OBJECTIVE
Imagine piercing an elastic and soft 80μm shell egg with an 8μm stiff glass needle; no contents dispersion, no deformation, no vibration can be tolerated.

CONCEPTUALIZATION
A piezoelectric material is used as the basis to make a partially-rotating actuator.

SIMULATION
After design conceptualization, the Finite Element Method (FEM) simulation is conducted to verify the behavior of the piezo-actuator.

THE PARTS
Following the simulation, we design and manufacture the components of the piezo-actuator.

CONTROL SYSTEM DESIGN
The control system is designed to ensure the proper operations of the proposed-actuator.

FINAL PRODUCT
The parts are assembled, and the control system is implemented to drive the proposed-actuator.

ACTUAL OPERATIONS
We are now ready to test the performance of the motor in the real installation. We try to penetrate an 80 micron egg cell with the lab-made device.

BLASTOCYST
The following figures present the development of the cells to blastocysts after artificial fertilization with the piezo-actuator.

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