

DEVELOPMENT OF A SINGLE-BOARD COMPUTER HIGH-RESOLUTION MICROENDOSCOPE (PiHRME) TO INCREASE ACCESS TO CERVICAL CANCER SCREENING IN UNDERSERVED AREAS

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Over 85% of cervical cancer deaths occur in developing countries.¹ Even though the early detection and treatment of cervical precancerous lesions has been shown to prevent invasive cervical cancer, limited resources make it difficult to implement standard cervical cancer screening methods, such as the Pap Smear, in low-resource areas. Instead, many developing countries rely on the visual inspection of the cervix with acetic acid (VIA) to help identify precancerous and cancerous lesions. While VIA has a high sensitivity (82.14%), it has a poor specificity (50.00%), resulting in the overtreatment of women and misallocation of limited resources.² Recent studies have shown that combining VIA with high-resolution microendoscope (HRME) imaging increases the specificity of cervical cancer screening.³⁻⁴ The HRME is a low-cost imaging system (~\$2,100) that allows the user to image epithelial tissue *in vivo* at sub-cellular resolutions at the point-of-care. The current HRME imaging system is also accompanied with automatic image analysis software to distinguish normal and low-grade lesions from high-grade precancerous and cancerous lesions of the cervix.

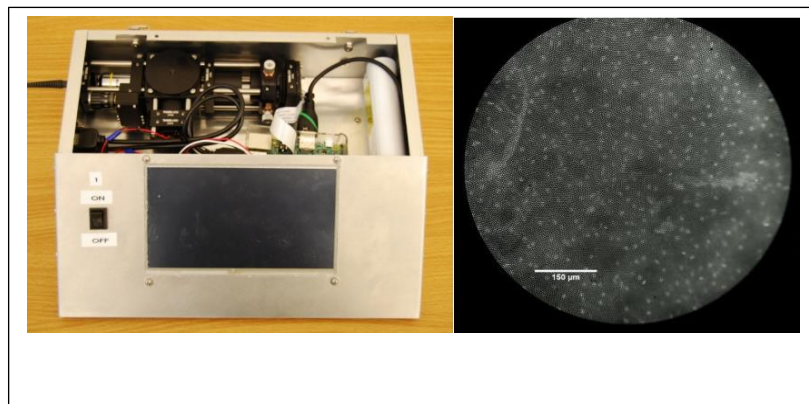


Figure 1 – First generation PiHRME (left) and PiHRME image of the cervix (right).

To increase the accessibility of HRME imaging, we have now developed a lower-cost (~\$1,500) and more portable HRME system based on a single-board computer (PiHRME). Studies have shown that using a Raspberry Pi single-board computer can reduce the cost of HRME imaging without compromising its spatial resolution. Furthermore, the Raspberry Pi can be programmed to wirelessly connect with a central computer to provide automatic image analysis of saved images in real time with the potential of being able to connect multiple units simultaneously. By decreasing the cost of high-resolution imaging, the PiHRME can help to further increase access to cervical cancer screening in underserved areas of the world.

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