RV COLLEGE OF ENGINEERING®
(Autonomous Institution affiliated to VTU, Belagavi)
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING
RV Vidyaniketan Post, 8th Mile, Mysuru Road,
BENGALURU– 560059, KARNATAKA, INDIA.

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SPECIAL POINTS OF INTEREST





# THE EDITORIAL

World Telecommunication and Information Society Day (WTISD) has been celebrated annually every 17th May since 1969, marking the founding of ITU and signing of the first International Telegraph Convention in 1865. The theme proposed for WTISD-2023 is "**Digital Technologies for Road Safety**". Causing an immense cost to economies and great trauma to societies, road accidents have always constituted as one of the top priorities in transportation research. However, a particular element that makes the road safety research an even higher priority at this current point of time is the fact that both the concept and technology of transportation are rapidly evolving. This introduces new challenges, as well as new opportunities, for the researchers and practitioners of road safety.

New technologies such as smart traffic light and traffic control systems, artificial intelligence, the use of telematics and automotive technology can contribute to prevent and reduce the number of road related accidents and thus improve road safety.

## Applications of AI in Road Safety:

A self-driving car (sometimes called an autonomous car or driverless car) is a vehicle that uses a combination of sensors, cameras, radar and artificial intelligence (AI) to travel between destinations without a human operator. The data includes images from cameras on self-driving cars from which the machine learning (ML) and deep learning (DL) algorithms learns to identify traffic lights, trees, curbs, pedestrians, street signs and other parts of any given driving environment. Artificial Intelligence (AI) powered solutions may soon make roads in India a safer place to drive.

## Applications of IoT Technology in Road Safety:

In-car sensors can monitor driver behaviour and provide alerts if a driver appear drowsy or distracted. Various imaging sensors can be used for object detection, reading speed markers, and generally making a vehicle aware of factors farther down the road. If there is an accident, stopped traffic, or a slippery surface, IoT would enable the road to transfer knowledge of these hazards to nearby vehicles. Receiving alerts to potential hazards provides time for a driver to react.

## Applications of Telematics in Road Safety:

Telematics employs the usage of a "black box" in a vehicle that is using GPS. The idea is to use the mobile phone network to measure speed, acceleration, braking, and cornering movements. This data is then transferred to servers, where it is analyzed to provide driver feedback. This encourages better driving practices and closer monitoring.

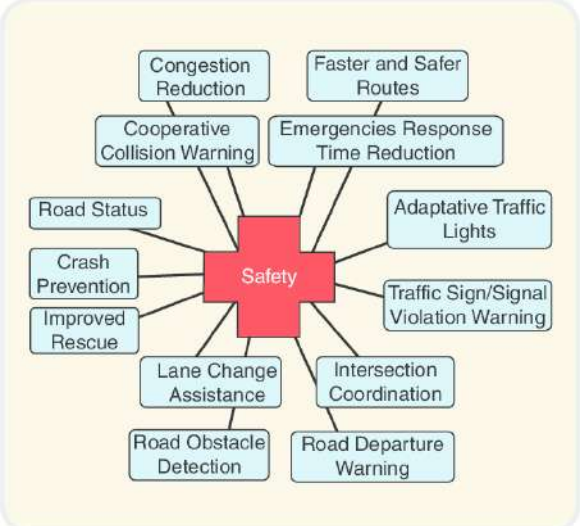


Image Courtesy: Emergency Services in Future Intelligent Transportation Systems Based on Vehicular Communication Networks

**Department Activities:**
**Workshops/Conference Organized**

- IEEE International Conference on Computational Systems and Information Technology, for Sustainable Solutions (CSITSS-2022) during 21st to 23rd December 2022, RV College of Engineering, Bengaluru, (Dept. of CSE, ISE, MCA, ECE, ETE and EIE) and Florida International University, Miami, USA .
- One week workshop on "Trends & Opportunities in E-Vehicles", under COE E-mobility, RVCE in association with Greeves cotton limited, 2/5/2022 – 7/5/2022

**Webinars/Invited talks/ Exper lectures Organized:**

- Overview of Semiconductor Industry and VLSI Design Flow, **Mr. Nikhil G.V.,** Senior Engineer, Qualcomm, Bengaluru, 28/05/2022.
- "Internet of Things " by **MS. Shivapriya Hiremath,** Product manager, Intel Corporation, Santa Clara, California, US, 02/08/2022.
- Signal Processing in Wearable Devices by **Ramesh P E, and Mr. Madhu, Principal Engineer,** Advanced Development team, Tektronix on 02/09/2022 under IEEE Signal Processing Society Bengaluru chapter jointly with IEEE Sensor council Bengaluru chapter
- "Fuzzy logic and its applications" by **Dr. Ramya H R,** Asst. Professor, Dept. of ETE, MSRIT, Bengaluru on 09/02/2023
- Industry Conclave on Opportunities and Challenges in Sensors, Robotics, Automation and Signal Processing ON 10th and 11th of Feb 2023.
- "MMIC Design" by Sreenivasa Rao, MMIC Design Head GEECI / CeNSE, Indian Institute of Science, Bangalore, India , held on 13/03/2023.

**Invited Talks Delivered by Faculty:**

- Dr. Bhagya R, IOT, Trends and Applications on 20/03/2023 at IETE, Bengaluru from 27th February to 24th March 2023 for one month internship on IOT and Embedded Systems.
- Dr.Shanthi P, Delivered Expert lecture on "R&D facilities in RVCE" in I-STEM Tech Management Conclave ITMC, 21/02/2023 – 22/02/2023, at IISc, Bangalore.
- Mr. P Nagaraju, Digital Image Processing and its applications on 17/02/2023 at Dept. of Electronics, Mount Carmel college (Autonomous), Bengaluru.
- Dr.Kumaraswamy H V, Preparing Quality Question paper and Assignments towards the attainment of CO, PO &PSO on 14-02-23 at AIT, Bangalore under Margadarshan Scheme.

# ABOUT THE DEPARTMENT

Department of Electronics and Telecommunication Engineering started in the year 1992. Now Dept. has one U.G. and two P.G. programs. Moreover the department is recognized as a research center under VTU to carry out M.Sc. (Engg.) and Ph. D.

## Programs Offered

♦ **U.G. Program:**

Bachelor of Engineering in Electronics and Telecommunication Engineering with an intake of 60 under gone multiple cycles of Accreditation.

♦ **P.G. Programs:**

Master of Technology in Digital Communication Engineering with intake of 36, accredited by National Board of Accreditation, New Delhi.

Master of Technology in RF & Microwave Engineering with intake of 18, accredited by NBA, New Delhi.

The department has a total of 21 teaching faculty members, out of which 11 are Ph.D holders, 10 are pursuing Ph.D and competent technical and support staff.

## Research Facilities

Department developed industry based labs such as Keysight (Advanced RF and Wireless Communication Lab), Tejas networks, and CCTV Research Lab to strengthen U.G., P.G. projects and Research activities. The details of the research labs are listed as follows:

**1) RVCE-Keysight Advanced RF and Wireless Research Lab:**

| FACILITIES AVAILABLE |
|---|
| Agilent Vector Signal Analyzer: EXA 7 GHz |
| 24 Systems loaded with Keysight EDA Tools |
| Agilent MIMO Baseband Generator PXB |
| Agilent Mixed Signal Oscilloscope, 4 Ch, 4 GSa/s with 16 Digital Channels |
| Agilent Vector Signal Generator: MXG 6 GHz |
| R&S Vector Network Analyzer: 13.6 GHz |
| Software Defined Radio Kits |

| TECHNOLOGIES SUPPORTED |
|---|
| GSM/GPRS/EGPRS |
| WCDMA/HSDPA/HSUPA/HSPA+ |
| AMPS/IS95A-B/IS2000/EVDOA-B |
| WLAN/BT/ZigBee/RFID/WiMax/LTE |
| MIMO |
| DC-HSDPA |
| SDR, Cognitive Radio |

**2) Optical Research Lab:**

| FACILITIES AVAILABLE |
|---|
| Tejas 1600C SDH Optical Transport equipment |
| Tejas 3301 CWDM Equipment with ROADM facility |
| RXT2380RxT2.5G Test set up |
| RXT2380 SW 25G Test set up |

| TECHNOLOGIES SUPPORTED |
|---|
| SONET |
| SDH |
| WDM |
| CWDM |
| DWDM |
| Packet transport |

**3) CCTV Research Lab:**

| IR PTZ Camera | 2MP, 20x Full HD Recording -150 Mtr |
|---|---|
| Body Worn Camera | 2 MP Full HD Recording |
| IR Network Bullet Camera | 2MP Full HD Recording - 40Mtr |
| Wi-Fi Bullet Camera | 2MP Full HD Recording |
| Outdoor CPE Access point | 5GHz 300Mbps 23dBi with Dual Polarized Directional Antenna |
| Mini bullet IP cameras | 2MP fixed lens 3.8mm |
| NVR | 8 channel, 1 TB HDD |
| Work Station | Dell, Intel® Core™ i9,RAM- 32GB (2x16GB) DDR4, Storage - 512GB, 4TB 5400rpm SATA 3.5" HDD, |

# ABOUT THE DEPARTMENT….

### Faculty Membership of Professional Bodies

| Sl. No. | Faculty Name | Association | Membership Detail |
|---|---|---|---|
| 1 | DR. K. SREELAKSHMI | IEEE/IETE | No. 93879876/ F-144426 |
| 2 | DR. H.V. KUMARASWAMY | IEEE/IETE | No. 97518487/ F-131347 |
| 3 | PROF. P. NAGARAJU | IEEE/IETE | No. 97518449/ F-131353 |
| 4 | DR. K. NAGAMANI | IEEE/IETE | No. 94839025/ F-502973 |
| 5 | DR. R. BHAGYA | IEEE/IETE | No. 95663275/ F-502679 |
| 6 | DR. B. ROJA REDDY | IEEE/IETE | No. 94817651/ F-230094 |
| 7 | DR. PREMANANDA B.S. | IEEE | No. 92328975 |
| 8 | DR. K. SARASWATHI | IEEE | No. 92375938 |
| 9 | DR. SHANTHI P. | IEEE /IETE | No: 95654327/F-503387 |
| 10 | DR. RANJANI G. | IETE | No: F –502698 |
| 11 | DR. K. VISWAVARDHAN REDDY | IAENG | No: 320653 |

### U.G. Rank Holders (2018-2022 Batch):

| Sl. No. | USN | Name of the student | Rank | CGPA |
|---|---|---|---|---|
| 1 | 1RV18TE030 | NIRANJAN D R | I | 8.94 |
| 2 | 1RV18TE037 | RAHUL KEJRIWAL | II | 8.94 |
| 3 | 1RV18TE002 | AKHIL CHAWLA | III | 8.92 |
| 4 | 1RV18TE044 | SHANTANU B S | IV | 8.94 |
| 5 | 1RV18TE059 | VIGNESH G UPADHYA | V | 8.81 |
| 6 | 1RV18TE026 | N SAHITHI | VI | 8.74 |

### P.G. Rank Holders (2020-2022 Batch):

### M.Tech. in Digital Communication

| Sl. No. | USN | Name of the student | Rank | CGPA |
|---|---|---|---|---|
| 1 | 1RV20LDC24 | SATISH HULAGAPPA BHA-JANTRI | I | 9.48 |
| 2 | 1RV20LDC23 | SAI SHRUSHTI S | II | 9.36 |
| 3 | 1RV20LDC09 | HEMALATHA R V | III | 9.33 |

### M.Tech. in RF and Microwave Engineering

| Sl. No. | USN | Name of the student | Rank | CGPA |
|---|---|---|---|---|
| 1 | 1RV20LRF11 | P MANJUNATH | I | 9.61 |
| 2 | 1RV20LRF05 | CHAMAN JAYARAM | II | 9.50 |
| 3 | 1RV20LRF10 | NAMRATHA PRAKASH | III | 9.13 |

- **Project Grants Received from Funding Agencies:**

  Modernization of Wireless Communication Laboratory with full-fledged testing and Characterization of passive and active circuits for 5G and Allied technologies by ***Modernization & Removal of Obsolescence.***

  Dr. K. Sreelakshmi
  Dr. K. Nagamani
  Dr. B. Roja Reddy

- **IEEE EXECOM:**

  **Dr. K. Nagamani**

  SPS Bangalore Section and Sensors Council Chapter Bangalore Section

  **Dr. Premananda B.S.**

  ITS Bangalore Section.

  **Dr. Bhagya R.**

  CTSoc, IEEE, Bangalore section.

- **BoE in other Institutions:**

  Dr. G. Sadashivappa
  Dr. H.V. Kumaraswamy
  Prof. P. Nagaraju
  Dr. K. Nagamani
  Dr. Bhagya R
  Dr. Premananda B.S.

- **Ph.D. Doctoral Committee Member in other Institutions:**

  Dr. G. Sadashivappa
  Dr. K. Sreelakshmi
  Dr. H.V. Kumaraswamy
  Dr. K. Nagamani
  Dr. Premananda B.S.
  Dr. R. Bhagya
  Dr. B. Roja Reddy
  Dr. Shanthi P.

- **IETE office bearers**

  Dr. B Roja Reddy
  Dr. G. Ranjani

**Faculty/Student Publications:**
International Journal: 03

International Conference: 23

# Digital Technology for Road Safety

The use of the Digital Road Model (DRM) makes it possible to solve problems in the field of ensuring the movement of Highly Automated Vehicles (HAVs) on public roads. The DRM is based on approaches aimed at the safe interaction of HHAVs with other road users. The key components of these approaches are:

- Ensuring safety by increasing situational awareness, including maximizing the use of road transport infrastructure capabilities;
- Ensuring safety through the implementation of accumulated results obtained during trial operation.

Defining the types of dynamic objects in the concept of a DRM: To date, for high-quality and safe traffic on highways, HAVs are equipped with sensors and artificial intelligence.

- Dynamic objects should include all possible objects and obstacles that are located on the roadway and are not elements of a traffic management project and a project for the construction and/or reconstruction of a highway.
- Objects (obstacles), This category should include artificial barriers installed on the roadway as a result of unauthorized work, various kinds of debris, hitting which may lead to a violation of the integrity of the design of the elements and sensors of the vehicle.
- Vehicles, this category should include all vehicles whose drivers and passengers do not belong to the category of vulnerable road users.
- Pedestrians, this category should include people who move along sidewalks near the carriageway, on roadsides, cross the carriageway both at established pedestrian crossings and in the wrong places, courtyards and adjacent territories, etc.
- Low mobility and vulnerable road users, children. This category should include minor road users, persons with disabilities who move with the help of special devices, cyclists, motorcyclists and other road users travelling on personal mobility devices.
- Animals, this category should include, first of all, any animals, hitting which may lead to a violation of the integrity of the design of the elements and sensors of the vehicle.

The determination of the location of dynamic objects by DRM technologies can be carried out both with the help of various dynamic object systems and the subsequent transmission of this information using various means of communication (V2X) to DRM databases, and with the help of elements of the DRM road infrastructure. Information about dynamic objects allows you to increase situational awareness of HAVs, thereby increasing road safety.

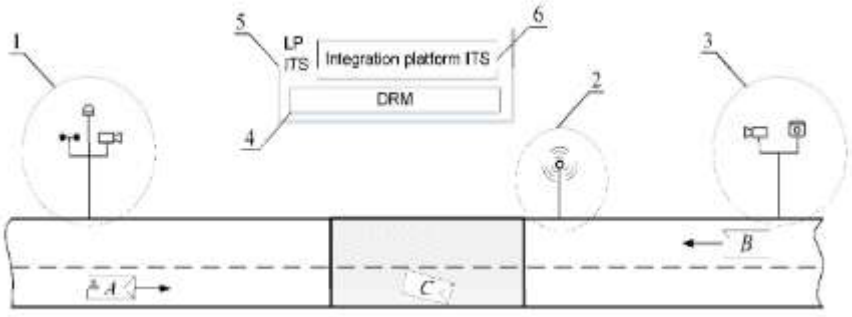


Fig.1 The physical architecture of DRM

The DRM includes the following data layers:

High-precision data of the road network and roads, including: - initial data of road elements and geodetic measurements; - high-precision map; - trajectories of the movement of HAV; data of ITS elements; data of C-ITS elements; high-precision depersonalized HAV data; highly accurate information about other road users and obstacles.

[Courtesy: A. I. Vorobyev, N. S. Golubchenko, A. A. Koveshnikov, T. V. Vorobyeva, D. Yu. Morozov "Ensuring the Safe Movement of Highly Automated Vehicles by Means of Digital Road Model Technology".]

**Akshitha S.(VIII Sem. B.E.), Anjali M. (VIII Sem. B.E.), Dr. B Roja Reddy**

**Invited Talks Delivered by Faculty:**

- Dr. G Sadashivappa, Design of Analog & Digital circuits using Multisim on 19/01/2023 at Department of ECE, SJBIT, Bengaluru.
- Dr.Shanthi P, RF CAD Tools for Research and Education on 15/12/2022 at Dayananda Sagar College of Engineering, Bangalore.
- Dr. Roja Reddy, Sensors and algorithms used in UGV on 9/12/2022 at BEL Academy for Excellence, Bangalore.
- Mr. P Nagaraju "System properties and applications" on 21/10/2022 at SJC Institute of Technology, Chikkaballapur.
- Dr. Kumaraswamy H V, Fundamentals & Application of Basic signal processing on 21/10/2022 at SJC Institute of Technology Chikkaballapur (FDP).
- Dr. K Sreelakshmi, Electronic Computer Hardware & Networking, Bharat Electronics Limited (BEL), Bengaluru, on 19/05/2022.

## Student Achievements:

- Upendra Shetty DR (1RV19ET017 ), Deekshit Ananta (1RV19ET017), Rachana (1RV19ET039), Shreyas (1RV20ET405) outstanding project titled " **Smart vehicular system"** & secured **First place** in "Telecombat"-A national Level project contest 2022 (Virtual mode) Organised by the Department of ETE, BMSCE.
- Arjun Balaji(1RV21ET007), Novice Winners in ILNU Parliamentary Debate 2023 on 19/2/23 .
- Arjun Balaji(1RV21ET007), 1st Place in IIT Madras Controversia Debate 2023 on 02/01/2023 .
- Arjun Balaji(1RV21ET007), Avik Trilok (1RV21ET010), Divyansh Shah(1RV21ET012), Sairam S (1RV21ET046), Best project AICTE Technocreativity 2022 on 23/09/2022 .
- Drrithi Ranganath(1RV21ET013), 2nd place and 3rd Place in VTU athletics and VTU Cross Country athletics respectively on 27/06/2022.
- Drrithi Ranganath(1RV21ET013), 3rd place All India Thal Sainik Camp on 25/09/2022 .
- Chinmay M Raj (1RV20ET016 ), 1st place in JIT(pranathi)-Mad Ads and Coliseum(RVCE) on 18-6-22 and 15-7-22 respectively.
- Arnav Singh (1RV20ET066 ), Srishti Ghosh (1RV20ET053 ), **First Place** in BIT ( Manthan ) - Battle of Bands on 23/06/2022.
- Mehul Srivastava (1RV20ET033 ), special mention (3rd) in Solo instrumental and battle of bands Intercollegiate (BMS) on 28-05-2022.

## DIGITAL TRANSFORMATION IN ROAD SAFETY USING TINY ML

Road safety is a major concern worldwide, with millions of fatalities and injuries every year. Digital transformation using Tiny Machine Learning (Tiny ML) is a new approach that can help address this problem. Tiny ML is a branch of machine learning that is designed to run on microcontrollers with limited memory and processing power. By enabling the deployment of intelligent algorithms on small, low-power devices such as sensors, wearable's and other IoT devices, Tiny ML can help improve road safety in a number of ways. Tiny ML algorithms can be used to monitor driving behavior in real-time, analyzing data from sensors such as accelerometers, gyroscopes, and GPS. By analyzing this data, Tiny ML models can identify dangerous driving behaviors such as speeding, sudden braking, and reckless driving. The system can then alert the driver or authorities to take corrective action, reducing the risk of accidents.

Tiny ML algorithms can also be used to predict maintenance requirements of vehicles. By analyzing data from sensors in the vehicle, Tiny ML models can identify potential issues before they occur, alerting the driver or authorities to take preventive measures. This can help reduce the number of accidents due to mechanical failures. Tiny ML algorithms can be used to analyze traffic patterns and optimize traffic management. By analyzing data from sensors and cameras on the road, Tiny ML models can identify areas with heavy traffic and recommend alternative routes to reduce congestion. This can help reduce the risk of accidents due to traffic congestion. Tiny ML algorithms can be used to analyze data from cameras on the road and provide intelligent signage and road markings. For example, the system can analyze traffic flow and provide dynamic signage indicating the speed limit, lane changes, and other information to drivers. This can help reduce the risk of accidents due to driver error.

Tiny ML algorithms can also be used to predict collisions between vehicles and take preventive measures. By analyzing data from sensors in the vehicle, Tiny ML models can identify potential collision scenarios and alert the driver or take automatic measures such as emergency braking. This can help reduce the risk of accidents due to driver error. In conclusion, digital transformation using Tiny ML can help improve road safety by enabling intelligent algorithms to run on small, low-power devices. By analyzing data from sensors and cameras on the road and in vehicles, Tiny ML models can identify potential risks and take preventive measures, reducing the risk of accidents and improving the safety of drivers and pedestrians. As this technology continues to advance, even more innovative applications in the future can be expected.

**Dr. Bhagya R & Namratha Sreedhar, M.Tech III Sem., DCE**

## ಹೆಸರಿನಲ್ಲಿ ಏನಿದೆ?

ಮಹಾತ್ಮರಿಗೊಬ್ಬ ಶಿಷ್ಯನಿದ್ದ. ಅವನ ಹೆಸರು ದುಷ್ಟ ಅಂತ. ಆ ಶಿಷ್ಯನಿಗೆ ತನ್ನ ಹೆಸರಿನ ಬಗ್ಗೆ ಅತೀವವಾದ ನೋವಿತ್ತು. ಕೆಟ್ಟ ಕೆಲಸ ಮಾಡದಿದ್ದರೂ ಲೋಕದ ದೃಷ್ಟಿಯಲ್ಲಿ ದುಷ್ಟನಾದೆನಲ್ಲ ಎಂಬ ಕೊರತೆ ಅವನನ್ನು ಕಾಡುತಿತ್ತು. ಒಂದು ದಿನ ಆತ ಗುರುಗಳ ಬಳಿ ಹೋದ. ತನ್ನ ಸಂಕಟವನ್ನು ತೋಡಿಕೊಂಡ. ಗುರುಗಳು ನಕ್ಕು ನುಡಿದರು. ಹೊರಗಿನ ಪ್ರಪಂಚವನ್ನು ಒಮ್ಮೆ ಸುತ್ತಿ ಬಾ. ಯಾರ್ಯಾರ ಹೆಸರು ಹೇಗಿದೆ ಎಂಬುದನ್ನು ತಿಳಿದುಕೊಂಡು ಬಾ ಎಂದರು.

ಗುರುಗಳ ಆಜ್ಞೆಯಂತೆ ಶಿಷ್ಯನು ಲೋಕಸಂಚಾರಕ್ಕೆ ಹೊರಟ. ಮಾರ್ಗಮಧ್ಯೆ ಬಿಕ್ಷುಕನೊಬ್ಬ ಎದುರಾದ. ಅವನೋ ದಟ್ಟದರಿದ್ರ ಆದರೆ ಅವನ ಹೆಸರು ಮಾತ್ರ ಶ್ರೀಮಂತನೆಂದಾಗಿತ್ತು. ಮರುದಿನ ಅವನಿಗೆ ದಾರಿಯಲ್ಲಿ ಅಳುತ್ತಿದ್ದ ಯುವಕನೊಬ್ಬ ಎದುರಾದ. ಯಾಕಯ್ಯಾ ಅಳುತ್ತಿದ್ದೀಯಾ? ಎಂದು ಪ್ರಶಿಸಿದ ಆ ಶಿಷ್ಯ. ನನಗೆ ವ್ಯಾಪಾರದಲ್ಲಿ ಅತೀವ ನಷ್ಟವಾಯಿತು. ನನ್ನ ಮಗ ತನ್ನೆಲ್ಲಾ ಸಮಯವನ್ನು ಜೂಜಿನಲ್ಲೇ ವ್ಯಯ ಮಾಡುತ್ತಾನೆ. ನನ್ನ ಹೆಂಡತಿಯೂ ಸದಾ ಕಾಯಿಲೆಯಲ್ಲೇ ನರಳುತ್ತಿರುತ್ತಾಳೆ ಎಂದ ಆ ಯುವಕ.

ಆ ಶಿಷ್ಯನೋ ಕುತೂಹಲದಿಂದ ನಿಮ್ಮ ಹೆಸರೇನು ಎಂದು ಪ್ರಶಿಸುತ್ತಾನೆ. ಆ ಯುವಕ ತನ್ನ ಹೆಸರು ಆನಂದ ಎನ್ನುತ್ತಾನೆ. ಅದೇ ದಿನ ಗುರುಗಳ ಶಿಷ್ಯನ ಕಣ್ಮುಂದೆಯೇ ರಾಜಾಜ್ಞೆಯಂತೆ ಒಬ್ಬನನ್ನು ಮರವೊಂದಕ್ಕೆ ನೇಣು ಹಾಕುತ್ತಾರೆ. ಹೀಗೆ ಶಿಕ್ಷೆಗೆ ಗುರಿಯಾದ ವ್ಯಕ್ತಿಯ ಹೆಸರೋ ಚಿರಂಜೀವಿ ಎಂತಾಗಿರುತ್ತದೆ.

ದೃತಿಗೆಟ್ಟ ಶಿಷ್ಯ ಗುರುಗಳ ಬಳಿ ಹಿಂದಿರುಗುತ್ತಾನೆ. ಏನಯ್ಯಾ ಶಿಷ್ಯ ದಾರಿಯಲ್ಲಿ ಯಾವ್ಯಾವ ಹೆಸರಿನವರನ್ನು ಸಂಧಿಸಿದೆ? ಯಾರಾ ಹೆಸರನ್ನು ಇಟ್ಟುಕೊಳ್ಳಲು ಬಯಸುತ್ತೀಯಾ ಎಂದು ಗುರುಗಳು ಪ್ರಶ್ನೆ ಮಾಡುತ್ತಾರೆ.ಇಲ್ಲಾ ಗುರುಗಳೇ ನಾನೀಗ ಮನಸ್ಸು ಬದಲಿಸಿಕೊಂಡಿದ್ದೇನೆ. ಕೇವಲ ಹೆಸರನ್ನು ಇಟ್ಟುಕೊಳ್ಳುವುದರಿಂದ ಏನೂ ಪ್ರಯೋಜನವಿಲ್ಲ. ಎನ್ನುವ ತೀರ್ಮಾನಕ್ಕೆ ಬಂದಿದ್ದೇನೆ.

**ಪದ್ಮಪ್ರಿಯ ಸಿ. ಜೆ., ಕಛೇರಿ ಸಿಬ್ಬಂದಿ**

# Quantum Computing and its Impact on Cryptography

Few of us give much thought to the tiny padlock symbol that appears in our web browsers every time we use an e-commerce site, send, and receive emails, or check our bank or credit card accounts. It's a signal that the online services are using HTTPS, a web protocol that encrypts the data we send and receive across the internet. This and other forms of encryption protect all kinds of electronic communications, as well as things like passwords, digital signatures, and health records. Quantum computers could undermine these cryptographic defenses. These computers are not just more powerful supercomputers, instead of computing with the traditional bits of 1 or 0, quantum computers use quantum bits, or qubits (CUE-bits), to run multidimensional quantum algorithms. This increases the number of computations performed and opens new possibilities for solving challenging problems that classical computers can't tackle.

Current public-key algorithms, such as RSA and ECC, depend on the difficulty of computing the prime factors of large numbers and solving the discrete logarithm problem, respectively. These algorithms are not susceptible to brute force attacks given that even with massive amounts of computing power, they would take centuries, or, in some cases, even longer than the lifetime of the universe, to break. However, it is possible to create unique algorithms for quantum computers (e.g., Shor's algorithm) that can break these Transport Layer Security (TLS) communication algorithms (RSA/ECC) in a matter of minutes, essentially rendering them useless once quantum computers reach a certain scale.

Quantum safe cryptography (QSC), also known as post-quantum cryptography, is a new generation of the public-key cryptographic system that is undergoing evaluation by the National Institute of Standards and Technology (NIST). It is important to note that QSC only protects your data from a breach as it travels to a service endpoint. Imported root keys (including their associated payloads) are encrypted by TLS session keys. Data-at-rest encryption uses symmetric keys and AES 256 symmetric keys and is safe from large quantum computer attacks. The one thing to note here is that because QSC uses a larger key size compared to classic public key algorithms, the network bandwidth requirements will be higher. Quantum -safe algorithm performance can be affected by network profile, CPU speed, and API call rates. These new quantum cryptographic algorithms are based on hard mathematical problems that even large quantum computers cannot break. The general trend observed in the QSC algorithms proposed so far has been a large variation in performance characteristics. This means that some algorithms will be better suited to particular use cases than others.

Most cryptographic hashes (such as SHA2, SHA3, and BLAKE2), MAC algorithms (such as HMAC and CMAK), and key-derivation functions (bcrypt, scrypt, and argon2) are only slightly affected by quantum computing and hence, can be considered quantum-safe. Similarly, symmetric ciphers (AES-256, and Twofish-256) that use 256-bits or more as key length (don't use 128-bit AES) are quantum-safe. On the other hand, the most popular public-key cryptosystems and most digital signature algorithms are quantum-broken. These quantum-broken algorithms are soon to be replaced by new-age quantum-safe signature algorithms (e.g., lattice-based, or hash-based signatures), however, they are constrained by their use of longer key lengths, which would require more powerful quantum computers deployed on a large scale. Transitioning to any form of new cryptographic infrastructure is an inherently complex and expensive process that must be planned and managed with care. Given that the next radical change in cryptography algorithms emerges from the development of quantum-safe algorithms, it is vital to lay out corresponding standards that allow for a global level playing field for innovation in QSC development.

In response to these growing concerns, NIST has initiated a process to solicit, evaluate, and standardize quantum-resistant public-key cryptographic algorithms by drawing on cutting-edge research from academia, industry, and governments worldwide. It is expected to come out with its much-anticipated set of QSC standards sometime around 2024.

**Shaswat Valivati (VIII Sem. UG) and Dr. Premananda B.S.**

Image credits: https://wp.technologyreview.com/wp-content/uploads/2019/07/quantumexplainer3.2-01-10.jpg


Image credits: https://securityboulevard.com/2020/09/adopting-quantum-cryptography-why-y2q-will-be-too-

## Department Alumni Meet 2022

An hybrid (online and offline) alumni meet was conducted on 24th September, 2022 at 10:30 AM, by Department of Electronics and Telecommunication Engineering in TE 307.

Alumni of UG and PG (DC and RFME) had attended the meet and shared their experiences and achievements after their graduation. Alumni gave suggestions and inputs for curriculum revision and motivated the graduate students.


## Paper Abstracts

**Quantum Cryptographic Applications in Smart Grid Communication**
Sanjan D Murthy, Adharsh V, B Ashrith, Pranav P Athri, and Srivani S G

In this project, The understanding of the B-92 protocol and its feasibility in smart grid communication is important. The flow of sensitive data is a key component of smart grids, and that it is crucial to safeguard this data from illegal access or modification. Hence, the goal of this project is to put the B-92 protocol into practise, providing strong security assurances by leveraging the quantum features of light to create secure keys for data encryption and decryption. The objective of this team is to raise stakeholder confidence in the smart grid system while enhancing the overall security and integrity of smart grid communication, lowering the danger of cyberattacks. This project aims to analyse a quantum simulation and understand the working of quantum error correction.

**LTE Connectivity Impact on Collision Avoidance**
Muskan Siddiqa I and Anagha B R

Long-Term Evolution (LTE) technology can be used in road safety applications to enhance communication between vehicles, infrastructure, and other devices. LTE can provide high-speed data transfer, low latency, and reliable connectivity, making it an ideal technology for applications such as vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication. LTE can be used to provide real-time traffic updates, which can help drivers avoid accidents and traffic congestion. Additionally, LTE can be used to facilitate communication between vehicles and infrastructure, allowing vehicles to receive warnings about road hazards, weather conditions, and other potential safety risks .

**Pothole Detection Using Image Processing and Data Logging**
Harsh Bhan Giri, Harshad Biradar, Nihal Gupta, Pranav V Jirali and J.N.Hemalatha

Potholes are the main cause of accidents; it is crucial to identify and categorize them using image processing techniques. Different image pre-processing and segmentation methods for pothole detection were reviewed using performance measures. In this paper image pre-processing based on the difference of Gaussian-Filtering and clustering-based image segmentation methods are implemented for better outcome. According to the findings, edge detection-based segmentation is favoured for its specificity and K-Means clustering-based segmentation was selected for its quickest computation time. The primary objective of this study is to find a superior approach that is more precise and efficient than current methods

**Smart Road Safety System using V2V- Communication**
Harshitha LN and Suchetha G

V2V conversation is being advanced as one of the most advanced technologies to overcome the congestion, street injuries and vehicle collisions .It also allows in imparting traffic efficiency, road safety protection. The automobiles are predicted to share information about their speed, distance, velocity. This facts can be leveraged to mitigate the troubles leading to avenue accidents. on this paper, present a detailed and in-intensity take a look at technology-IEEE 802.11p and LTE-V2V being under energetic attention to be used in vehicular conversation.

## Paper Abstracts

### Implementation of ML Algorithms for Target Detection

Deepak Patel N M, Usha M M, and B Roja Reddy

The Radar is a detection tool that uses radio waves to determine an object's radial velocity, angle, and distance from the location. In shared spectrum systems, band is shared by users with different priority levels or tiers. The primary user of the band is navy ship-borne radar, whereas LTE users are the secondary users, who are permitted to use the band when the radar is not existing and functional in their region of operation. The RF dataset for different radars is generated using simulated radar waveform generator using MATLAB GUI developed by National Institute of Standards and technology (NIST). Several Machine learning algorithms like SVM algorithm, RBF algorithm, KNN algorithm and CNN model are evaluated on the dataset. The performance of the ML algorithm is tested in this paper using field-measured waveforms of incumbent signals in and around the band. In This paper the ML algorithms are implemented and compared for target detection of radar .

### Digital Technologies for Road Safety

Prakash Biswagar and Raghavendra R

Road traffic accidents are one of the most critical problems for human life and infrastructure. According to the World Health Organization (WHO), road traffic injuries cause more than 1.35 million deaths per year, with 93% of them occurring in developing countries. Globally, the road traffic death rate ranges from 3 to almost 36 per 100,000 populations. In addition to the human cost, road accidents are also associated with high financial drain, for example, medical spending, productivity losses and property damages that severely burden a country's socio-economic fabric. It is estimated that these costs range from 1% to 5% of countries' GDP, with up to 3% in developing countries and 2.2% to 4.6% in developed countries. However, a particular element that makes the road safety research an even higher priority at this point is the fact that both the concept and technology of transportation are rapidly evolving. The emergence of driving automation and connected transportation systems are only few dimensions in which advanced technology is expected to make significant changes to road safety. These changes, however, may also embody new safety problems that did not exist prior to these developments. The UN General Assembly has set an ambitious target of halving the global number of deaths and injuries from road traffic crashes by 2030

### Lane Detection using Deep Learning Techniques

Rithika Kannan and Kori Madhura Jagadish

In today's world, technology is taking a rapid growth. In which automotive industry is one of such. There are manydevelopments, which focus on automationof several tasks in driving. The moto is to achieve safety of the driver and the road users. This can provide comfortable driving since the focus is on improving the quality of driving. As known human erroris one of the main reasons for accidents on road. Hence, we have ADAS (Advance Driving Assistance System) which uses camera, several sensors and radars to overcome many misfortunes. The maingoal is to avoid traffic accidents and injuries. In this paper, we use deep learning techniques and some of its algorithms toimplement lane and road edge detection, which is one of the important aspects inADAS. The objective of this paper is tounderstand the concepts used here. We are trying to detect lane using DL techniques and using algorithms like CNN andYOLO. The data sets are collected and the project is developed. Optimization is done for all the three concepts as mentioned above. For implementation, we are using a python code, which is run on google colab. The hardware requirements can be laptops/PCs with the required softwarerequired

### Performance Analysis of Wavelength Division Multiplexing MIMO Free Space Optical Communication Systems

Vaishnavi S, Vidyashree K, and Ranjani G

Free space optics (FSO) has emerged as a viable alternative to radio frequency communication, frompast few years. It gives a promising high-speed point-to- point communications solution and also considered as widebandwidth and cost-effective. MIMO-FSO are increasing popularity as a result of their performance under various atmospheric conditions. Wavelength Division Multiplexing(WDM) is widely used in optical communication to use the capacity of the fiber channel more efficiently. This work is related to performance analysis of different techniques such as wave length division multiplexing, multiple input multiple output and FSO -WDM-MIMO systems using Opti-system software. The link parameters such as Eye pattern, Minimum BER and Maximum Q-factor are analyzed.

**Placement Statistics of UG students:**

**Number of eligible students: 58**

**Number of offers made: 68**

**Number of students placed: 49**

**Number of students with open dream package: 34**

**Number of students with dream package: 30**

**Placement statistics of PG students (2020-2022):**

**Placed DCE: 19**

**Placed RF&MWE : 10**

**Placement Statistics of PG students (2021-2023):**

**Internship DCE: 10**

**Internships RFME: 02**

**Students Participation in NCC:**

- **Thanmayee Reddy K.**
- **Samudyata A.**
- **D.R. Upendra Shetty**
- **Prajwal R.**
- **Aishwarya R.**
- **Harshitha B.**
- **Drithi Ranganath**

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# Centre of 5G and Emerging Wireless Technologies

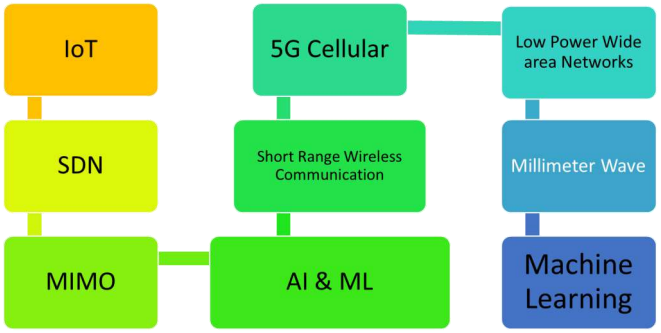
## VISION

- Empowering innovative young researchers and entrepreneurs in Emerging Wireless Technologies.

## MISSION

- Building state of the art infrastructure for designing and implementation of advanced wireless solutions for industrial and societal benefit.
- Enhancing Knowledge and Skill through training to make students industry ready.
- Undertaking interdisciplinary research projects through collaboration with Industry & research organizations and developing Sustainable Solutions

### Technology Trends in 5G




### FUNDED BY MODROB, AICTE

**F.No. 9-29/IDC/MODROB-REG/Policy –I/2021 -22, Letter dated:** 4.01.2022

**Title: Modernization of Advanced RF and Wireless Communication Laboratory with full-fledged testing and Characterization of the passive and active circuits for 5G and Allied technologies.**

P I **: Dr. K Sreelakshmi**, Professor and HoD, Dept. of ETE , RVCE

Co PI: **Dr. Nagamani K**, Professor ,Dept. of ETE , RVCE
Co PI: **Dr. B Roja Reddy**, Associate Professor, Dept. of ETE , RVCE

**Signing of MoU with the DADB**: To offer the Certification Course on 5G in Association with the DADB

**Signing of MoU with Tektronix** : •Support the Centre with available equipment's procured under MODROB

### Activities carried under 5G centre

**Visit to Tektronix was arranged for Dept. of ETE students on** on 14th Feb 2023, Edulab, Tekcoe lab , service solution operation and HPCC lab.

**Visit to IISc , 5G Lab**: Interaction with the Dr Chandra R Murthy , IEEE FELLOW

## World Telecommunication and Information Society Day: WTISD-2022
## National Conference on "Digital Technologies for Smart Cities"

To mark the Celebration of "World Telecommunication and Information Society Day–WTISD-2022", a two day National Conference on "Digital Technologies for Smart Cities" was organized during 17th and 18th May, 2022. The theme proposed for WTISD-2022 by ITU is "Digital Technologies for Older Persons and Healthy Ageing ".

National Conference is an annual event of the department to spread awareness, research opportunities for serving the society and enhancing technical interaction among faculty, researchers and students. The following events were conducted as a part of the celebrations: technical talks, paper presentations, release of the department newsletter and award of Arunodaya Scholarship. The events were sponsored by RSST,HR Universal Systems, Fluxgen Sustainable Technologies, RailTel, Ministry of Railways, infynix data services Pvt Ltd, and Krupa Communications.

**Inauguration Ceremony**

**Release of Tarangavani - Dept. Newsletter**

**Arunodaya Scholarship Recipients**

**Group photo**

***Every year Dept of ETE provides Arunodaya Scholarships for both UG and PG students.***

***The following are the beneficiaries for the year 2021-2022***

| S.No | USN | Name of the Student | Semester |
|---|---|---|---|
| 1 | 1RV20ET025 | Harsha S Gowda | IV (UG) |
| 2 | 1RV19ET017 | D R Upendra Setty | VI (UG) |
| 3 | 1RV19ET046 | Sagar H M | VI (UG) |
| 4 | 1RV18TE023 | M Pooja | VIII (UG) |
| 5 | 1RV21LDC19 | Navyashree M | I (PG) |
| 6 | 1RV20LRF03 | Akshata Ballolad | IV (PG) |

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***MISSION***

1. Provide comprehensive education that prepares students to contribute effectively to the profession and society in the field of Telecommunication.
2. Create state-of-the–art infrastructure to integrate a culture of research with a focus on Telecommunication Engineering Education.
3. Encourage students to be innovators to meet local and global needs with ethical practice.
4. Create an environment for faculty to carry out research and contribute in their field of specialization, leading to Center of Excellence with focus on affordable innovation.
5. Establish a strong and wide base linkage with industries, R&D organization and academic Institutions.

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