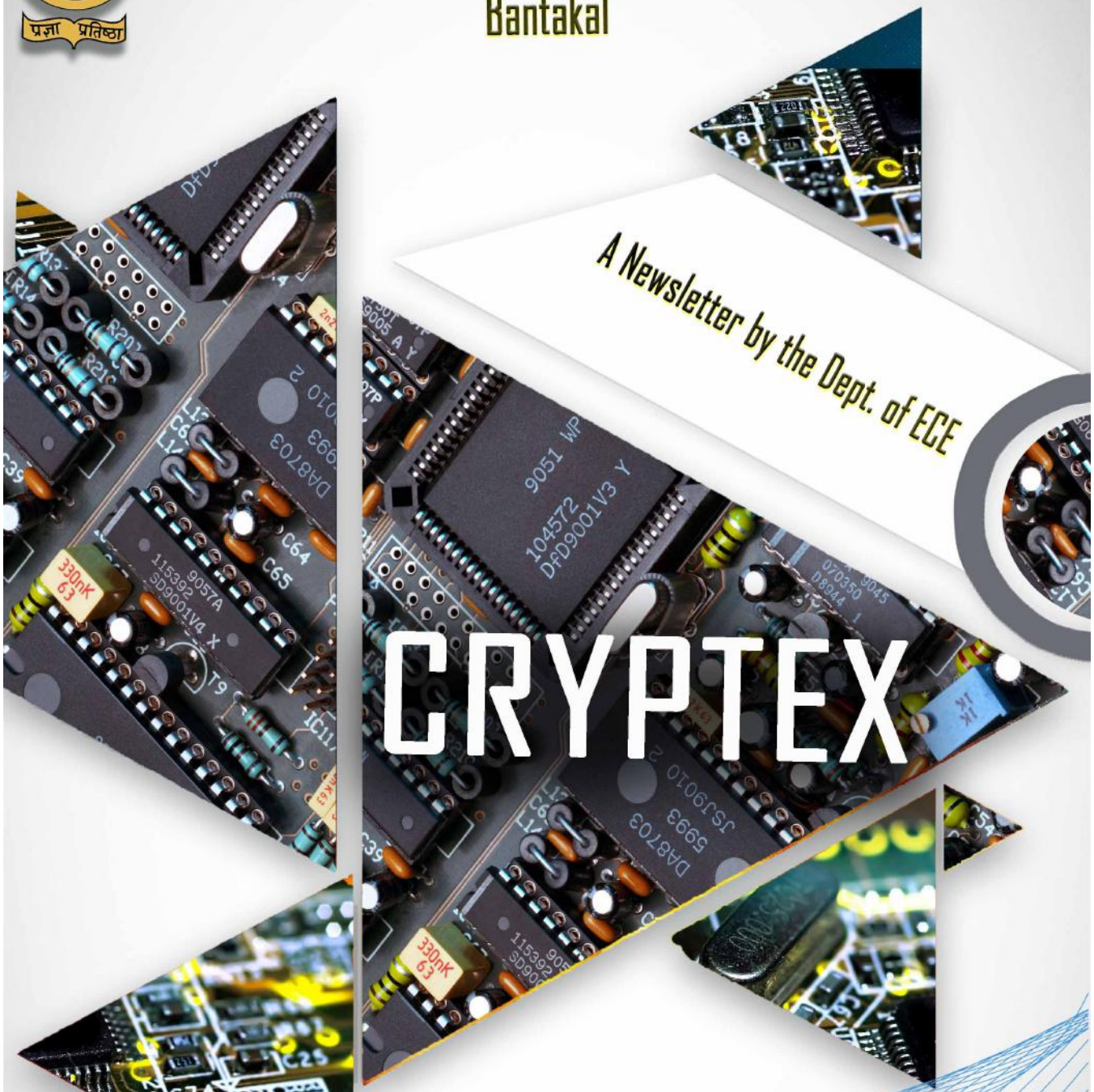
Shri Madhwa Vadiraja Institute of Technology and Management

Bantakal



A Newsletter by the Dept. of ECE

CRYPTEX

VOL. : 1

ACADEMIC YEAR 2015-16

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Vision-Mission

Departmental Profile

VISION

"To emerge as an excellent technical education center and be an integral part in the development of advancing technologies and global challenges, in the field of Electronics and Communication Engineering."

MISSION

1. To facilitate an ambience conducive to the excellence in technical education.
2. To provide a platform that will ensure the exchange of ideas and dissemination of knowledge.
3. To establish a research oriented center by having rapport with industries.
4. To foster ethical and value based education with credibility by promoting activities that have societal impact.

PROGRAMME EDUCATIONAL OBJECTIVES

The objectives of the Electronics and Communication Engineering undergraduate program at SMVITM are the following:

5 years after graduation, the graduates should:

PEO-1: Exhibit essential knowledge of applied sciences, mathematical modeling, logical interpretation and virtual realization to resolve real-time problems in the field of Electronics and Communication Engineering

PEO-2 Work productively as an Electronics and Communication Engineer, including supportive and leadership roles on multidisciplinary teams

PEO-3 Inculcate effective communication skills to excel in professional growth

PEO-4 Take part in lifelong learning in pace with the advancing technological society

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POINTS OF INTEREST

ಪರಬ್ರಹ್ಮ ಶರೀರಪುಷ್ಟಿ ಜನತಾಂದರ್ಯಷ್ಟಿ ಕೈವಲ್ಯಬೋ
ಧರಮಾ ಮೌಕ್ತಿಕಹಾರಯಷ್ಟಿ ಕವಿತಾವಲ್ಲೀ ಸುಧಾವೃಷ್ಟಿ ಸ ।
ರ್ವರಸೋತ್ಪಾದ ನವೀನಸೃಷ್ಟಿ ಬುಧಹರ್ಷಾಕೃಷ್ಟಿ ಸರ್ವಾಂಗಸುಂ
ದರಿ ವಿದ್ಯಾನಟಿನಾಟಕಂ ನಲಿಗೆ ಮತ್ಕಾವ್ಯಸ್ಥಲೀರಂಗದೊಳ್ ॥

- Sachin Bhat

Messages

Message from Director

" I am glad to note that Dept. of ECE is bringing out a newsletter, 'CRYPTEX' focussing on the latest developments in the Electronics field along with highlights of activities and achievements of students, faculty and staff of ECE dept. at SMVITM, for the first time in the history of this budding institute. Commendable initiative ! Compliments to all concerned in bringing out this useful, technical news bulletin. Hope and wish, it will act as an eye opener for the readers, fulfil the objetives and satisfy the knowledge thirst. Best wishes for the successful endeavour."

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Editorial team

Sachin Bhat
Rayan Christ

Expert Coaching on Analog Electronic Circuits

A one-day special coaching session on Analog Electronic Circuits was organised on 23 September 2015. The session was done by Dr. Somashekara Bhat, Professor& HOD of E&CE Department, MIT Manipal.Starting from the simple load line analysis of diode circuit, Prof. Somashekara Bhat explained the intricacies of transistor amplifier, frequency response, biasing, voltage and current sources, h-parameter model, feedback concepts, etc. Throughout his session, he used simple analogies while explaining complex circuits, so that the concepts were well understood by the students. By making the students work out simple and complex problems on transistors, he explained how to tackle complex circuits and make them look simpler. He also gave numerous hints on verifying the answers by logical thinking. The students and the faculty actively participated in the session by asking questions and clearing their doubts.

Prof. Dr. Thirumaleshwara Bhat, Principal of SMVITM inaugurated the function. Dr. Balachandra Achar, Professor and HOD of E&CE department, thanked Prof. Bhat for taking time off his busy schedule and spending one valuable day with the students.

Workshop on Analog IC Design

The Department of ECE organized a one day workshop on "Fundamentals of Analog Integrated Circuit Design" on 17 June 2015. Prof. Dr. P. R. Mukund of Rochester Institute of Technology USA, and Adjunct Faculty at SMVITM Bantakal was the resource person. During the workshop, Prof. Mukund shared his nearly 40 years of vast experience and knowledge about the subject to the participants. His presentation included the important design concepts of operational amplifier, such as MOSFET fundamentals, small signal modeling, cascode connection, miller capacitance, noise analysis, etc., which were highly appreciated by the participants. Incidentally, this was Prof. Mukund's first such workshop outside USA, and he promised to conduct similar one week workshops at SMVITM every year, for the benefit of the students and faculty.

More than 50 faculty members of SMVITM and other Engineering colleges participated in this workshop and got benefited.

Robotics Workshop

SMVITM in association with RoboSapiens Technologies Pvt. Ltd., New Delhi, organized a two-day workshop for its students on Robotics with Embedded-C at its campus on 12 & 13 September 2015.

During the workshop, the participants received hands-on training in assembling and programming of line-following and edge avoiding robots. Mr. Ashish Kumar and Mr. Anurag Kumar from RoboSapiens Technologies, who were the resource persons for the workshop. At the end of the workshop there was a zonal level robotics competition, where the best five teams that would represent the institute at the next level of the competition to be held at IIT, Delhi in March 2016 were selected.

Prof. Dr. Thirumaleshwara Bhat, Principal inaugurated the workshop, Prof. Dr. Balachandra Achar, HOD, ECE formally welcomed the guest. Mr. Nikhil Acharya and Mr. Rayan Christ D'Souza, final year ECE students coordinated the entire program. Dean (Academics), Prof. Dr. A. Ganesha and the faculty members were present during function.

Guest Lecture on Evolution and Trends in VLSI Technology

A delegation of Engineers and HR officials from KarMic Designs Pvt. Ltd. Manipal visited SMVITM and interacted with the final & pre-final year students of E&C Engineering on Engineers' Day, that is, on 15 Sep 2015. The delegation included Mr. P. Vasudevan, Team Leader and Trainer; Mr. Ashish, Mr. Dundappa and Ms. Shravya. Mr. Vasudevan addressed the students and gave a brief introduction, evolution of VLSI. He also told about the position and opportunities in semiconductor industry. He motivated students to either opt for Structural, behavioral and other areas in VLSI domain.

The delegates also visited the placement department. They appreciated the infrastructures and facilities in the department. Earlier, Prof. Dr. Balachandra Achar, HOD of ECE department welcomed the delegates with flowers. Ms. Sowmya Bhat compered the program. Mr. Raghavendra Rao P proposed the vote of thanks.

Overview of Advanced Project Tools

ISTE Student Chapter, in association with the department of E&C Engineering, conducted a Guest Lecture on the topic "an overview of advanced project tools", on 06 Nov 2015 in the college premises. Mr. Vishnuprasad V Bhat of Swadeshee, Pangala, was the resource person. All the students of the final year E&C Engineering, office bearers of ISTE student and faculty chapters attended the talk and interacted with the resource person.

Mr. Vishnuprasad Bhat, highlighted the role of entrepreneurs, quoting from the life history of great personalities. He emphasized the importance of referring to datasheets while starting a project, and also on the choice of suitable tools like Keil, Microvision used for printed circuit board design. His talk also focused on the importance of real time operating system applications, how the parallel operation could be performed in those applications, etc. The talk provided the students a platform for sharing their thoughts regarding setting up an enterprise and also about the critical issues regarding the selection of suitable components and tools for their projects, and were provided with proper guidance regarding all these aspects.

3-day short course on Analog Design

Dr. P R Mukund, a distinguished professor of Rochester Institute of Technology, USA who is also a member of the Governing Council of SMVITM has conducted a 3-day short course in Analog Electronic Design at SMVITM, from 8 to 10 Jan 2016. Faculty members of various other Engineering colleges have attended the course and enriched their knowledge. During these 3 days, Prof. Mukund discussed extensively on MOS differential pair, operational amplifier, frequency analysis, stability analysis, common mode rejection, slew rate, operational trans-conductance amplifier design, design validation using Mentor Graphics tool, folded cascade amplifier, noise analysis, band-gap voltage reference, and related topics. He also constituted a research group centered at SMVITM to initiate research activities and undertake sponsored projects on analog electronic design.

This was the second course conducted by Prof Mukund on the topic. Earlier, in June 2015 he had conducted a similar course for interested faculty.

Career Awareness Program

ISTE Student Chapter, in association with the department of E&C Engineering, conducted a Guest Lecture on the topic "Career Awareness Program", on 25th Feb 2016 in the college premises. Mr. Arun John Mathias from Sandeepani School of Embedded System, Bengaluru, was the resource person. All the students of the Final year & Pre Final year E&C Engineering, office bearers of ISTE student and faculty members attended the talk and interacted with the resource person.

Mr. Arun, started the talk with giving a brief statistics on the current employability status of engineering students. He highlighted the growth of VLSI and Embedded industry, which has increased demand of fresh engineers. His talk also focused on the recent industry trends in core engineering field. He listed down more than fifteen roles/designation currently being practiced in the core companies; their skill set requirement, companies name, job responsibilities etc and explained the career growth ladder. Mr. Arun emphasized on the importance of right mix of knowledge, attitude and additional skills for a successful career. The talk provided the students a platform for sharing their thoughts and was endowed with proper guidance regarding all the aspects of career in core VLSI & Embedded field.

Mini Project exhibition and competition

Department of ECE organized an exhibition-cum- competition of mini-projects for the IV and VI semester ECE students on 06 May and 12 May respectively. This was held in order to provide hands-on experience to the students so that they can do better projects during their final semester. 26 teams of IV semester students and 25 teams of VI semester students participated in the exhibition. Each team worked on unique projects taking help from the faculty members and senior students. The projects varied from simple electronic alarm circuits to complex robotics, depending on the interest levels of the students. During the competition, two best projects from each semester were chosen based on the stipulated judgment criteria.

Prof. Dr. Thirumaleshwara Bhat, Principal of SMVITM, presented mementos and certificates to the winning teams, and Prof. Dr. Balachandra Achar, HOD of ECE distributed the cash prizes.

Guest Talk on Project Building Concepts

ISTE student chapter in asociation with t h e dept. of ECE organized a guest talk on "Project building concepts" by Mr. Sunil T S by Advanced Electronics(ALS) of Bengaluru on 09 March 2016. The second and third year students of ECE branch attended the talk.

Mr. Sunil appreciated the college for providing a well-equipped innovation cum project laboratory in the ECE department for the benefit of students. He motivated the students to make the best of the facility by working towards innovative projects. He highlighted on how to make use of datasheets provided by the manufacturers and cited circuit models as examples during his talk. He also inspired the 2nd year students who had taken part in the internship program at ALS, to extend their mini-project work and come up with better projects this year. Overall, the session was interactive and all the students were highly motivated to carry out project works in every semester of their study in the college.

Prof. A Ganesha, Dean Academics, Prof. Balachandra Achar, HOD of ECE department, and other faculty members were also present during the occasion.

Guest Lecture on Signals & Systems

Department of ECE organized a guest lecture on Signals and Systems by Dr. Kumara Shama, Department of ECE, MIT, Manipal on 11 May 2016. The IV semester students and faculty members attended the lecture and enhanced their understanding of the subject.

Guest talk on BSNL

On 10th May, 2016, Mr. V G Naik of BSNL, Mangaluru delivered a guest talk on different training models available with BSNL. The students of IVth semester B section attended the session.

PULSE - A multi functional smart fitness band

This project etches a cost effective health monitor and a protector, smartly designed as a wristband that measures many vital physical parameters such as Heart rate, Temperature, Step count and a few more. The data is then recorded to an online server that can be accessed through any mobile device. It has a wide range of applications including fitness, health care tracking and physiological research. This is a versatile system which do not just record data but also will notify the necessary contact in case of an emergency along with the location of the user.

This device can be used for fitness, protection and 24×7 care of the elderly/injured. It consists of various modes of operation and the novel Red switch mechanism is a key feature especially for women, that notifies and sends a distress signal along with location to the selected contact during emergencies no matter what the device's condition is.The device is now completely standalone and user friendly, making it one of a kind in the current market of wearable devices.

The project is developed by the team of Nikhil Acharya, Rayan Christ D'Souza, Rahul Kumar, Fervez Jaffer and Vishweshwara Sharma under the guidance of Prof. Nagaraja Rao,.

Automatic Ration Materials Distribution

The final year Electronics & Communication Engineering students of Shri Madhwa Vadiraja Institute of Technology have designed a unique ration distribution system making use of GSM (Global System for Mobile communication) and BAN technologies.

In the proposed system, the consumer has to touch the BAN reader, upon which the microcontroller will verify the consumer details and provides the quantity of ration materials available for the current month. The consumer has to then specify the required quantity of materials such as rice, wheat, kerosene, etc. using a keypad and the system will disburse the specified amount of materials automatically by microprocessor-controlled valves. After disbursing the materials, the system will also send relevant message to the consumer's mobile and the government officials. In this way, corruption and wastage of food materials can be eliminated from the public distribution system.

The system was developed by the students Venkatesh Diwakar, Hithesh Kumar, Sudeep Naik and H. Vishwanath, with the guidance and support of Prof. Ms. Kusuma Prabhu and Prof. Dr. Balachandra Achar.

Achievements

Faculty Achievements

- Nagraj Rao, Asst. Professor(Sr) has registerd his P.hD in VTU, Belagavi under the guidence of Prof. Shantaram Rai, Canara College of Engineering.

- Sachin S Bhat, Asst. Profesor has registered his Ph.D in Reva University.

- Sachin S Bhat, Asst. Professor has published papers titled 'Translating Indian Sign Language to text and voice messages using flex sensors' in Internationa Journal of Advanced Research in Comunication Engineering, Vol 4, Isue 5, 2015 and 'Period prediction of ancient Kannada epigraphal scripts' in IJIREEICE, vol 1, Special Issue 1, Feb 2016.

- Raghavendra Rao, Ast. Professor has published a paper titled "Simulation of Advanced Perturb and Observe MPPT for a standalone PV system" in International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol 4, Issue 12, Dec 2015.

- Sachin S Bhat, has presented "New secure video transmission technique by nearby reversible color transmission" in nCORETECH-16, LBS collge of Engineering, Kerala.

- Arun Upadhyaya, Asst. Profesor has attended one week FDP on Cipher System conducted by Dept. of ECE, MIT, Manipal

Student Achievements

- Ms. Sneha Hegde, student of VII sem ECE, has won SECOND prize in the female under 68 kg category, in the 7th state level KARATE championship, conducted by Akhila Karnataka Sports Karate Association of Karnataka, held at the institute of Agriculture Technologies, Bengaluru, on 24 Jan 2016.

- Mr. Nikhil Acharya, student of VII sem ECE, participated in VTU- Mega State Level Education HACK FEST - Oct 2015 at VTU Belagavi and won FIRST prize along with IBM and Microsoft grants.

BIOMIMAIC ROBOTICS: A DESIGN INSPIRATION FROM NATURE

BUILDING A BETTER both sometimes means looking outside the shop for inspiration. Borrowing from the characteristics and abilities of insects, birds, fish and mammals, scientists and engineers have designed robots that can swim, jump, snuggle, and steal book. The science is called bio mimetic robotics. Their abilities are copied from earth's greatest examples of success, living organisms; they tend to function better in the unpredictable real world than the controlled artifice of laboratory. However, these are not complete replica of animals; we actually extract those most useful abilities, and make some modifications, in order to achieve the design in a practical way.

Bio mimetic robotics is an emerging subject that keeps developing these years and has great future and very vast area of application. One of early example is study of bird to enable human flight leading to the invention of aircrafts.

Some of robots are discussed below.

ROBOTIC LOBSTERS : Underwater robot based on lobsters biology, utilizing factory type of operation. Power is critical factor. Artificial intelligence is also being implemented. Locomotion without motors; reducing the electronic neurons to analog VLSI and to generate motor program like central pattern generators based on a nonlinear dynamic model of real lobster neurons. Artificial neurons will drive artificial muscles. Thus elimination feedback control. Integration of gravity, flow sensors, etc. to artificial brain.

SPRAWL ROBOTS: The "sprawl" family of hand-sized hexapedal robots are prototype designed to test ideas about locomotion dynamics, leg design and leg arrangement and to identify areas that can be improved by shape deposition manufacturing. Draw their inspiration from the physical construction and mechanical design principles that are responsible for the robustness of the cockroach. Sprawl robots are some of the fastest and most robust legged robot. These are characterized by speed, stability, terrain movement, obstacle handling.

ENTOMOPTER : This tiny robot is designed to crawl and fly, but stresses on flying. Idea is micro-air vehicles and should overcome gravity. These robots look more like machines than winged animals because the bio-inspired things are not as well understood.Size is the problem to be encountered. Indoor and outdoor operations. Terrestrial and Aerospace models . Made from carbon composite material with chemical energy source. Initially the operation has to be perfect, before stepping onto flight control algorithms.

- Sridevi,
7th Sem

HOW TO REDUCE MOBILE PHONE TOWER RADIATION

The large number of installation of mobile phone towers in densely populated areas of many cities throughout the world has raised greater health concerns due to the existence of high level electromagnetic radiation in the neighborhood of these towers. Due to this, there arises an urge to find a solution for this situation, i.e. by diminishing these radiation levels to the maximum extent and thus provide a greater protection to general public and workers. Here we will look into some of the simple techniques used to reduce these radiation levels to a larger extent.

We all know that, wireless telecommunication systems uses a large number of mobile phone towers in order to provide the telecom facilities to their various subscribers who are spread across different geographical locations. These towers have multiple antennae that radiate the electromagnetic waves. There is a strong perception relating to the presence of powerful electromagnetic radiations, in the vicinity of these towers which may cause adverse biological effects. If strict policy directives for these towers installations are not taken immediately, then this could create a panic amongst the general public. Therefore suitable regulations, effective monitoring and controlling and execution at all levels by governmental bodies must be established.

According to World Health Organization (WHO), INTERPHONE (a 13 country coordinated case control study), Independent Expert Group on Mobile Phones (IEGMP) and Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) survey, it has been found that electromagnetic radiation can contribute to health deficiency, including an increased risk of brain tumors, eye cancer, salivary gland tumors, testicular cancer and leukemia. Several surveys have found a variety of such self-reported symptoms for people who live close by to base stations. Collectively, they haven't provided evidence of a relationship, but they have had sufficient limitations to leave the question unresolved. International Commission on Non-Ionizing Radiation Protection (ICNIRP) study has concluded that the exposure levels due to mobile phone base stations are generally around one-ten-thousandth of the guideline levels. And moreover, WHO has classified mobile phone radiation on the International Agency for Research on cancer (IARC) scale into group 2B-possibly carcinogenic to humans. This means, that there could be some risk of carcinogenity, so additional researches to long term and heavy use of mobile phones/ wireless technologies has to be conducted.

Not only controlling the numerous installations of towers, but also undertaking systematic study for measurement of radiation levels in some high density urban areas to make sure that power density levels are well below prescribed threshold limits, and the results must also be made available for public and scrutiny. It is better to take preventive measures and try to mitigate these radiation levels and provide greater protection to general public and workers in India. The present threshold limits prescribed by government are too generous, (one of the highest in the world) and hence there is a need to review and find remedy of matter for the situation and not to wait until it becomes subject of matter of a public interest petition in light of possible environmental adverse effects.

Electromagnetic radiation is a form of energy which has wave like behavior, as it travels through space. It has both electric and magnetic field, which oscillate in phase perpendicular to each other and perpendicular to the direction of propagation. When referring to biological radiation exposures, electromagnetic radiations are divided into two types: ionizing and non-ionizing. Because the human body is composed of 60% water, ionizing and non-ionizing radiations refers to whether the RF energy is high enough to break the chemical bonds of water (ionizing) or not (non-ionizing). Clearly, radiation that has enough energy to move atoms in a molecule around or cause them to vibrate or pump an electron to a higher energy state, but not enough to remove electrons is termed as non-ionizing radiation, with notable exception of some ultraviolet rays .

The Radiation mitigation techniques are as follows

1) Transmitter power reduction: The transmitter power is directly related to power density and square of electric field/ magnetic field strength. Therefore, reduction in transmitter power would result in reduction of radiation level but, this also cause reduction of coverage area.

2) Increasing the antenna height: The power density at any observation point is the feature of antenna height. If this is increased in height, then the power density/ field strength at the observation point is reduced due to an increase in the distance to the point of observation.

3) Increasing antenna gain: it is able to limit the radiation level in the area accessible to people by controlling the gain or directivity of antenna i.e. it is recommended to use a low-power transmitter with high gain of antenna for horizontal beam.

4) Change in HRP: HRP is a function of azimuth angle, representing distribution of energy in a horizontal plane. It is possible to reduce the radiation level by using antenna with a narrow horizontal beam.

5) Change in VRP: VRP is a function of elevation so, an optimization of VRP, reduces the radiation level.

Conclusion:

Operators who provide wireless communication facilities should study this and ITU-T recommendations, to keep the operation of base station transceivers with regulations, and keeping in mind, environmental protection against the radiations, emitted by antennas. Care must be taken, and hence try to reduce the radiation levels to a minimum amount by employing simple, suitable techniques and provide greater protection to public and workers. Some recommendations to minimize possible health hazards are: minimizing the mobile usage, adopting mobile phones and microcells with a low as reasonably practicable levels of radiations, using hands free, headsets etc.

- Vaishnavi Kamat, 7th Sem

Departmental Profile

Electronics today stands at the forefront of the rapidly expanding horizon of science and technology. The Department of Electronics and Communication Engineering in SMVITM was established in the year 2010, initially offering an undergraduate program with an intake of 60 students per year. The intake was increased to 120 in the academic year 2012-13. The Department has well-qualified faculty members – highly motivated in teaching and guiding the students in exploring newer avenues in the fields of electronics and communication.

The Department is always intent on creative and technologically advanced skill transfer to the students through teaching, mentoring and counseling. It regularly organizes seminars, symposiums, workshops and invited talks by eminent faculty from reputed institutions and industry experts, to keep the students abreast of the latest technological developments in related fields. The services of some academicians of high repute have been utilized by the Department with the objective of supplementing teaching, mentoring and guiding the students as well as faculty members ever since the inception of the Department. The Department has its own library comprising of over 125 text books and technical magazines for quick reference. To nurture creative ideas and provide hands-on training to the students, the Department has set up Innovation/Project laboratory with state-of-the-art equipment and latest versions of software tools, in addition to the regular laboratories.

Name of the Faculty with Educational Qualifications and Designation

Prof. Dr. Radhakrishna S Aithal, B.E., M.Tech., Ph.D. Professor & director
Prof. Dr. Balachandra Achar H V, B.E., M.Tech., Ph.D. Professor & HOD
(Dr.) Nagaraja Rao, B.E., M.Tech., (Ph.D.) Senior Assistant Professor
Mr. Rajesh Nayak, B.E., M.Tech. Assistant Professor
Mrs. Shashikala R, B.E., M.Tech. Assistant Professor
Mr. Chetan R, B.E., M.Tech. Assistant Professor
Mr. Krishna Kumar P, B.E., M.Tech. Assistant Professor
Mrs. Rashmi K R, B.E., M.Tech. Assistant Professor
Mr. Sandesh Kumar , B.E., (M.Tech.) Assistant Professor
Ms. Shareen J Noronha, B.E., M.Tech. Assistant Professor
Mr. Arun Upadhyaya, AMIE, M.Tech. Assistant Professor
(Dr.) Sachin S Bhat,B.E., M.Tech.(Ph.D)Assistant Professor
Mr. Sachin Prabhu K, B.E., M.Tech. Assistant Professor
Mr. Vinaya Kumar S R, B.E., M.Tech. Assistant Professor
Ms. Vrunda Adkar D, B.E., M.Tech. Assistant Professor
Mr. Aruna M S, B.E., M.Tech. Assistant Professor
Ms. Sowmya Bhat, B.E., M.Tech. Assistant Professor
Mrs. Rajashree Nambiar P B.E., M.Tech. Assistant Professor
Mrs. Laxmi Shetty, B.E., M.Tech. Assistant Professor
Mr. Ranjit Bhat, B.E., M.Tech. Assistant Professor
Mr. Raghavendra Rao, B.E., M.Tech. Assistant Professor
Mr. Ganesh Shetty, B.E., M.Tech. Assistant Professor
Mr. Avinash N J B.E., (M.Tech.) Assistant Professor
Ms. Kalavathi, B.E, Assistant Professor

ADJUNCT FACULTY

- Prof. Dr. P R Mukund, B.S., M.S., Ph.D., Professor, Electrical & Microelectronics Engineering Department, Rochester Institute of Technology, Rochester, NY, USA
- Prof. Dr. Somashekara Bhat, B.E., M.Tech., Ph.D., Department of Electronics & Communication Engineering, MIT, Manipal

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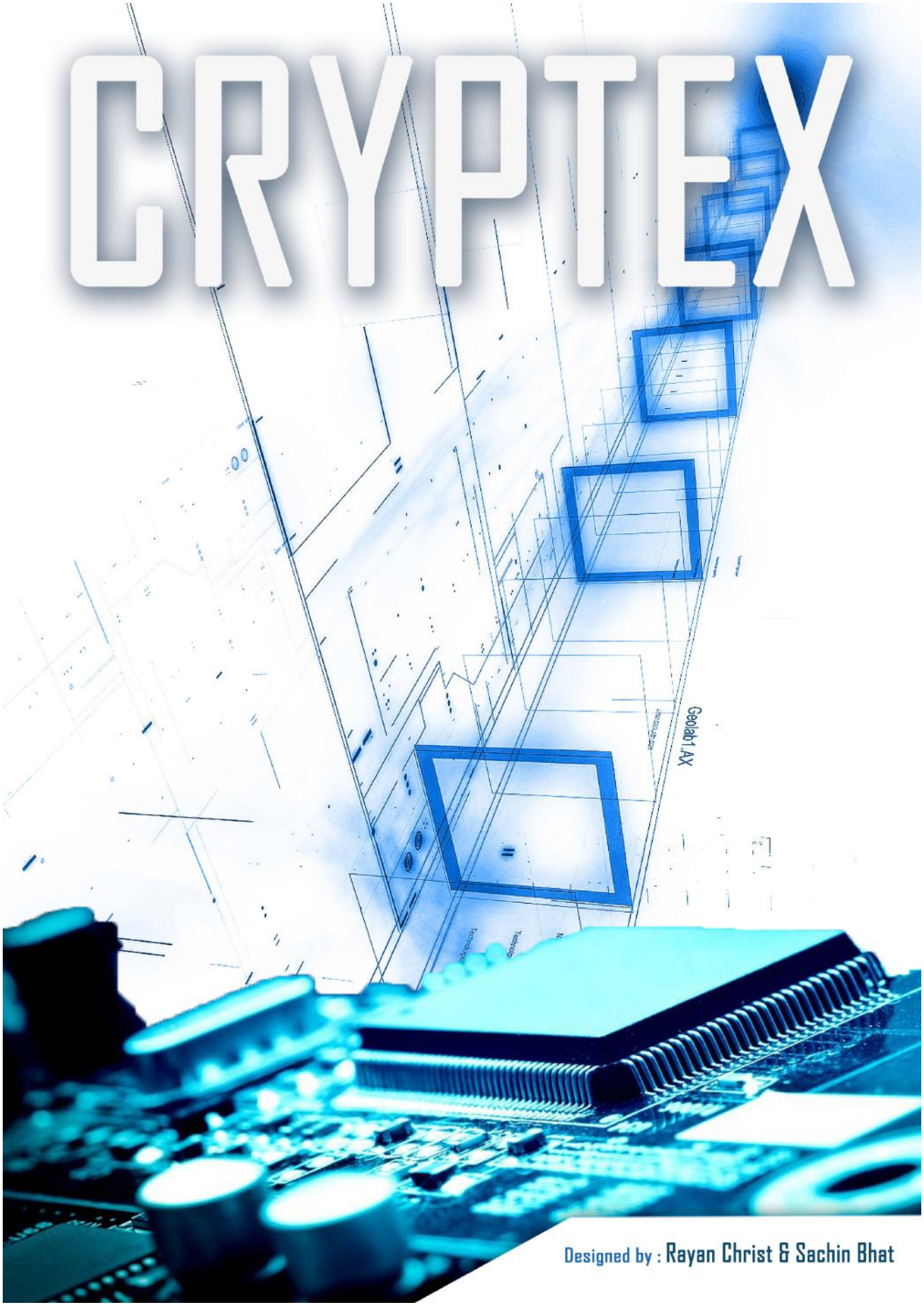

Designed by : Rayan Christ & Sachin Bhat