















Fig. 8. Automatic multi-focus program user interface.

### 3. Conclusion

In this study, we constructed an optical microscope for accurate cell analysis and implemented an autofocusing algorithm that can automatically acquire the necessary images for cell analysis by focusing on the cell surface, cell nucleus, and dyed reagent. Fig. 8 illustrates the program user interface (UI) for executing the automatic multi-focus algorithm. In order to verify the system performance, we automatically captured three clear images of PI-stained cancer cells focusing on the cell surface, cell outline, and stained regions. In the future, it should be possible to use this method in a reliable automatic skin health diagnosis system by analyzing images of various skin disease cells and constructing a database according to cell health statuses. The proposed system can also be applied to a fluorescence phase-contrast microscope, where the time and effort required to capture cell images can be saved and a significant enhancement in cell analysis convenience is expected.

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**Jaeyoung Park** <https://orcid.org/0000-0002-3932-9538>

He received B.S. degree in Department of Information and Communication Engineering from Sunmoon University in 2016. Since March 2017, he is with the Department of Information and Communication Engineering from Sunmoon University as a M.S. candidate. His research interests are embedded system, biosignal processing, pattern recognition, and biometric system with biosignals.



**Sangjoon Lee** <https://orcid.org/0000-0002-9829-4822>

He received B.S. degree in measurement and control and M.S. degree in electron from the Myongji University, Korea, in 2001 and 2005, respectively, the Ph.D. degree in Electrical and Electronic Engineering (biomedical engineering) from Yonsei University, Korea, in 2011. He has been worked of Sunmoon University as a professor of Division of Smart Automotive Engineering. His research interests are embedded system, biosignal processing, pattern recognition, and biometric system with biosignals.