At a recent conference in Jaipur, Myshkin Ingawale, a Mumbai-based entrepreneur, launched a device called TouchHB which he claims could save millions of innocent lives. Millions of pregnant women and newborn babies die due to misdiagnosis of anaemia. Since anaemia is an easily and cheaply curable disease, lives can be saved by early detection.

Anaemia is one of the most rampant health problems in India and many other developing countries. WHO claims anaemia to be the most prevalent nutritional deficiencies affecting a billion people around the world. Anaemic mothers often give birth to Low Birth Weight babies (LBW); if they turn out to be girls, they end up being anaemic mothers to another round of LBW babies. As a result, the vicious cycle continues.

The sad factor is that anaemia is easily preventable and curable. Early detection and proper treatment can help save millions of lives. The treatment includes administering Iron tablets to pregnant women.

The detection, however, till now needed a blood test. This seems to be a problem in rural India and many other parts of the world. The blood sample needs to be tested on a huge instrument called the coulter counter. This device is quite expensive and needs a specialist technician to operate. The only solution Myshkin Ingawale could think of to prevent deaths caused by anaemia, was to come up with a device simple enough to be operated by ASHA (Accredited Social Health Activist) workers and portable, to be carried around from village to village.

Myshkin Ingawale and his team started brainstorming for an innovative device that would democratise the health care system. The team included some doctors, biomedical engineers, and other professionals. They started experimenting with different technologies that could be used to test blood in a non-invasive manner. They finally stumbled upon a technology, known as photoplethysmography.

Photoplethysmography is a non-invasive, simple and low-cost optical technique used to detect volume changes in the body. In this case, the instrument needed to measure the levels of Haemoglobin (Hb) in blood. To do this, three different wavelengths of light were used, which would measure Hb, oxygen level and pulse rate. The readings are based on the amount of light scattered, absorbed and transmitted. The results are displayed on a small screen attached to the probe.

However, the first protocol the team tried did not work. In fact, they failed 32 times before they finally hit the Eureka moment. The first trial was based on pulse oximeter. The team presented their project at various tech-fests organized around the country. This gave the team the much-needed encouragement as the project received a lot of accolades as well as funds. Those funds were re-invested to improve TouchHB.

The working device is based on a technique called photoplethysmography.
It is a non-invasive method of detecting volume changes in the body, be it air or blood. This technology has been long known to scientists, since 1936 to be precise. The pioneer behind the science of photoplethysmography is Alrick Hertzmann. Hertzmann along with his colleagues at St. Louis University, USA published a paper describing the use of a reflection mode system to measure blood volume changes in the finger. This research threw up several clinical applications based on photoplethysmography.

The device working on the principle of photoplethysmography only needs two components: the light source and a photo detector. The light usually used belongs to the red or near infrared wavelength spectrum. After the light rays do their bit of analysing the blood, the readings from the light diode are displayed on a small screen. The size of the whole unit is about the size of a mobile phone – portable and effective!

The results can also be transferred to a mobile device through an Android application. The team is fine-tuning it further and trying to develop ToucHB software that would transfer data from a mobile device to a web address. This transfer of data could be important in scenarios where doctors may not be present in person.

The technology is utilized in many commercially available medical devices such as pulse oximeter, vascular diagnostics and digital beat-to-beat blood pressure measurement system. It is being used for detection of various vascular diseases. One of the working examples includes measurement of efficiency of musculovenous pump of lower leg. The device measures changes in skin blood volume using a small light probe placed above the ankle. The severity and nature of venous problems can be detected. It serves as a quick, non-invasive, painless test performed at vascular outpatient clinics.

The project is gaining enough attention from sponsors not just in India but around the world too. The first funding received was from the Centre for Innovation, Incubation and Entrepreneurship (CIIE) of IIM Ahmedabad. The government was next in line to provide more funds to support the budding research. The team also received a whopping aid from Echoing Green Fellowship, New York, USA.

Currently, one death per minute is caused by anaemia in India. It is also the number one killer in parts of Africa. WHO has been trying to find a solution. In 1995, they came up with a Haemoglobin Colour Scan; it compared blood samples against a printed catalogue. But the efficacy of these tests was questionable. The readings depend upon various factors that could be easily ignored resulting in reduced efficacy. ToucHB, on the other hand, has 99% accuracy.

Researchers in Mali are also trying to control deaths of their citizen due to lack of iron. Mohamed Ali Niang and his brothers are trying to develop fortified rice. This grain will be Iron-rich, nutritious, grown locally, and the cost will be the same as the normal rice. With this food product, they are hoping to at least reduce the malnutrition problem in their country.

Mohamed and Myshkin Ingawale have now partnered to fight against the evil anaemia. Myshkin’s device will test patients for Haemoglobin count and help in providing proper and timely treatment while Mohamed’s rice will cure the Iron deficiency. Mohamed is using Myshkin’s device in Mali while Myshkin is using Mohammed’s rice in India.

WHO has released a world map providing information about anaemia-stricken patients. The hot spots can be seen in South Asia and Africa. Myshkin and his team are gearing up to completely erase those spots by the year 2020 using ToucHB. They plan to sell the instrument to all clinics. The device being so easy to use and portable, detection of anaemia or haemoglobin level would become as easy as measuring Blood Pressure.

The device is battery operated. The cost of a single device is around $6000-$13000 and the probe can be used for approximately 10,000 tests. The only part that needs to be replaced is the probe, the rest of the device has life-long guarantee and is in no need of any sort of maintenance.

Currently, one death per minute is caused by anaemia in India. It is also the number one killer in parts of Africa.

Contributed by Ms Samiya Fatima, c/o Mr Badruddin Khan, H.No.16-2-55, Akbar Bagh, Hyderabad-500036