

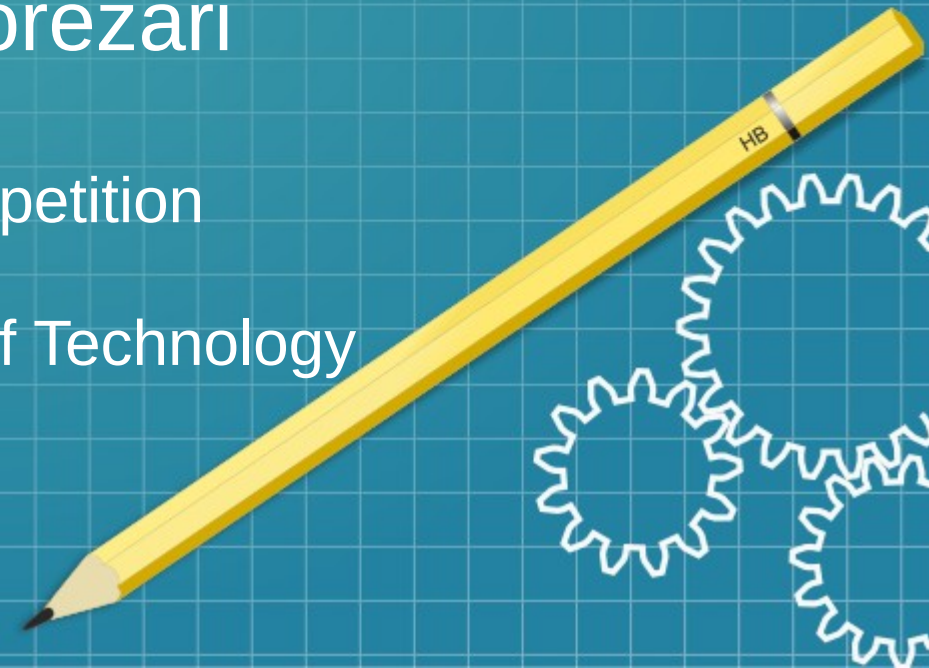


Designing and Constructing Point-of-Care Device

Ali Fele Paranj
Yashar Moradi
Ehsan Shorezari

Plasma Competition

Sharif University of Technology





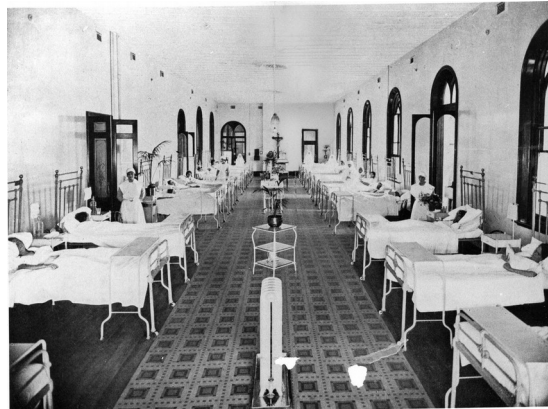
Our Group:

A short Introduction

- Ali Fele Paranj : Physics
- Yashar Moradi : Electronics
- Ehsan Shorezari : Communication Engineering

Why Point-of-Care devices?

- In the past —————> testing was wholly or mostly confined to the medical laboratory

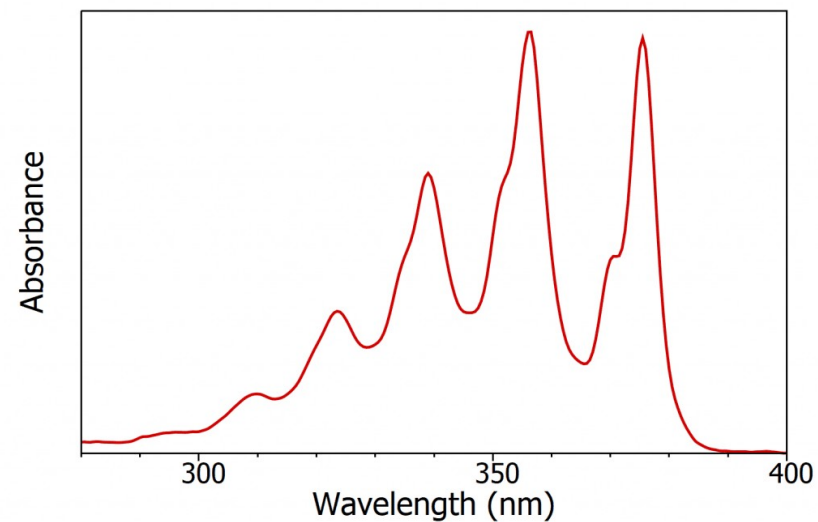
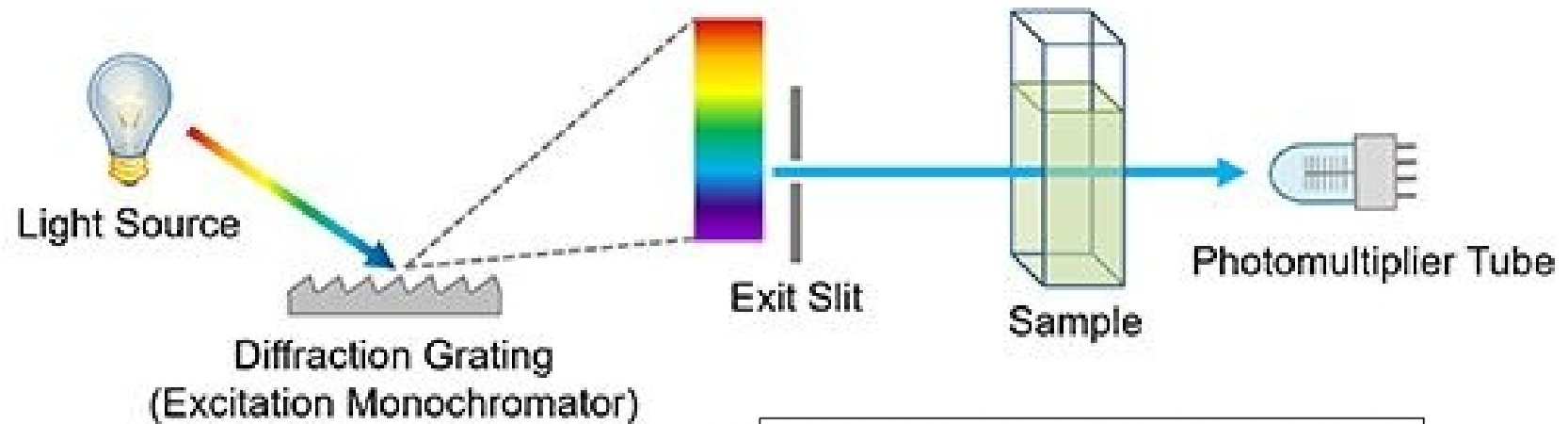


- Nowadays —————> testing at or near the point of care—that is, at the time and place of patient care

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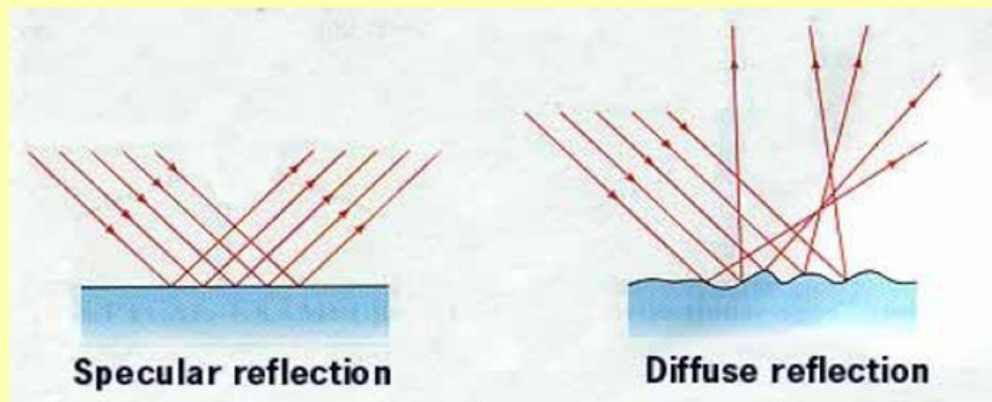
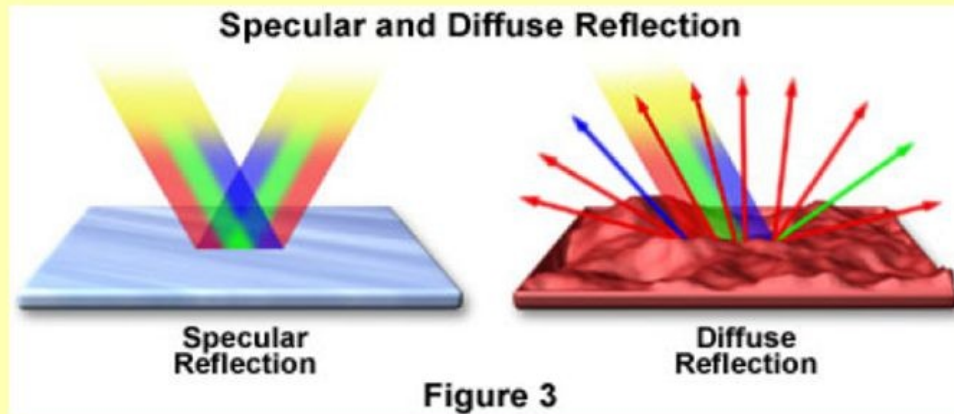


Spectroscopy



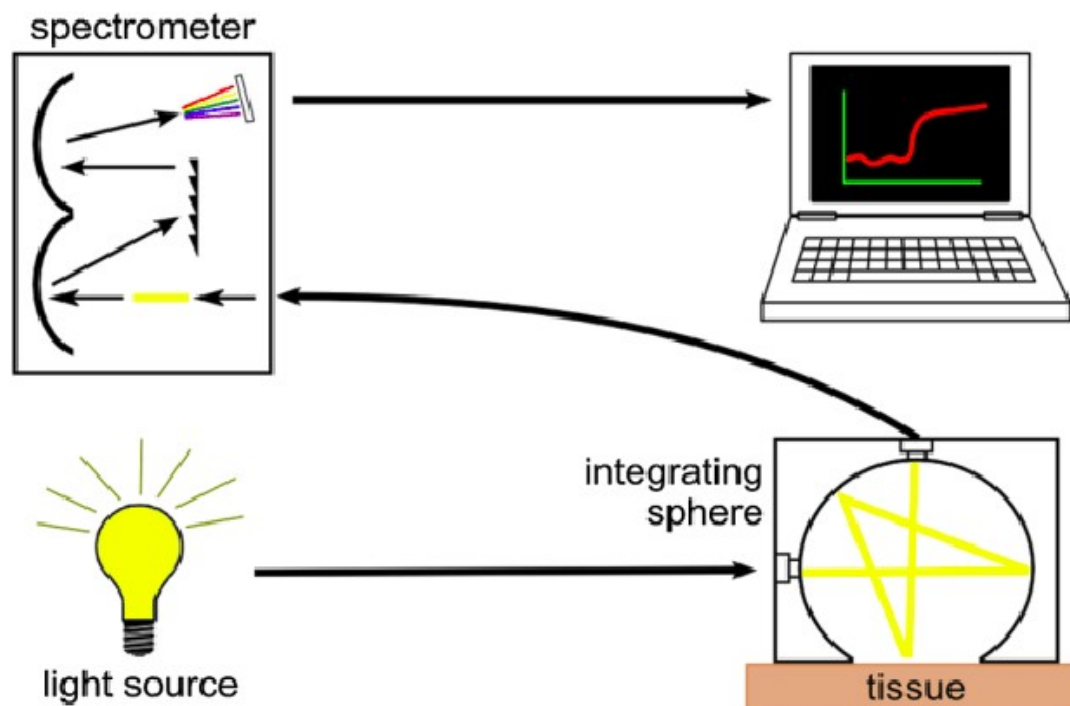
Types of Reflection

Specular vs Diffuse Reflection



Reflectance Spectroscopy

- For Powders
- For little amounts of specimen

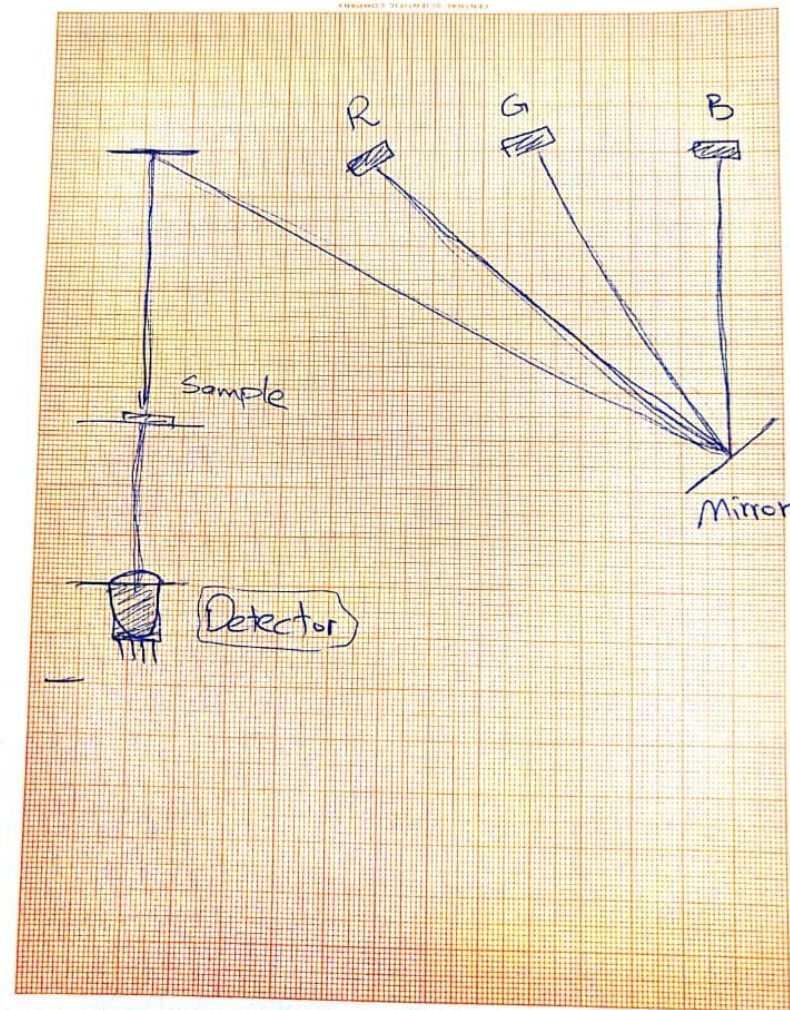


Three approaches

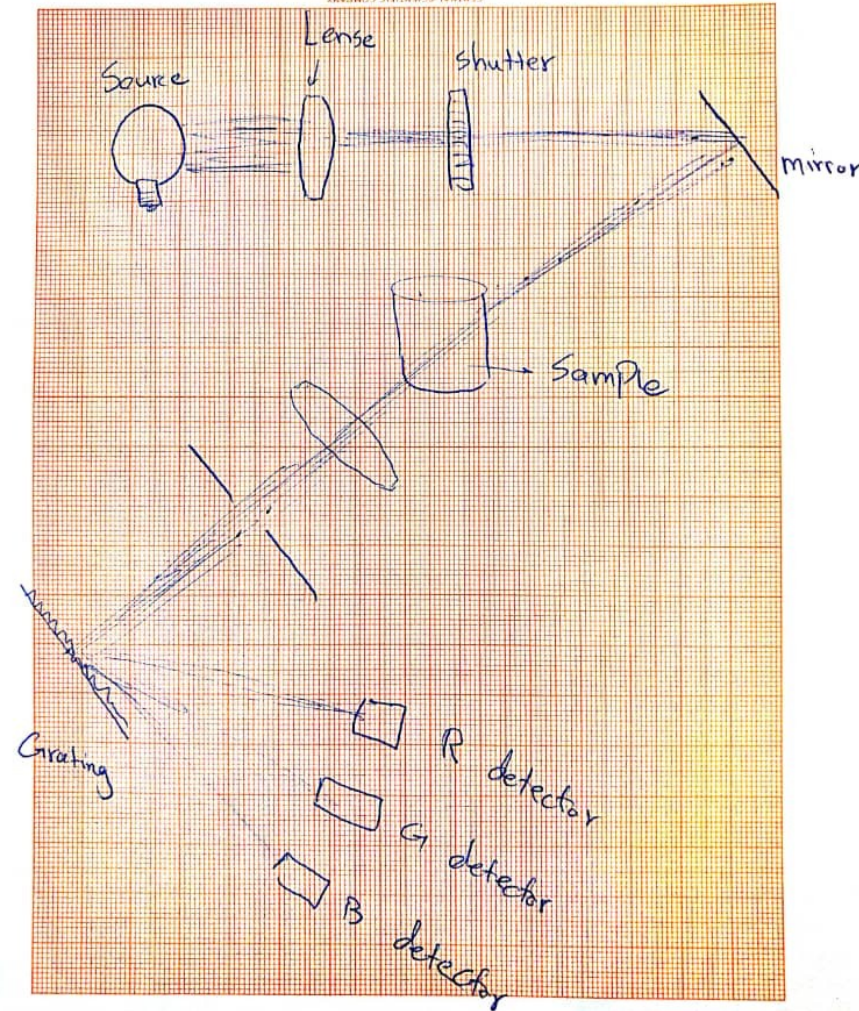
- Three light sources
- One light Source + Diffraction Grating + Mirrors
- One light Source + Diffraction Grating



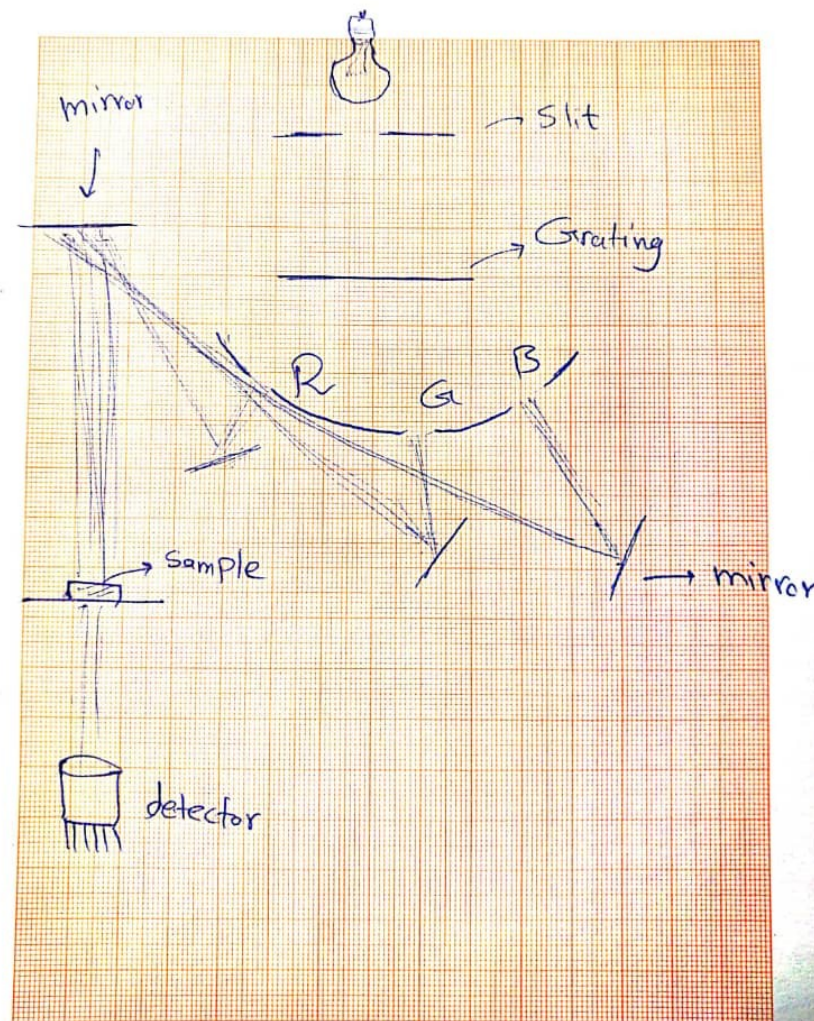
Three light sources



One light Source + Diffraction Grating



One light Source + Diffraction Grating + Mirror



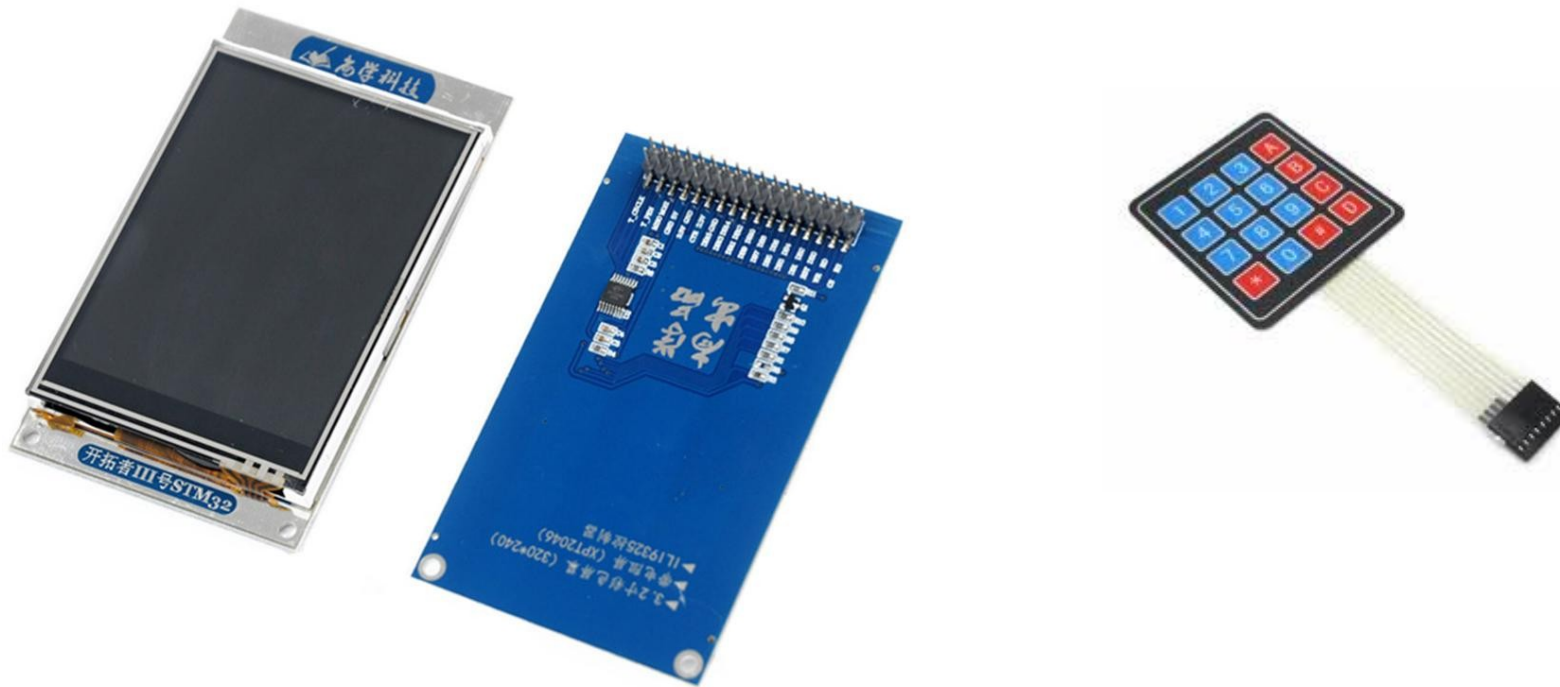
Electronics and Peripherals

- ARM Cortex-m (STM32) as the processor which supports:
 - I2C, UART, SPI
 - ADC
 - LOW power consumption
 - Boot loader



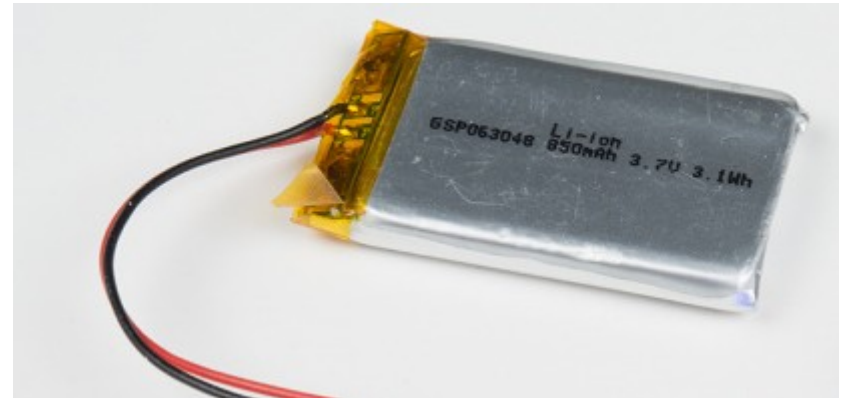
Electronics and Peripherals

- Screen with touch (or may be with keypad)



Electronics and Peripherals

- Battery based
- Can be synced with Smart Phone Via Bluetooth or WIFI.



ANDROID

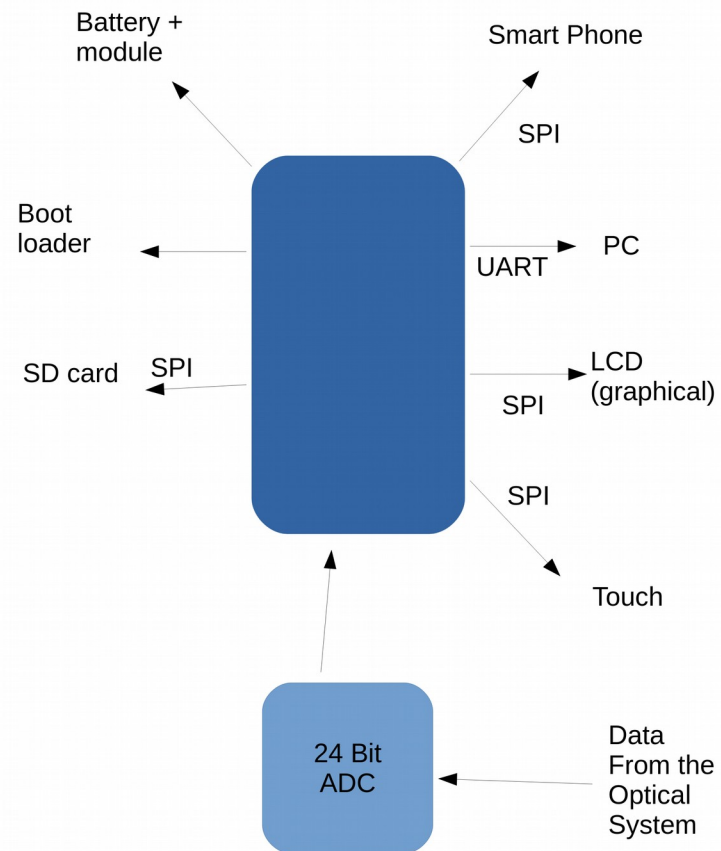
Electronics and Peripherals



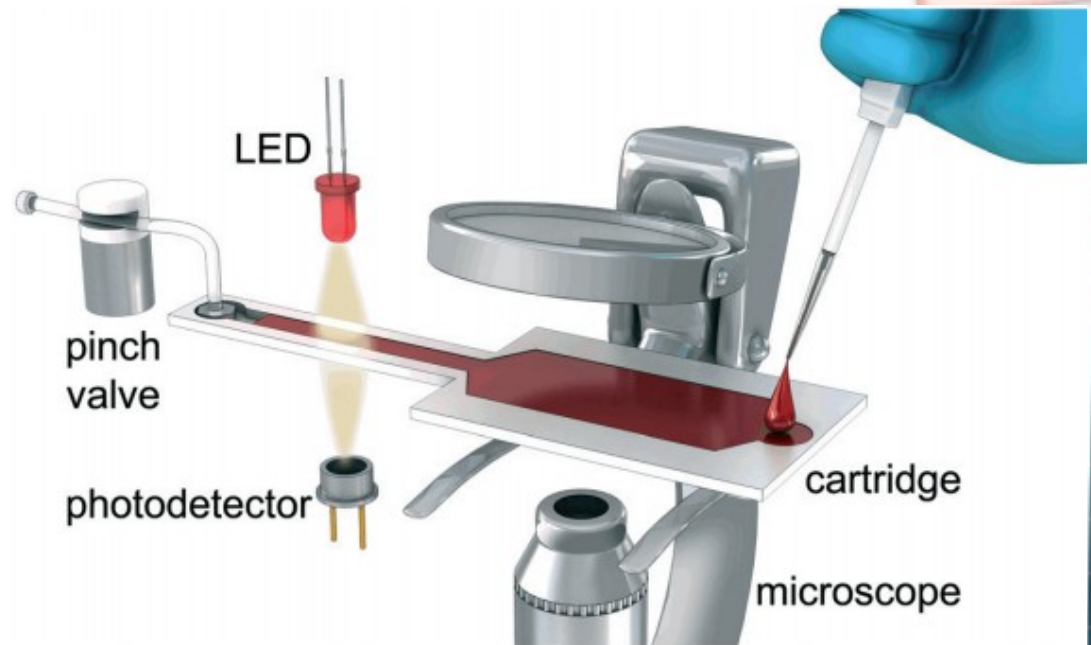
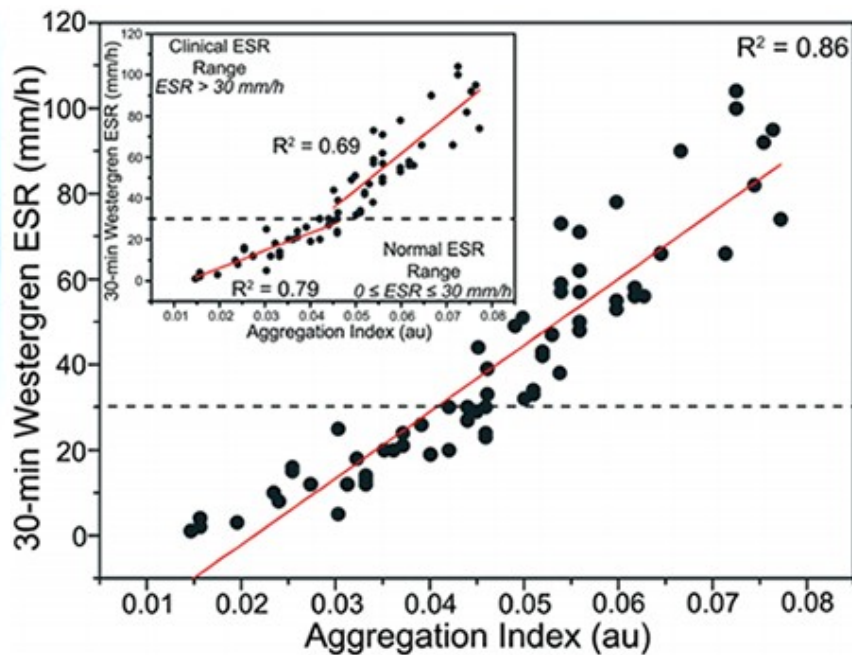
- Saving Data on SD card
- Log data to computer (is still optional)



Peripherals



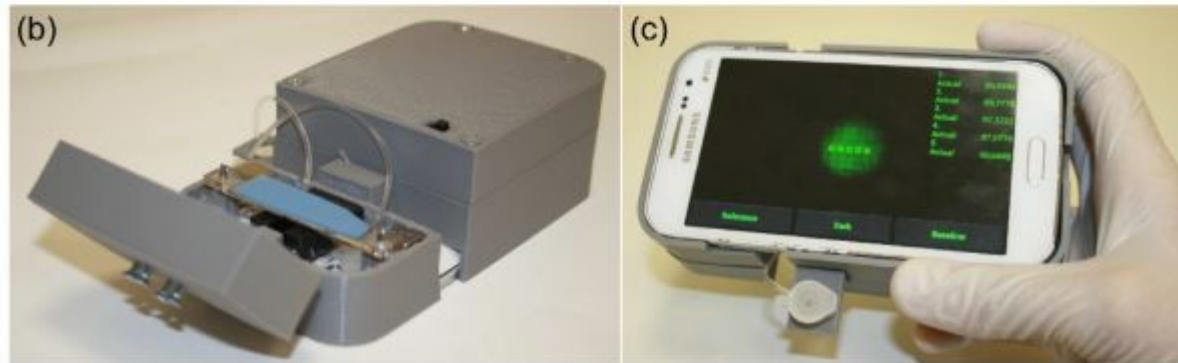
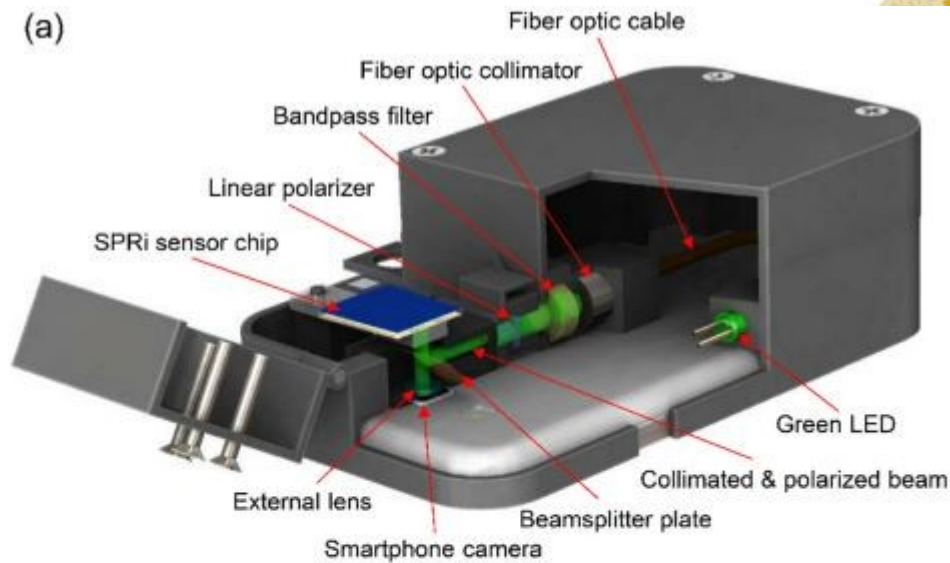
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Portable microfluidic system for rapid measurement of erythrocyte sedimentation rate (Z. Isiksacan et. al. 2016)

We developed a microfluidic system that measures erythrocyte sedimentation rate (ESR) from erythrocyte aggregation using only 40 μl of whole blood in 2 min. The system consists of a disposable single-channel polycarbonate cartridge and a handheld opto-electro-mechanical analyzer. The test cycle starts off by completely disaggregating erythrocytes in the cartridge using a rigorous back and forth fluid motion generated by a solenoid pinch valve. Then, the fluid motion is ceased, and cells start to aggregate. During this aggregation phase, optically transmitted through the cartridge is measured for 1.5 min. Then, the ESR value is calculated using the optical signal change. For experimental verification of the microfluidic system and the measurement method, whole blood samples of 70 patients were tested with our system. The microfluidic system was shown to correlate with the conventional Westergren method with %86 using linear regression. Designing another unique cartridge, we were able to demonstrate the one-to-one correspondence between the aggregation of erythrocytes and the optical transmission signal. This microfluidic system is of high value for ultrafast point-of-care ESR measurement, which requires only a drop of whole blood.

Similar Products



A smartphone based surface plasmon resonance imaging (SPRi) device (H. Guner et. al. 2017)

Similar Products



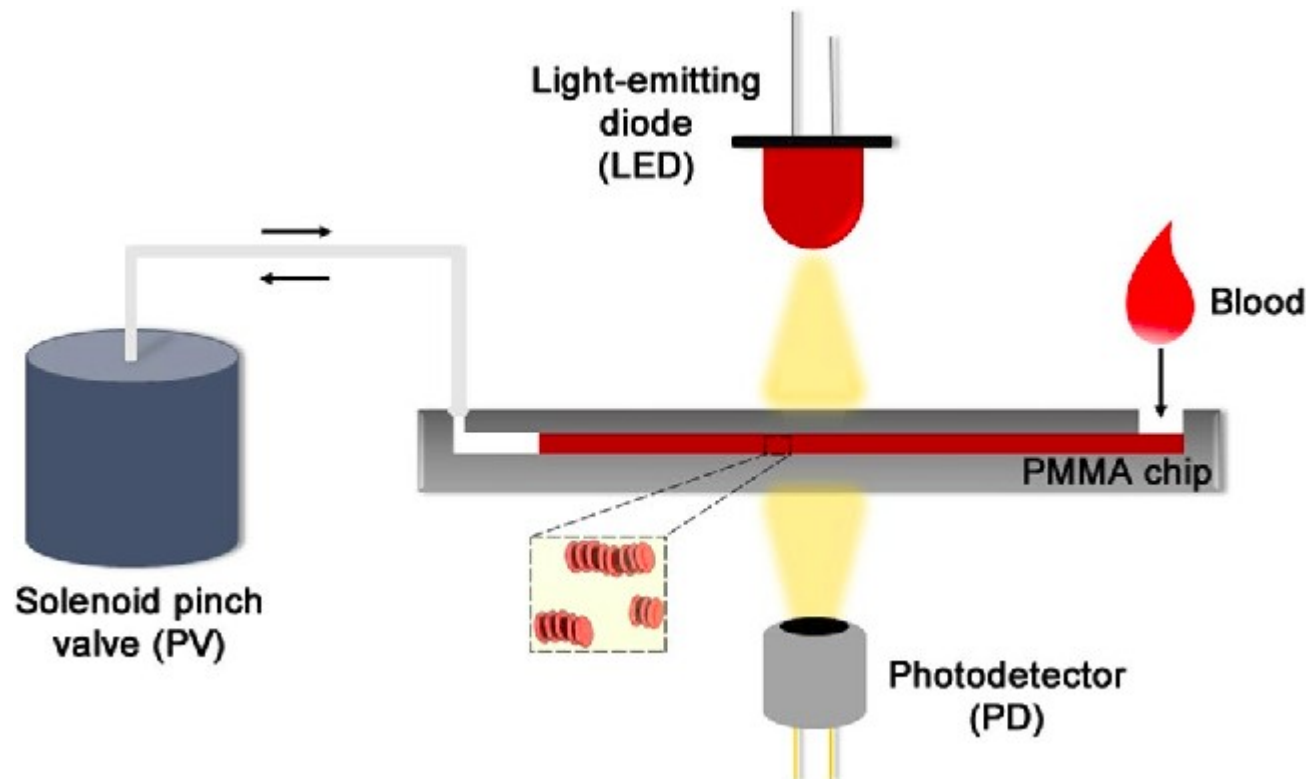
A point-of-care device for newborn jaundice monitoring (unpublished)

Similar Products

Chemistry • Published 2017 • DOI: 10.1007/s10404-017-1878-7

A microfluidic erythrocyte sedimentation rate analyzer using rouleaux formation kinetics

[Ziya Isiksacan](#), [Mohammad Hossein Asghari](#), [Caglar Elbuken](#)

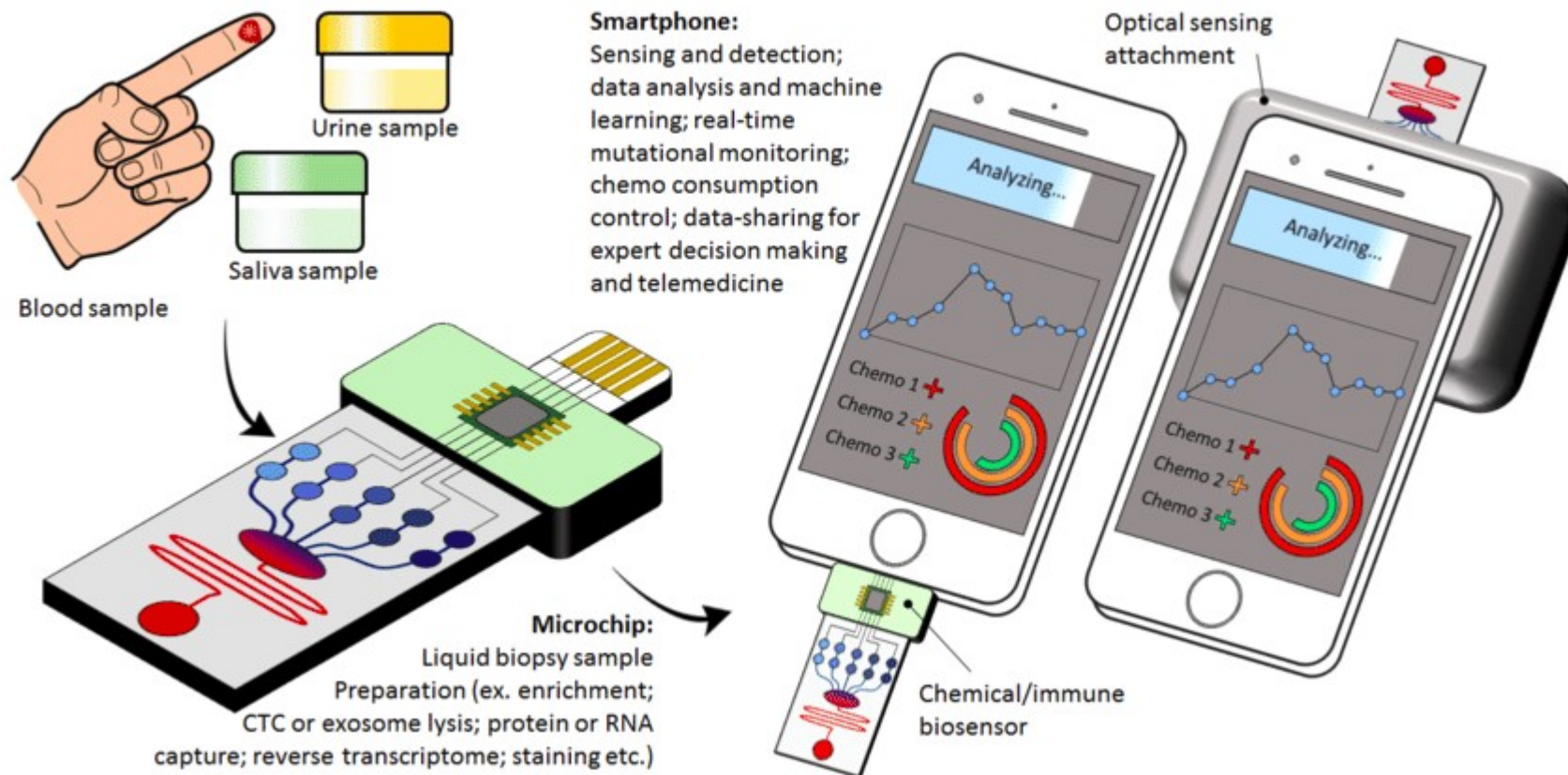


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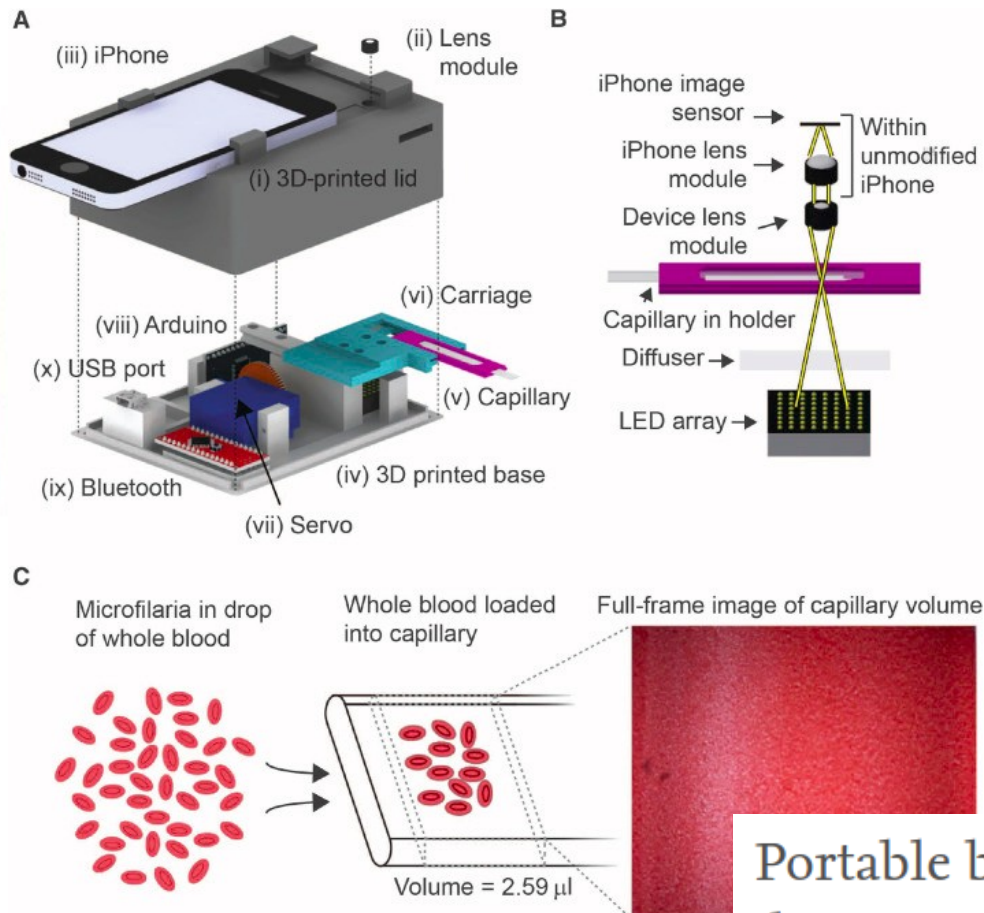
Liquid Biopsies for Management of Pancreatic Cancer

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Mohammad Zarei ✉

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