

MBE 4069 Group final year project 2012-2013

A vision-assisted automated microscope stage positioning system

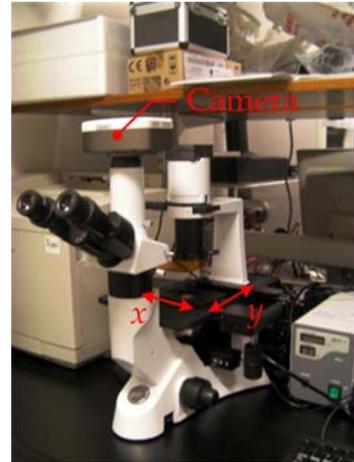
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Category: In-house
Team: ~3 – 4 students

Project description

Motion control is an important aspect in machine automation, especially when we need precise positioning of a compartment in a machine. A movable stage capable of the planar linear translation (in x - and y -directions) has been implemented in various machines for long, *e.g.* in computer numerical control (CNC) and rapid prototyping machines.

In this project, we propose to apply such movable stage to automate the imaging process of a biological microscope. The microscope has equipped with a digital camera connecting to a computer, therefore the computer can execute certain image process algorithms to extract important information from the acquired images. This information can then be considered as feedback signals for the stage positioning, in order to improve the precision and quality of the automated inspection of biological samples (*e.g.* human blood, proteins and DNA). While this technology is particularly essential to the microscopic applications, the technical knowledge itself is widely applicable to many other automated machines in general.



The biological microscope reserved for this project.

Preliminary sub-tasks

The followings are very brief tasks breaking down the overall objective into multiple achievable sub-goals. They are yet unconfirmed, but are listed to provide an idea of what the works are about.

- Establish a digitally controlled xy stage, composed of two linear motorized translation positioners for x - and y -directional movements.
- Interface programming for control of the stage using a computer.
- Image capture achieved by a microscopic camera. The images will then be used to identify the current sample position.

Technical contents

These are the components that the selected students are expected to acquire (mainly provided by the supervisor), therefore only minimal or no prerequisite knowledge of the candidates is required.

- Mechanical design
- Serial port programming using C++ (for the control of the xy stage)
- Graphic user interface developed using Visual C++
- Image analysis and processing techniques

Students are welcome to contact the supervisor for details of the project.