



**Centre for Innovation in Medical
Electronics(CIME),**

BMS College of Engineering, Bangalore

OBJECTIVE:

CIME has been set up with the objective of creating a **FORUM FOR INDUSTRY, INSTITUTION AND HOSPITALS** to **WORK TOGETHER** for **DEVELOPING AFFORDABLE INNOVATIVE HEALTHCARE DEVICES** and Encouraging Faculty/Student **RESEARCH DRIVEN ENTREPRENEURSHIP.**

GOALS:

- **Identify, Build & Nurture the Entrepreneurial Spirit within The Student and Faculty Community.**
- **Build Partnerships with Universities/Industries/VC Community to create a platform for collaboration on Technological/ Clinical/ Funding Aspects.**
- **Help successful Incubates to raise funds for their Ventures by working with Local & National venture capital firms and National/ International Government funding Agencies (DST, DBT, TEPP, DRDO Etc.)**

Inauguration of CIME

It was an auspicious day on **03-02-2015** that the **Department of Medical Electronics** inaugurated the most awaited “**Center for Innovation in Medical Electronics(CIME)**”



The chief guests for the promising event were **Dr. P Dayananda Pai**, Hon'ble Chairman & Trustee, B. M. S. College of Engineering and **Dr. Purna Prasad**, Director, Clinical Technology & Biomedical Engineering Information Technology, **Stanford University** Medical Center, CA, USA.

The presence of **Dr. Kayala Mallikharjuna Babu**, Principal, BMSCE, **Dr. G N Sekhar**, Vice Principal, BMSCE, **Dr. Gundu Rao**, University of Mennesota, **Prof Veena Vijayendra**, Stanford University, **Dr. Shyam Vasudevarao**, Maastricht University, **Dr. Luk Dewite**, Maastricht University, **Dr. Lloyd Vincent**, Narayana Hrudayalaya enriched the occasion multidimensionally.



The event was a motivation and fascinated the students and industries to use the facilities of CIME, BMSCE. The students will also get an opportunity to work closely with the industry as interns.

The ultimate goal of the centre is to get the students on board as Incubates.

The CIME driving committee members are

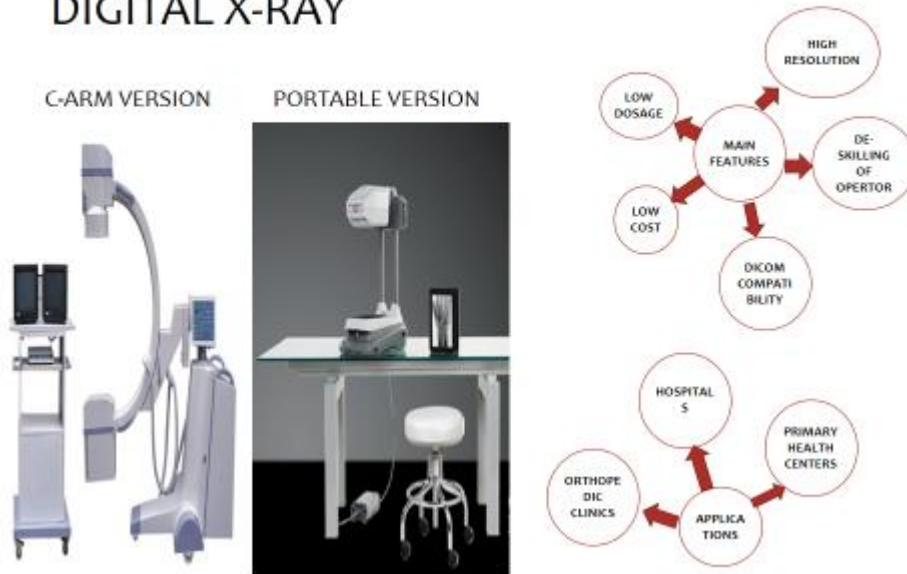
- Dr Shyam Vasudeva Rao
- Dr Gundu Rao
- Dr H N Suma
- Shailendra Rao Nalige
- Abhishek Appaji M

The core activities to be undertaken were proposed as:

- To layout a Grants office.
- To setup medical device laboratory.
- To setup an incubation centre.
- To structure a patent centre.
- To start an academy for clinical engineering , and
- To conduct various National/International Conferences/ Workshops.

BRIEF DESCRIPTION OF PROJECTS UNDER INCUBATION

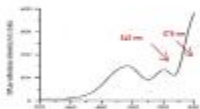
DIGITAL X-RAY



ORAL CANCER SCREENING DEVICE

DETECTION PRINCIPLE

DIFFUSE REFLECTANCE SPECTROSCOPY



Dysregulated hemoglobin absorption spectra

□ DR is due to multiple backscattering of the white light.

□ DR light intensity depends on tissue morphology (nuclear size distribution, vascularity, epithelial thickness and collagen content) and the amount of oxy- and deoxy-hemoglobin in blood.

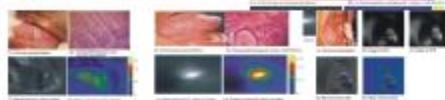
□ During tissue transformation towards malignancy, tissue morphology as well as composition gets altered.

MULTI-MODAL DR IMAGING INTRA-ORAL CAMERA



DR IMAGE GUIDED BIOPSY

Pseudo Color Map of the dysregulated hemoglobin absorption malignant site in a lesion for biopsy



Speckled white patch on left lateral tongue identified as dysplasia

Right lateral border of tongue with well differentiated SCC

VALUE PROPOSITION

- A low cost device for mass screening and frequent check-ups without any discomfort or health risk to patients
- A comprehensive solution for oral cancer, gingival inflammation and dental screening based on combined diffuse reflectance and fluorescence imaging
- Compact and portability enables usage in clinical and non-clinical environments
- Capable to gear sections of society so device can be used by health workers in PHCs & mass screening camps

BENEFITS



PATENTS

- Sakshik N, and Terenti T L, "A Multi-Spectral Diffuse Reflectance Imaging System for Diagnosis of Oral Cavity Cancer", Patent Appl. No. 2019-CR-2011, Filed on 21.08.2019
- Sakshik N, Rajagopal J, Sakila, Shrey S, Thomas, Anika Mathew, Pooj Sebastian and Jayaprakash Madhavan, "A low-cost device for detecting spectroscopic changes in tissue", Patent Appl. No. 2019-CR-2018, Filed on 20.10.2019, Publication date 14.12.2021

HEALTH NO 1 PROBLEM
10.4 MIL ARE DUE TO VESTIBULAR DISORDERS

VERTIGO & BALANCE DISORDERS
 HALF OF ALL CASES OF DIZZINESS

50% UNDETECTED
3-5% VISITING COST
\$ 54 B

THE CONDITION IS GROSSLY UNDER DIAGNOSED IN MOST OF THE WORKERS

FROM CASES → LOW COST → BAD POSTURE → BUSY SCHEDULE

TO ADDRESS THESE ISSUES WE ARE CREATING A LOW COST, INTEGRATED, FEATURE RICH BALANCE ASSESSMENT TOOL

Which is sleek, robust, accurate, easy to use and capable to integrate tests in a simple device. Works on the principles of eye and head tracking.

Science Behind It

- Vestibular disorders are highly prevalent in modern systems.
- The vestibular system has direct connections to motor control systems.
- Sleeplessness, all-day work, sedentary lifestyle, poor ergonomics, prolonged screen time, etc.
- Each study indicates an eye movement disorder is associated to vestibular system.

Technology Driving It

- Eye Tracking Technology used to capture high frequency eye-movements, saccades, fixations, etc.
- Integrated inertial sensor tracking and image tracking.
- Software capable of detecting and analyzing abnormal eye-tracking.
- Results are calculated in the form of color-coded graphs and reports.

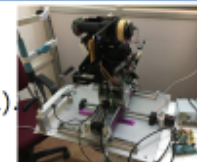
Cyclops MedTech is a Bangalore, India based company focused on creating highly innovative and cost effective medical technology and medical devices.

INTERNATIONAL CONSULTANCY PROJECT AT CIME

Smart Eye KIOSK for Community Screening (SEK-C)

Project Description:

- > Non mydriatic, fully automated eye screening device.
- > Detection of reversible causes of blindness like Cataract, Glaucoma, Age-related Macular Degeneration (AMD) and Diabetic Retinopathy(DR)
- > Short Examination Time
- > Applications – Shopping mall, Airports, Bus stands.



KIOSK

Inter pupillary distance (IPD) calculation

Refraction measurement

Anterior Imaging



Posterior imaging



70.000 Euros (50 Lakh INR)

Investigators: Abhishek Appaji, Dr H N Suma
Sponsored by - Ng Teng Fong Healthcare Innovation Program
Collaborators - Dr. Rupesh Agrawal, TTSH
 Prof. Tjin Swee Chau, NTU
Advisor - Dr. Shyam Vasudeva Rao
RAs: Vijayashri.B.Nagavi, Dr Bharath Hegde, Uma Shankar



EXPECTED OUTCOMES FROM PROJECTS INCUBATED AT CIME

- The projects getting incubated at CIME are expected to mature into a viable Business Enterprise at the end of the Incubation period.
- The final outcome will also depend on the type/stage of Project taken up for Incubation, like
- **Proof of Concept/Prototype Development** – It is expected that they will graduate from the Incubation centre with a VC/Public funding for commercialization of their product.
- **Final Product Development** – Successful launching of the product into the market.

OUTCOMES AT THE END OF THREE OF PROJECTS INCUBATED AT CIME

1. DIGITAL X-RAY:

- Incubate: Appaji M Abhishek
- Funding: DST-IDP, amount 59.14 lakh
- Industry Partner: EHE, Bangalore
- Status:
 - i. Prototype ready
 - ii. Final Project report submitted to DST

2. OCSD – Oral Cancer Screening Device

- Incubate: Dr Subhash Narayan, Sascan, Bangalore
- Funding: BIRAC-50 lakh, Elevate Karnataka-50 lakh and Vilgrow-50 lakh
- Status:
 - i. Company formed – SASCAN
 - ii. One PG student interned with stipend. She was absorbed into the company as an employee
 - iii. Graduated from CIME by paying 6% stake to BMSCE

3. Vertigo – Balance Disorder Detection device

- Incubate: Dr D R Srinivas, Cyclops, Bangalore
- Funding: BIRAC- 50 lakh, VC-6 crore

- Status: Out in the market with around 96 installations
- The incubating time was around 8 months. Two PG students were involved in the project with stipend

OUTCOME OF THE CONSULTANCY PROJECTS DONE AT CIME

Smart Eye Kiosk for Community screening (SEKC)

- i. Funding: Ng Teng Fong Healthcare Innovation Programme (NTF HIP), Singapore-33 lakh
- ii. Status: Prototype shipped to TTSH, Singapore.
- iii. The last installment of the project was considered as Consultancy amount and 40% was paid to CII-TDB-TNET Centre, BMSCE.

OTHER ACTIVITIES AT CIME

b-eCare 2015 - INTERNATIONAL CONFERENCE ON PREVENTIVE AND PREDICTIVE HEALTHCARE TECHNOLOGIES

July 26th, 27th and 28th, Bangalore, India

The conference was inaugurated by U T Khader, Hon'ble Minister of Health and Family Welfare, Government of Karnataka.





Pre-Conference Workshops:

- **Enabling Ability in Disability through Standards & Technology**
- **Digital Health Training and Certification**



- **MedTech Innovation – Bench to Bed side:**



- **In Vivo Assessment of Retinal Vessel Oxygen Saturation - Future Landscape**



Distinguished Speakers:

- **Keynote Address (Digital Helathcare Revolution):** The day began with a keynote address presented by Dr. Daniel G Miller, President & CEO, Excorp Medical Inc., Minneapolis, USA.



- **Preventive Healthcare Clinical Evidence Models:** Dr. Kris Vijay, Medical Director, Cardiovascular Division of the Scattsdale Clinical Research Institute, Scottsdale Healthcare, USA



- **Research and Clinical Tools for Preventive and Predictive Healthcare:** Dr. K N Bhanuprakash, Research Scientist, Laboratory of Metabolic Imaging, SBIC, A*Star, Singapore
- **Home Health and Connected Patients:** Prof. Gundu Rao, University of Minnesota Medical School, University of Minnesota, USA



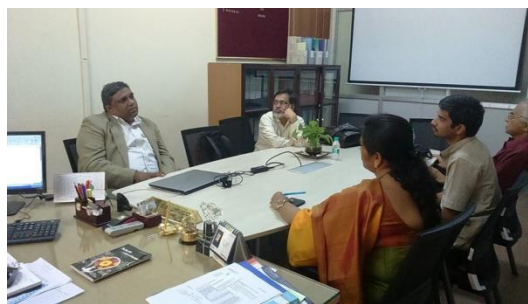
Visitors to Centre for Innovation in Medical Electronics (CIME).

Dr. Lazar Mathew, a distinguished visitor, witnessed the centre on 8th Feb 2015. The interactive session was well informed and inspiring. He reviewed the projects undertaken by incubates and encouraged to apply for various funding from government agencies.



On 11th Feb 2015, **Dr. Surya Raghu**, ET Cube (ET3) International Advanced Fluidics LLC, Maryland, USA and discussed the possible collaboration with CIME by contributing his mentorship.

On 11th Feb 2015, **Dr. Srihari Boregowda**, Chief Business Architect, Sharp Software Development India Pvt Ltd, Bangalore visited CIME, BMSCE and gave the inputs for extension of the projects and use cases of the products to be developed by the Incubates.



The third event on 11th Feb 2015 was a special lecture on "Emerging Trends in Medical Devices" delivered by **Dr. Gundu H R Rao**, University of Minnesota, USA. The lecture was comprehensively informative. He shared his experience in the field of bio engineering and biomedical engineering especially Non-invasive blood glucose measurement. He also gave an insight of few case studies and success stories in the domain of Medical Devices.



Mr. Navin Govind, Aventyn, Sweden visited CIME, BMSCE on 12th Feb 2015 who whole heartedly agreed to collaborate and spoke about the joint conference to be organized in July 2015 on Preventive and Predictive Healthcare Technologies ICPHHT2015.



Dr. K N Bhanuprakash, Scientist, A-STAR, Singapore visited CIME, BMSCE on 13th Feb 2015. An interesting talk was delivered by him, which was not only interactive, but also enlightening about the various image processing aspects in CT/MRI domain. He further discussed with the centre about each projects undertaken by incubates and suggested how it can help the students to enhance the skills and knowledge by implementing a part of each products to make into reality. He discussed the teething problems to be encountered by each incubates technically and also the managerial aspects/responsibility to be driven by the centre.

