Novel Smartphone Microscopic Technologies

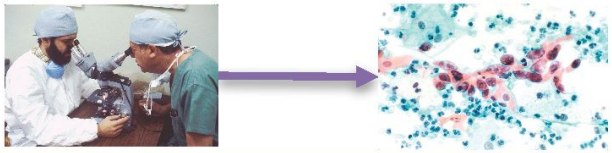
Waseer Mohamed*, Weiqi Chen, Dr. Ryan Hartman****

** Bard High School Early College II*

*** Flow Chemistry with Microsystems Lab, Department of Chemical and Biomolecular Engineering, NYU*

ABSTRACT:

The purpose of this study is to combine microscopy and pathology in order to catalyze and facilitate the diagnosis of diseases in remote regions. For example, the high incidence of cervical cancer within remote countries, stems from the paucity of screening, testing, and treatment. In order to address this crisis, experimentation with novel smartphone microscopic technologies was done, in order to integrate and utilize the already ubiquitous smartphone for screening and medical examinations. Evaluating medical samples will procure vital information that can be sent to medical professionals with the appropriate equipment and facilities which will allow for a proper diagnosis and treatment.



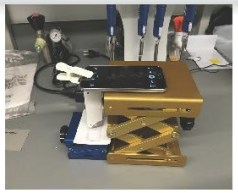
MATERIALS & METHODS:

CCD[1]:

- Mounted on top of the microscope
- Connected to a computer via USB

AP[1]:

- Eyepiece fastener and adjustable adapter
- Connected to microscopic through eyepiece



WD[2]:

- 200X magnification
- Clamp on
- Stage needed

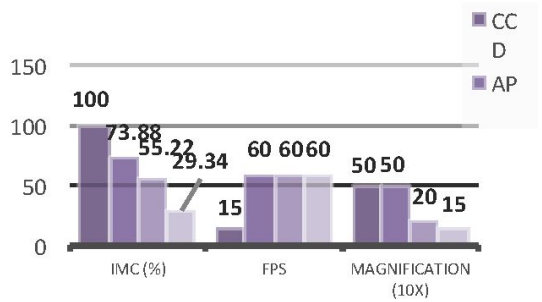
MP[3]:

- 150X magnification
- Adhesive "soft" plastic
- Stage and external illumination needed

RESULTS & DISCUSSION

Product	Specifications: Resolution (Photo, Video)
CCD	5 MP (1296x792)
AP	16 MP (5312x2988), (1920x1080)/(3840x2160)
WD	16 MP (5312x2988), (1920x1080)/(3840x2160)
MP	16 MP (5312x2988), (1920x1080)/(3840x2160)

Image Analysis



Product	Strengths	Limitations
CCD	-High IMC -High Magnifications	-Low Resolution -Low Frame Rate
AP	-High IMC -High Magnification -Easy to Use UI	-Some Visual Impediment, Stemming from Adapter
WD	-High Magnification -High Frame Rate	-Low IMC -Poor Stabilization
MP	-High Frame Rate -Cost Efficient	-Poor Stabilization -Requires External Illumination -Some Visual Obstruction

FUTURE APPLICATIONS:

- The AP is capable of supplanting CCD cameras, due to cost efficiency and ease of use
- The AP can be used easily to catalyze diagnosis in remote countries
- The Clip-On Lens and Adhesive Lens have great potential towards portable Microscopic application

ACKNOWLEDGMENTS:

The Pinkerton Foundation

Alexapath