The blood count with differential is a single test which known to be rapid assessment of possible anemia, infection and immunosuppression. It provides a useful health monitoring method for astronauts especially under radiation and stress during spaceflight. The specific aim of this project is to develop an automated portable blood count instrument which requires only small sample volume (~50~200nL) and easy operation.

The prototype has been tested in a zero-G flight at ast year, and recently the following milestones have been achieved:

1. 4-Part Differential Leukocyte Count (DLC) using fluorescent sensing
   We demonstrated 4-part differential leukocyte count on a portable blood count system with disposable microfluidic cartridge. The test results include the concentration of total leukocytes and the percentages of four types of leukocytes including lymphocytes, monocytes, neutrophil and eosinophil. Blood samples were permeabilized and stained with fluorescent dyes FITC and PI. Green and red fluorescence are measured to count and identify different types of leukocytes. The system can achieve a throughput of 1000 WBC/second.

2. RBC and platelet count
   We also demonstrated RBC and platelet count on the same system but a slightly modified configuration. The extinction signals are used to count RBC, and red fluorescence signals from immunostaining are used to count platelets. Blood samples are stained with anti-14-PE, which specific for platelet, and diluted 1000 times for test.