**Project Proposal: Cross-Platform Malaria Detection System Using Smartphone Microscopy and Machine Learning Techniques**

**Introduction:** Malaria remains a significant public health challenge in many parts of the world, particularly in Africa. Accurate diagnosis is critical for effective treatment and control of the disease. This project proposes the development of a cross-platform system that leverages smartphone microscopy and machine learning (ML) combined with some deep learning techniques to detect malaria parasites in blood samples. The system aims to provide a cost-effective, accessible, and reliable diagnostic tool suitable for use in resource-limited settings and unskilled individual.

**Objectives:**

* Develop a smartphone-based microscope by attaching lenses to phone camera for high-resolution blood smear images.
* Train a CNN model with OpenCV and TensorFlow to detect malaria parasites.
* Create a cross-platform mobile app for iOS and Android integrating the microscope and ML model.

**Methodology:**

**Machine Learning Model:** Utilize available African datasets covering diverse blood smear conditions. Implement image preprocessing techniques such as contrast adjustment, noise reduction, and normalization to prepare images for analysis. Use convolutional neural networks (CNNs) such as VGG16, ResNet, or MobileNet for the model architecture. Train the model and validate, convert the trained model to a mobile-friendly format using TensorFlow Lite or Core ML.

**Mobile App Development:** Develop a Flutter app with a user-friendly interface, guide for lens attachment, and connect to a Python API to send captures. It then displays if malaria parasites are detected or not.

**Hardware Steup:** Utilize commercially available clip-on microscope lenses with bright lightening such as BLIPS or PNNL Smartphone Microscope to enhance the magnification capability of the smartphone camera for visualizing malaria parasites in blood smears. Leverage smartphone's camera with at least 8MP cameras. A tripod like to stabilize the smartphone during image capture to reduce blurriness and ensure focus.

Use clip-on microscope lens es (e.g., BLIPS, PNNL) with bright lighting and 8MP+ smartphone cameras. Stabilize with a tripod for clear images.