

Thesis Project Portfolio

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

(Technical Report)

**ACTOR-NETWORK THEORY ANALYSIS OF THE NOVARTIS
INFRINGED DRUG PATENT**

(STS Research Paper)

An Undergraduate Thesis

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

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

My technical work and my STS research are connected primarily through the process of obtaining a patent and understanding what implications it has for future engineers who want to develop a novel invention. A patent is a type of intellectual property that gives its owner the legal right to exclude others from creating, utilizing, or selling a novel invention for a limited period of time in exchange for publishing a sufficiently detailed invention. While my technical project focuses on the development of a novel biomedical device, it will require intellectual property for various components and applications. My technical project focuses on the development and testing of an automatic organoid/microsphere movement device. My STS research explores two large pharmaceutical companies that had overlaps in a chemical compound leading to an infringed patent. For my technical project, it is important to understand my STS research as the commercialization of my device would require the protection of my intellectual property.

My technical work focuses on designing a device that precisely withdraws and places organoids into a designated location within a permissive biomaterial using an automated set-it-and-forget-it approach. My capstone team created a prototype of an automated device and completed preliminary testing to verify the concept. Our team built the device from an initial design drawing utilizing linear guide rails, stepper motors, a high-definition camera, a nanoliter injector, and CAD-printed components. The device is designed to be used for the application of research on organoids, which are three-dimensional cell cultures constructed from stem cells that function to mimic human organs *in-vitro*. The machine will be utilized in Dr. Christopher Highley's lab for continued development and research applications. Our device aims to improve a manual process and improve the precision of current research methods. We also hope to patent the

components of the device and commercialize it to allow other researchers and engineers globally to advance research in drug development, the study of diseases, and transplantable organs.

My STS research explores an infringed patent between Novartis and Plexxikon Inc. over a pharmaceutical drug sold to Novartis by GlaxoSmithKline. My research focuses on Novartis's acquisition of the drug Tafinlar and explores the groups involved in the process. My claim is that Novartis did not willingly infringe on Plexxikon's chemical compound. Instead, GSK willingly sold an infringed drug to Novartis for monetary benefits and to satisfy its shareholders. My paper explores the idea that the United States Patent Office and GlaxoSmithKline did not adequately perform their roles during Novartis's acquisition of GSK's oncology portfolio. The goal of my research is to ensure that future engineers develop novel technologies and drugs that do not overlap with proprietary technologies.

Working on these projects simultaneously has greatly impacted my overall work. My technical work allowed me to understand the applications of my team's novel device and the proprietary components that could be patented in the future. Similarly, the research I conducted for my STS paper allowed me to understand the complexities of patents and how it is important that I ensure the patents I receive do not overlap with others. This increased my motivation to have a completed prototype capable of picking up and placing organoids to allow for discussions involving the intellectual property of the device. In summary, working on both my STS research paper and my technical project together this past year has allowed me to learn the stages involved in developing technologies and ensuring that the rights of my work are not stolen.