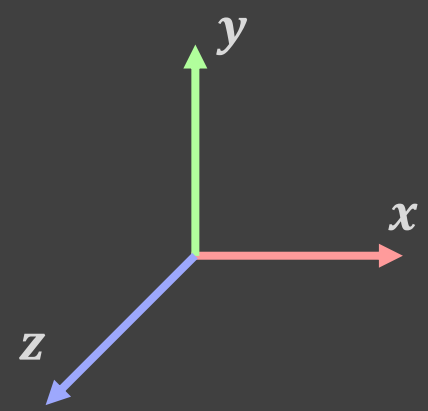
벡터

벡터의 외적

$$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{r_x} & \hat{r_y} & \hat{r_z} \\ a_x & a_y & a_z \\ b_x & b_y & b_z \end{vmatrix} = (a_y b_z - a_z b_y)\,\hat{r}_x - (a_x b_z - a_z b_x)\hat{r}_y + (a_x b_y - a_y b_z)\hat{r}_z$$

$$= (a_y b_z - a_z b_y, a_z b_x - a_x b_z, a_x b_y - a_y b_z)$$

```
Web VPython 3.2

a = vector(10, 0, 0)

b = vector(0, 10, 0)

c = cross(a,b)

a_arrow = arrow(axis= a, color = color.red, shaftwidth=0.2)

b_arrow = arrow(axis= b, color = color.green, shaftwidth=0.2)

c_arrow = arrow(axis= c, color = color.blue, shaftwidth=0.2)
```



감사합니다

구선생 로보틱스