The cross-sections of the macro vibrissae are tapered toward the tip and their lengths (160 - 220mm) are approximately four times larger than the long whiskers of a typical adult
Rat.

the whisker base is mounted into a polyurethane rubber plug, a small magnet is bonded to the base of each whisker and a Hall effect sensor used to sample the displacements of the magnet in two directions

shorter (80mm) non-actuated whiskers (microvibrissae)

three degrees of freedom : elevation, pitch and yaw

The central computing resources
consist of a PC-104+ reconfigurable computing platform, composed of a single
board Computer and a closely coupled array of FPGAs for hardware accelerated
Processing.

I=(πr^4)/4

modulus of elasticity= 3.5 GPa to 7 GPa

```
diff_eq = sp.Eq(sp.diff(E*I*sp.diff(y, x, x), x, x), -w)
```

d2/dx2 (EI(d2y/ dx2))=−q(x) Where:

- (y) is the deflection of the beam,
- (x) is the position along the beam,
- (E) is the modulus of elasticity,
- (I) is the area moment of inertia of the beam's cross-section, and
- (q(x)) is the distributed load on the beam.

```
import sympy as sp

# Define the symbols
x, L, P, E, I = sp.symbols('x L P E I')

# Define the deflection function
y = sp.Function('y')(x)

# Define the distributed load
w = P

# Define the differential equation for the beam deflection
diff_eq = sp.Eq(sp.diff(E*I*sp.diff(y, x, x), x, x), -w)

# Solve the differential equation
deflection = sp.dsolve(diff_eq, y)
```

In this code:

- x represents the position along the beam,
- L is the length of the beam,
- P is the distributed load on the beam,
- E is the modulus of elasticity, and
- I is the area moment of inertia of the beam's cross-sect