

Thesis Project Portfolio

**THE DEVELOPMENT AND TESTING OF A NOVEL AUTOMATIC
ORGANOID/MICROSPHERE MOVEMENT DEVICE**

(Technical Report)

**EXAMINATION OF THE ETHICAL IMPACTS ON RESOURCE ALLOCATION TO
ORGANOID AND ADULT STEM CELL RESEARCH**

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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Sociotechnical Synthesis

Organoids are 3D tissue constructs that have the ability to replicate structural and functional properties of human organs and tissues, giving them great potential in the field of medicine with applications in the study of disease progression, drug testing and development, and even organ transplantation. Despite this potential, the development of organoids is hindered by the fact that organoids must be seeded into biomaterials for growth and differentiation, a process that is currently done by hand, making it imprecise and time-consuming. These issues caused by manual seeding lead to slower progression in organoid research and technological development. To address these issues our team has created an automated organoid seeding device that utilizes image detection software to precisely and efficiently seed organoids into biomaterials. The current technical limitations are not the only factor holding back organoids as a medical technology, there are also important social factors to be considered, particularly ethics. Organoids are derived from embryonic stem cells (ESCs), which carry significant ethical concerns in the fact that harvesting ESCs can be seen as the ending of a human life. This is an important factor to consider as these concerns potentially impact the amount of investment that organoid research receives and thus its technological development. In order to analyze how a social factor such as ethics can impact the development and evolution of a technology, my research will be done in the context of the theory of social construction of technology (SCOT). This research will be done in the form of semi-structured interviews with both stem-cell researchers and investors in the space along with literature review in order to determine if organoid and ESC research receives lower investment as a result of ethical concerns and if so, how this lack of investment has affected the development of organoids as a technology. Through this research, I expect to discover the extent to which a social factor like ethics can actually impact how a technology like organoids is able to evolve, particularly in relation to the theory of SCOT. The overall goal of the combined results from both the STS research and capstone project is to allow for organoids to reach their full potential as a medical technology so that they can be used in their extensive applications to save lives and create treatments for diseases that currently cannot be effectively treated. With the capstone project addressing one of the major technical issues involved with organoids and the STS research addressing a major social problem, the combination of these results will aim to remove some of the barriers currently holding organoids from reaching their potential.