



Transformation of A Traditional Micromanipulator to A Semi-Automatic Cell Surgery Robotic System for In-Vitro Fertilization

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Abstract. Micromanipulators are mechanical devices used for manipulating miniature objects in the order of microns. They are widely used in In-Vitro Fertilization (IVF) process, in which sperms will be held on a micro-needle and penetrate to an oocyte for fertilization. Skilful embryologists need to control the movement of the micro-needle accurately under the microscope by using the micromanipulator. For the proper setup, the micromanipulator should be placed in the hypoxia chamber in order to control the environment of IVF. However, this setup is impractical in actual processes due to the limited accessibility of the devices. This research focuses on addressing this inaccessibility issue by using a master-slave system that allows the embryologist to control the micromanipulator remotely from outside the hypoxic chamber. An added-on slave module is mounted on a joystick of the manual micromanipulator. As a result, the traditional micromanipulator will be transformed to a semi-automatic cell surgery robotics system for IVF.

Keywords: In-Vitro Fertilization, Micromanipulator, Tele-operation, Robotics