

Team Name: Pin Transfer Robot for Chemical Screening

Team Members:

Yousef Abdelsalam	Computer Engineering	(yousefabdelsalam@knights.ucf.edu)
Brenden Morton	Computer Engineering	(brenden@knights.ucf.edu)
Dominic Simon	Computer Engineering	(dominicsimon98@knights.ucf.edu)
Christopher Clifford (Team Lead)	Electrical Engineering	(chris.e.clifford@knights.ucf.edu)
(reserved for internal use only)	(reserved for internal use only)	

Point of Contact (cell phone): (321) 795 - 7670

Sponsors: none

Project Summary:

Pin transfer operations are used in chemical screening experiments to transfer an extremely small volume of molecule, chemical compound, or drug (typically nanoliters) from a chemical library source into a cell culture microplate destination. Pin transfer operations allow for many cell culture wells to be treated at the same time which enables high throughput screening for "hit" compounds that have a desired effect on the cell population of interest. Currently there are 3 different levels of pin tool system complexity. The simplest and cheapest option, typically around \$3000-6000, is a manual pin tool. These devices are mounted with a handle and must be manually held by the operator. This takes an acquired skill to use properly and is impossible to guarantee repeatability or accuracy between experiments.

A more complex system independent labs can purchase is a liquid handling station adaptation kit. These devices transform a liquid handling robot, which usually automatically pipet liquid volumes into different reservoirs and conical tubes, into a pin transfer robot. Because these robots were not initially designed for the pin transfer application, without additional robotics to load/offload microplates they cannot handle multiple microplates at the same time. These platforms can cost anywhere from \$10,000 and upwards depending on the capabilities required and supporting robotics used. Lastly, there are entire high throughput screening facilities whose entire purpose is to conduct screens with millions of compounds to identify drug candidates for disease such as cancer. These facilities can be found at the National Institutes of Health and other large biomedical research facilities. These robotic systems can require an entire laboratory of space and are expensive and exclusive to use. Advanced robotic screening systems can cost millions of dollars to build.

Our goal in this senior design project is to make a robotic system specifically designed for pin tool operation that is cheaper and more effective than a liquid handling adaptation system. The robot should ease the workload on laboratory scientists and most importantly provide more reliable and reproducible results than manual operation. Our system should be affordable enough that it will grant new labs access to this kind of equipment, which would allow them to conduct small scale chemical screening experiments on novel disease models that cannot justify the use of more expensive screening laboratories and equipment, enabling new scientific discoveries.