

# SHRI G.S. INSTITUTE OF TECHNOLOGY & SCIENCE

(An Autonomous Institute Established in 1952)

## Department of Biomedical Engineering



### Internship Report

Batch 2017 -2021

Name of Student: SURYANSH SHUKLA

Class: Third Year (V sem), Biomedical Engineering

Roll No.: 0801BM171053

<b>Department Vision</b>
To contribute for teaching excellence to generate human resource to cater the needs of industries and hospitals for affordable healthcare through research and innovation.
<b>Department Mission</b>
To bridge the engineering, science and healthcare sectors for indigenous development and to impart community services for mass healthcare through continuous research.

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Awarded Grades:

(Signature)

HoD /Placement and Internship Coordinator

*[Please put photocopy of internship certificate here]*

## **Acknowledgement**

I would like to express my sincere thanks and gratitude to Greater Kailash Hospital, NABH Indore M.P. for allowing me to complete our training in the facility.

The structure and content of this report have been deeply influenced by many people for whom I wish to express my gratitude.

I sincerely thank Dr. Radhika Bandi (Managing Director) and Dr. Anil Bandi (Medical Director) for giving me the opportunity to complete my training at Greater Kailash Hospital NABH Indore.

I want to express my gratitude to Dr. Pallavi Sharma and Mr. Chandra Kant Patil for providing me the opportunity to undertake this training of one-month duration.

I would like to express my gratitude to Dr. B.R Rawal, Head of department and Mrs. Avni Majawdia. Assistant Professor, SGSITS Indore for their support and guidance at every stage of our study.

I gratefully acknowledge the financial support provided by TEQIP - III, without which this internship is not possible.

Name Suryansh Shukla

Enroll. No. 0801BM171053

## **Description of Internship Centre**

*[Brief description of place of internship, details of contact person]*

Greater Kailash hospital was first started in 1977 by Dr. Jagadish Chandra Singh and Dr. Kusum Singh in the memory of Dr. Kailash Singh, an exemplary surgeon, and gynaecologist. The hospital has grown since in the year 2005 and now Dr. Anil Bandi and Dr. Radhika Bandi developed it as a multi-specialty hospital. A humble beginning was started to the township to cater to the medical needs of the people. Their untiring effort and self-service receive overwhelming encouragement and was widely appreciated. This resulted in a 150 bed super specialty hospital with over 25 specialties providing critical care round the clock. It has gained considerable recognition in 3 decades of time. Greater Kailash Hospital Pvt. Ltd. brings together the most talented medical professionals from all over the country to work in a healthy environment and providing state of the art technology. It aims to provide world-class healthcare and stay at the forefront of medical technology and techniques. It's their mission to provide the most complete and advanced healthcare under one roof. They strive to deliver excellent nursing services so that each patient receives the best medical care and yet ensure that it is affordable to everyone lies at the root of their philosophy at Greater Kailash Hospital. Vision of GKH is to make their institution a principal referral centre for all super specialty for disease for which patients had to travel to other cities until now.

Services available at Greater Kailash Hospital are Blood bank, bone marrow transplant, cardiac surgery, dermatology, dental, ENT, eye surgery and retina centre, gastroenterology, hair transplant and cosmetic surgery, infertility department, kidney transplant, nephrology and dialysis, neurosurgery and neurology, orthopaedics, oncology, plastic surgery, physiotherapy, pathology, pulmonology, psychiatry, paediatric orthopaedics,

radiology and imaging services, urology, dietetics and nutrition, ENT, endocrinology and diabetes, and joint replacement centre.

Greater Kailash Hospital is situated in a prime location of Old Palasia, Indore. It is one of the most advanced hospitals in MP. We have 3 decades of experience in the medical sector providing quality healthcare under the valuable guidance of highly experienced medical professionals. Ever since our inception, we have provided relief to millions of patients.

I was guided by Dr. Pallavi Sharma and Mr. Chandra Kant Patil at Greater Kailash Hospital during my internship. Dr. Sharma is admin head and Mr. Patil is Biomedical Engineer at Greater Kailash Hospital, Indore. We can reach Dr. Sharma through email [09pallavisharma@gmail.com](mailto:09pallavisharma@gmail.com) and by phone +91 79-74386928 and Mr. Patil with phone no. 98-93074662. Both the person are very humble and ready to help at any point of difficulty.

## **Training Outcomes/Outputs**

*[Learning, technology/skill acquired]*

Most important instrument in hospital is stethoscope. It consists of a hollow tube, ear piece and a flat disc. This device works on the principle of acoustics, and is used to listen to body sounds (lung and heart sounds). Nowadays two types of stethoscope are available- digital and acoustic. Other most commonly used devices in hospital are Ventilator, Defibrillator, Infusion pump, patient monitor, sphygmomanometer and Glucometer. Frequently used instruments in OR are cautery machine, OR table, OR lights or surgical light, HEPA filter, Heart lung machine, Anaesthesia machine, Operating microscope, C- Arm, insufflator, patient monitor.

Cautery machine burns a part of a body in attempt to mitigate bleeding. Without cautery machine surgery is impossible. Cautery machine uses high frequency alternating current to biological tissue in order to coagulate or cut the tissue. HEPA filter is 3 micron filter, used to filter air inside OR. Heart lung machine is used to bypass the function of heart and lungs when performing heart or lung surgery. Anaesthesia machine serves the purpose of ventilator and anaesthesia simultaneously. It has open circuit and closed circuit. It works on the basic technology of vaporisation. C- Arm is a simple X ray machine which is having a C like shape. It is most commonly used in cathlab.

Major diagnostic equipment involves MRI, CT, Ultrasound, Echo, ECG, EMG, EEG and Endoscopy. MRI is not available in Greater Kailash Hospital, Indore. CT scan or Computed Tomography is an advanced form of X ray. This machine is available in 16, 32, 64 and 256 and 320 slices. It is mainly used for tumour detection, finding site of hematoma and other imaging purposes. MRI is used when we have to see soft tissues, like nerves. Echo and ultrasound use the basic principle of sound-wave reflection and measuring the time required for travelling sound wave from source to detector. Different probes are used in echo and ultrasound, but most commonly 3s probe is used for adult and 7s probe is used for paediatric. Ultrasound is the intact way of diagnosis. Echo is used to get image of heart while ultrasound for abdomen, pelvic organ, muscles etc.

O<sub>2</sub> Supply is required everywhere, i.e. in OR, ICU, General Ward etc. So O<sub>2</sub> flow meter is used with Ambu Mask for supplying Oxygen to patient.

There is a difference in medical devices used for NewNatal, Paediatric and Adult. Like Dash 4000 monitor is used for NewNatal and Dash 2000 is used for Adult. Similarly for ventilator, High frequency ventilator is used only for NewNatal and ventilators with different modes are used for adult and paediatric.



For pathology most important device is blood gas analyser, it is used to measure blood gas ( $\text{CO}_2$ ,  $\text{O}_2$ ), pH, electrolytes( $\text{Na}^+$ ,  $\text{K}^+$ , carbonates and bicarbonates) and some metabolites( $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ , glucose and lactose). In many hospital this device is placed in ICU for regular monitor of blood sample of patient. Many other devices are used in pathology like VIDAS PC immunoanalyzer which is used for detecting immunochemistry, Dry chemistry analyser is used for diagnosis of metabolic disease(Heart disease, type II diabetes, stroke), Centrifugation machine is used for separating differently weight liquids like RBC from plasma.

Most frequently used service in hospital is dialysis. There are two types of dialysis Peritoneal dialysis and Haemodialysis. In Haemodialysis a machine is used which purifies the blood, two incision is made one is to remove the blood and send it to dialyzer and other incision for returning the filtered blood back to body. Whereas in peritoneal dialysis, filtration of blood is done using lining of abdomen.

Patient monitors( Dash 2000 and Dash 4000) displays respiration rate, body temperature, heart rate,  $\text{SPO}_2$  level(Oxygen saturation), ECG with and without pacemaker pulse, Invasive and non invasive blood pressure. It displays result in LCD screen. Dash 2000 is having MPC 821 32 bit micro-controller and 24MHz microprocessor with 4MB of flash memory and 4MB DRAM. Ni-Cd battery of 12V is present inside dash 2000 which provides backup upto 1.5h. It consumes 16W power as normal and 45W for fast charging.

I acquired the skill of how to bridge the gap between engineering and medicine. As during internship there are many instances to talk to doctor and technician, so I get the little bit of understanding of how to explain technology to Doctors.

## Future Avenues

*[Project ideas, Collaborative project scope etc.]*

*Page Limit: 2*

### *Problems*

Doctors use differential diagnosis methods for diagnosis of disease. Some of the doctor use this method on each and every patient and they have a great diagnosis but in rural areas very few doctors use this method for diagnosis. With my own experience doctor misdiagnosed heart problem with malaria and jaundice for cancer.

Second track of future development in biomedical can be LOP (Lab-on-a-chip). This is the simple concept which miniaturises several laboratory system on a single small chip. LOP is currently on clinical trial by dutch healthcare for measuring blood gas, HIV cell count, blood glucose and cholesterol.

Third avenue can be moving forward to non invasive techniques. It is most commonly seen in ICT or cancer patient that they need regular blood test and drug delivery through needle. Needle insertion is scary and painful. With invasive methods chances of infection are much greater.

Forth future avenue can be development of ultrasound to much greater extent. Scans like CT and MRI are excellent for taking images inside the body but CT is having problem of radiation and MRI machine can become monster if any metal piece came near MRI while running, also MRI is not suitable for patient with implants. While ultrasound is free from radiation and don't have any life threatening effect like MRI.

Surface diagnosis. If a patient whose whole body is burnout in fire, then it becomes very difficult to put any surface electrode. Therefore it becomes very difficult to even take ECG of that patient.

### *Project ideas*

*There can be infinite ideas for biomedical innovation. Some of the ideas for solving problems given above are - F*

1. Diagnostic Robot are designed during the boom of AI in 1970 for automatic diagnosis of disease. IBC developed Watson Software system as first commercial application for utilisation management decision in lung cancer treatment at Memorial Sloan Kettering cancer center. This idea can be expanded for common day to day disease like cold, viral and other common disease. So a project can consist of a software driven by ML algorithms which can be use in

day to day diagnosis for doctor. No technology can replace doctor, so this type of software or system can only serve as an assistant during diagnosis.

2. Inserting needle many times is not only painful for patient but sometimes patient gets frustrated with treatment, especially from needles. Non invasive diagnosis not only give comfort to patient but chances of infections can be reduced, cost'll be lowered, real time diagnosis may be possible (like Patient monitor for ECG and SPO2).

3. Ultrasound is the best technology for imaging as it is the safest ,cheap and portable imaging device. If ultrasound will be expanded to see the bones and other hard tissue then it can fulfill some part of CT and MRI.