

Semi-Automated, Low Cost Image-Based Leukocyte Classification using a Raspberry Pi

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Biological Sensors

Background/Relevance

- Current methods of white blood cell (WBC) 3-part differentials are still fairly expensive and require training to use.
- There is a need for an inexpensive, point-of-care (PoC), easy-to-use, portable automated hematology analyzer.

Innovation

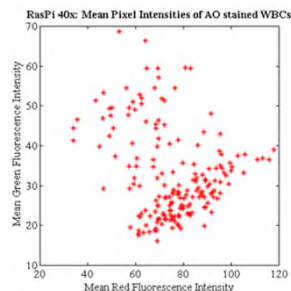
- Replace expensive components with low-cost computing and user-friendly computer algorithms.
- Demonstrate that a Raspberry P 2 Model B in coordination with a Point Grey Chameleon 2.0 can produce adequate results to current methods.

Key Results

- Measured a 3-part WBC differential using images taken with a Point Grey Chameleon 2.0 and classified using MATLAB software.
- Demonstrated that results from the modified system are comparable to that of earlier methods.
- Provided proof of concept for an automated classification system using LabVIEW software.



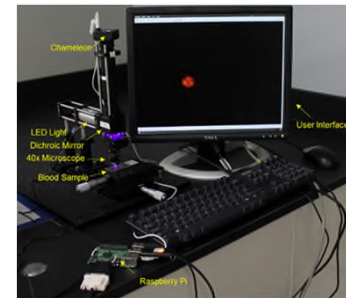
Point Grey Chameleon 2.0



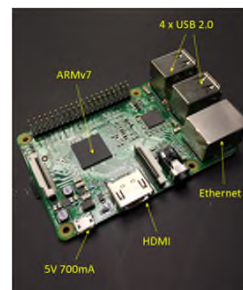
3 part differential of WBCs

Approach

- Use 0.01% acridine orange to prepare whole blood slides.
- Image slides for 30 minutes at a time, manually identifying monocytes, leukocytes, and granulocytes.
- Save images to Raspberry Pi and upload folder to secure FTP server.
- Run images through MATLAB scripts to produce a 3-part WBC differential scatter plot.



Imaging System



Raspberry Pi 2 Model B

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Conclusions

- The Raspberry Pi 2 Model B was successfully able to capture images with the Point Grey Chameleon 2.0.
- The system was also successful in uploading the images to a central server, processing the data, and produce a scatter plot.
- The 3-part differential results demonstrate a need for an unbiased way to categorize WBCs.

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