**INSPIRATION BEHIND THE DESIGN: (PUFFER FISH)**

When in threatening fearful conditions, the puffer fish (at normal conditions, a small lean fish) expands like into a bigger volume, eventually rises to the surface.

The puffer fish expands and contracts its body for rising and sinking (but that’s not the main use of that mechanism, the fish uses it to protect itself)

But this rising and sinking mechanism can be applied to the KSHEERA (submarine).

**WORKING MECHANISM:**

Before directly entering into the mechanism, we need to know about an important term, BUOYANCY

Buoyancy is force applied by the fluid onto the surface of the body whether the is submerged.

FB  = (density) x (volume of fluid displaced) x (acceleration due to gravity)

The general submarines use ballast tanks to increase or to decrease its weight, eventually sinking and rising can be achieved.

**But there is another possibility to achieve the above, that is by increasing and decreasing the volume of fluid displaced, without changing the weight of the submarine (eventually eliminating the use of ballast tanks) .**

The amount of fluid displaced will be maximum when the submarine is in its expanded state and minimum when the submarine is in its contracted state, causing rising and sinking of the submarine.

**CONTROL OF THE MECHANISM:**

The submarine contains a fixed cylinder shell which has two stepper motors attached at both the ends and the motors rotate a square threaded shaft

There are two movable shells which moves over the fixed cylinder. these movable shells contain a lead screw in the center through which the threaded shaft rotates.

So when the threaded shaft rotates, due to the lead screws the two shells starts moving in either directions in the longitudinal axis.

This keeps the center of mass unchanged and can change the volume of fluid displaced by the submarine.