

## Innovative Screening Tool Based on Physical Properties of Blood

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**Abstract :** This work combines two bodies of knowledge which includes biomedical basis of blood stain formation and fluid communities' wisdom that such formation of blood stain depends heavily on physical properties. Moreover biomedical research tells that different patterns in stains of blood are robust indicator of blood donor's health or lack thereof. Based on these valuable insights an innovative screening tool is proposed which can act as an aide in the diagnosis of diseases such Anemia, Hyperlipidaemia, Tuberculosis, Blood cancer, Leukemia, Malaria etc., with enhanced confidence in the proposed analysis. To realize this powerful technique, simple, robust and low-cost micro-fluidic devices, a micro-capillary viscometer and a pendant drop tensiometer are designed and proposed to be fabricated to measure the viscosity, surface tension and wettability of various blood samples. Once prognosis and diagnosis data has been generated, automated linear and nonlinear classifiers have been applied into the automated reasoning and presentation of results. A support vector machine (SVM) classifies data on a linear fashion. Discriminant analysis and nonlinear embedding's are coupled with nonlinear manifold detection in data and detected decisions are made accordingly. In this way, physical properties can be used, using linear and non-linear classification techniques, for screening of various diseases in humans and cattle. Experiments are carried out to validate the physical properties measurement devices. This framework can be further developed towards a real life portable disease screening cum diagnostics tool. Small-scale production of screening cum diagnostic devices is proposed to carry out independent test.

**Keywords :** blood, physical properties, diagnostic, nonlinear, classifier, device, surface tension, viscosity, wettability

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