

# *Sharnbasaveshwar College of Science, Kalaburagi*

*(Diamond jubilee celebrated 1956-2016, and ISO Certified 9001-2015)*

*Department of Electronics*

**Brief Report of**

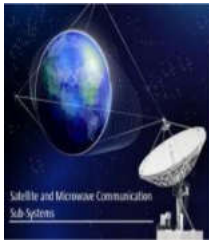
**IQAC initiative**

**One Day National Webinar on**

**“Advanced Communication Technology and Smart Dust Sensors”**

Date: 15.06.2020

Time: 11:30 a.m



## **Resource persons:**

### **1. Dr. H. M. Mahesh**

Professor,  
Dept. of Electronic Science,  
Bangalore University,  
Bengaluru


### **2. Dr. S. N. Mulgi**

Professor,  
Dept. of Applied  
Electronics Gulbarga  
University, Kalaburagi

## **Key note Speaker**

### **Prof. S. V. Halse**

Honorable Vice Chancellor  
Davanagere University,  
Davanagere

  
PRINCIPAL  
SHARNBASAVESHWAR COLLEGE  
OF SCIENCE, GULBARGA

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Centenary Celebrated Sharanabasaveshwar Vidhya Vardhak Sangha's

## SHARANABASAVESHWAR COLLEGE OF SCIENCE

(Affiliated to Gulbarga University, Diamond Jubilee Celebrated and ISO Certified )  
Vidya Nagar, Kalaburagi-585103, Email Id:[sbcscg@gmail.com](mailto:sbcscg@gmail.com)

Through: ZOOM APP

Under IQAC Initiative  
Dept. of Electronics  
organizes

Date: 15.06.2020  
Time: 11:30 am

One Day National Webinar on *"Advanced Communication Technology & Smart Dust Sensors"*

In the August Presence of  
Sri. Basawaraj S. Deshmukh  
Secretary.  
Sharanabasaveshwar  
Vidhya Vardhak Sangha's,  
Kalaburagi

Keynote Address by  
Prof. S.V. Halse  
Vice-Chancellor,  
Davanagere University,  
Davanagere karnataka

Session 1:  
Topic: Microwave  
Communication  
Resource Person  
Dr. S. N. Mulgi  
Professor, Dept. of Applied  
Electronics, Gulbarga University,  
Kalaburagi, Karnataka

Session 2:  
Topic: Smart Dust Sensors  
Resource Person  
Dr. H. M. Mahesh  
Professor, Dept. of Electronic  
Science, Bangalore University,  
Bengaluru, Karnataka

Organising Secretaries  
Dr. S. A. Malipatil,  
Dr. Jagadevi C. Gudda  
Sharanabasaveshwar  
College of Science, Kalaburagi.

### Registration

Link: <https://docs.google.com/forms/d/1KGD41QhAUqBXGZQqaJlplalzNv56JK7vB-M6czcfz4>


Principal

**Dr. S. G. Dollegoudar Patil**

Sharanabasaveshwara  
College of Science, Kalaburagi

## PROGRAMME SCHEDULE:

1. Welcome speech
2. Introduction of resource persons
3. Key note address: By Prof. S. V. Halse
4. **Session – I** : Presentation by Dr. H. M. Mahesh on Smart Dust sensors
5. **Session – II** : Presentation by Dr. S. N. Mulgi on Microwave Communication
6. Presidential Address : Principal, Dr. S. G. Dollegoudar
7. Vote of thanks

  
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## **Webinar Report**

IQAC initiative One Day National Webinar on “Advanced Communication Technology and Smart Dust Sensors” was organized by department of Electronics on 15.06.2020.

The main objective of the webinar was to provide overview of recent changes in the field of electronic communication and the sensors.

The webinar began with a welcome speech by Dr. Jagadevi C. Gudda, Asst. Prof. in Electronics. Dr. S. A. Malipatil, Asst. Prof. in Electronics gave an introduction about the Key note Speaker Prof. S. V. Halse, Honorable Vice Chancellor, Davanagere University, Davanagere. Prof. S. V. Halse addressed the participants and enlightened them on the relevant webinar topic.

Next, Dr. S. A. Malipatil introduced resource persons Dr. H. M. Mahesh, Professor, Dept. of Electronic Science, Bangalore University, Bengaluru and Dr. S. N. Mulgi, Professor, Dept. of Applied Electronics, Gulbarga University, Kalaburagi.

Prof. H. M. Mahesh delivered a talk on “Smart Dust Sensors” in the first session. In the second session Prof. S. N. Mulgi delivered a talk on “Microwave Communication”.

Dr. S. G. Dollegoudar, Principal, Sharanabasaveshwar College of Science delivered a presidential address.

Dr. S. A. Malipatil proposed a vote of Thanks. Around 90 participants attended the webinar.

The feedback from participants collected on the presentations and the contents of the webinar.

The panel discussion and chat boxes dedicated to specific questions around the topic are held during presentation sessions.

### *Profile of the Key Note Speaker:*

#### **Prof. Sharanappa V. Halse Vice Chancellor Davanagere University**

Prof. Sharanappa V. Halse has joined the Davanagere University as its third Vice Chancellor on 26th March 2018, Prior to this he was the Registrar (Administration) of the same University from 04.02.2017 to 25.03.2018 and Registrar (Admin.) of the Gulbarga University, Gulbarga from 22.11.2016 to 30.12.2016 and Registrar (Eval.) of the Gulbarga University, Gulbarga from 18.02.2013 to 07.12.2015, He was the Professor of Electronics, in Karnataka State Women's University, Vijayapura from 16.07.2007, Chairman and Dean of Faculty of Science and Technology and also served as Member of Syndicate, Senate and Academic council and IQAC Director of Karnataka State Women University, Vijayapura, Executive Council Member of Instrument Society of India and Indian Institute of Science, Bangalore. From 2004 to 2008. He served in Sharanabasaveshwar College of Science Gulbarga as Lecturer, Senior Lecturer and Selection Grade Lecturer from 25.11.1987. to 15.07.2007. Prof. Sharanappa V. Halse taught Electronics to the UG and PG Students for more than three decades and Guide to the Research Scholars and has published several Research Papers in National and International journals and has presented Research Papers in National and International Conferences, seminars, and Symposium etc. Prof. Sharanappa V. Halse born in the year 1962 in Jaigaon village of Bidar district, he has earned his graduation, post-graduation and doctoral degree from Gulbarga University, Gulbarga.

## *Profile of Resource persons:*


### **1. Dr. S. N. Mulgi:**

Dr. S. N. Mulgi has born in the village so called Bombalgi in Bidar District. He has completed his graduation from B. V. B. College, Bidar. He received his M.Sc., M. Phil and Ph. D degrees from Gulbarga University, Kalaburagi in the year 1986, 1989 and 2003 respectively. He is the recipient of two gold medals for his First Rank in M.Sc. He served in Degree and Engineering Colleges from 1989 to 1995. Since 1995 he has been working in the Department of PG Studies and Research in Applied Electronics, Gulbarga University, Kalaburagi. From 2010 he is working as Professor in this Department. During April 2010 – 2012 Dr. S. N. Mulgi has served as Chairman of Applied Electronics Department. Again from 12<sup>th</sup> April 2018 to till date he is working as a Chairman of the same Department. He is working as RUSA, Nodal Officer, Gulbarga University, Kalaburagi project sanctioned by MHRD, New Delhi worth of Rs. 20 crores and involved in many administration work assigned by the University. He served as the Chairman of BOS and Chairman and member of BOE for various university within and outside the state. He has got more than 30 years of research and teaching experience at PG level. He has engaged research work mainly in the field of Microwave Communication for the design and development of planar devices for various microwave communication applications. Dr. S. N. Mulgi has published more than 300 research papers in International, National Journals, Conferences, Symposium, Seminars etc. His research findings have appeared in many reference books. His papers have been selected as the best papers in several Conferences.

Under the guidance of Dr. S. N. Mulgi so far Eleven Ph. D and ten M. Phil degrees have been awarded. Presently several students are working under his guidance for Ph.D. Dr. S. N. Mulgi has successfully worked as co-investigator and completed the projects sanctioned by DST,



UGC New Delhi. He is the reviewer of many National and International Journals. He served as the advisory committee member of various National and International Conferences, Seminars etc. He has delivered several key note addresses, valedictory talks, chaired the technical sessions and presented technical talks in various National and International Conferences. He has delivered many popular science lectures to promote science awareness among the students and for teachers within and outside the state. Prof. S. N. Mulgi has published science article books in Kannada through prasaranga. One of his book is appeared as text book for B. Sc, BCA and BSW students from the academic year 2018-19. Dr. S. N. Mulgi has received prestigious Gulbarga University Karnatka Rajyotsava Award 2018 for writing science book in Kannada.

  
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## 2. Dr H M Mahesh



**Name :** Dr H M Mahesh



**Date of Birth :** 05.06.1968



### **Qualifications:**

❖ B Sc – University of Mysore – 1988

❖ M Sc – University of Mysore – 1992

❖ Ph D – Mangalore University – 2002



### **Fellowships Received:**

❖ Junior Research Fellowship – BRNS – DAE; 1995-1997

❖ Senior Research Fellowship – BRNS – DAE; 1997 – 2002

❖ Post Doctoral Fellowship – EPSRC, Queen’s University Belfast, Belfast UK: 2002 – 04



### **Teaching Interests:**

❖ Microwaves Devices, Circuits and Applications

❖ Semiconductor and Nano Electronic Devices

❖ Advanced Communication Systems

❖ Electronic detectors and Instrumentation

❖ Electrodynamics, Electromagnetic Theory

❖ Nuclear Electronics and Instrumentation



### **Research Interests:**

❖ Nano Electronic Thin Film Electronic Devices – Solarcells

❖ Polymer and Nano Electronic Sensors and Devices

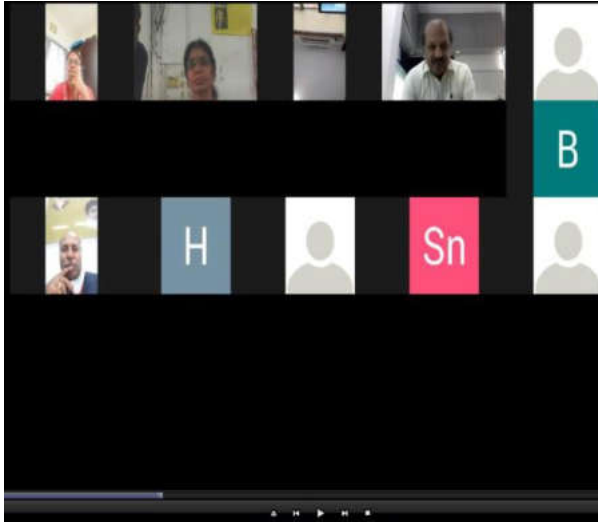
❖ Quantum Dots – Synthesis and applications

❖ Radiation effects on Electronic devices

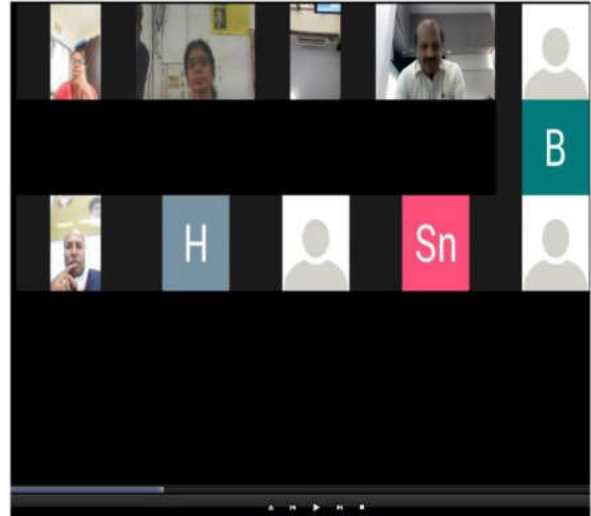
❖ Environmental Radioactivity

- Took the responsibility of establishing department of Electronics at Kuvempu University with latest technology as the founder Chairperson / Coordinator of the Department 2004 – 2008.
- Joined Bangalore University as a Reader during Oct. 2008.
- Presently, Professor at Dept. of Electronic Science, Bangalore University, Jnanabharathi, Bangalore
- Served as a Chairman, Dept. of Electronic Science Bangalore University, Jnanabharathi, 2010-12 & 2016 - 18
- Member of BOS (UG, PG) BOE and Doctoral Committees of various universities and institutions within and outside Karnataka
- Research Projects Involved and completed : Nine
- Grants received through projects : 85 Lakhs (from various funding agencies)
- As a research guide successfully Guided / Mentor of:
  - ❖ Post Doc : One
  - ❖ Ph D : Eight
  - ❖ M Phil : Two
- Adjudicated Ph D Thesis: > 25
- Published Research Papers in International and National Journals of repute : > 85 ;  
Book Chapters : 01 Elsevier  
Conferences > 130
- Countries visited: UK, Rhodes, Greece, IAEA Vienna in Austria, Italy, France, Ireland, Malaysia, Sweden, Finland, Srilanka, etc. on various capacities.

# *PPT's Presentations*



Participants



Participants

*A Special lecture  
on*  
**SMART DUST SENSOR**  
*Engineering systems in a cubic millimetre and beyond*

**Dr H M Mahesh**  
*Professor*  
Department of Electronic Science  
Bangalore University, Jnana Bharathi, Bangalore – 560056  
*hm\_mahesh@rediffmail.com; 9448233962(Cell)*

Dr H M Mahesh, Bangalore University WEBINAR


**OVERVIEW**

- Introduction
- Characteristics of the Smart dust
- Smart Dust – Meaning
- The Smart Dust Mote
- Smart Dust Architecture / Technology
- Smart Dust Components
- Communication with Smart Dust
- Application
- Challenges
- Conclusion

June 15, 2020 Dr H M Mahesh, Bangalore University WEBINAR 2


Webinar On: SMART DUST SENSORS

By: Dr. H. M. Mahesh

  
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## INTRODUCTION

- Smart Dust concept credited to researchers at the University California, Berkeley in 1997 by Prof. Kris Pister and Kahn.
- Their *smart dust project* discovers the limits on size and power consumption in autonomous sensor nodes.
- Size reduction is vital, to make the nodes as inexpensive and easy to deploy as possible.
- The research team were confident that they could incorporate
  - ❖ the requisite sensing
  - ❖ communication
  - ❖ computing hardware
  - ❖ power supply
  - ❖ Size –  $\text{cm}^3$  with excellent functionality



Size of the smart dust

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## CHARACTERISTICS OF SMART DUST

This new technology combines;

- ❖ Sensing
- ❖ Computing
- ❖ Wireless communication capabilities
- ❖ Autonomous power supply
- ❖ Are very very small in size (~ mm)
- ❖ Light in weight
- ❖ Low cost
- ❖ Can remain suspended in the environment like a dust particle
- ❖ It is very hard to detect its presence
- ❖ It is even harder to get rid of them once deployed
- ❖ Useful in monitoring real world phenomenon without disturbing the original process



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## SMART DUST – MEANING

The millimeter-scale wireless sensor nodes / mote are called "*Smart Dust.*"

*Smart Dust Sensors are:*

- ❖ can detect everything from light to vibrations.
- ❖ tiny dust size device with extraordinary capabilities
- ❖ Combines sensing, computing, wireless communication capabilities and autonomous power supply within volume only few millimeters
- ❖ the devices are small wireless MEMS sensors
- ❖ *very small and light in weight that they can remain suspended in the environment like an ordinary dust particle.*
- ❖ *the air currents can also move them in the direction of flow.*

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## SMART DUST MOTE

A single Smart Dust mote has:

- Sensors –  $0.5 \times 0.5 \times 0.1 \text{ mm}^3$
- Solarcell –  $1 \times 1 \times 0.1 \text{ mm}^3$ , 0.1 mW generation
- a power source based on thick-film batteries –  $1 \text{ mm}^3$  – 1J storage
- CMOS controller –  $1 \times 1 \times 0.1 \text{ mm}^3$
- Power Capacitor –  $0.5 \times 0.5 \times 0.1 \text{ mm}^3$
- a semiconductor laser diode and MEMS beam steering mirror for active optical transmission –  $1.0 \times 0.5 \times 0.1 \text{ mm}^3$
- a MEMS Corner Cube Retro-reflector (CCR) for passive optical transmission –  $0.5 \times 0.5 \times 0.1 \text{ mm}^3$ , 10 kbps, 1  $\mu\text{W}$ , 1 km
- Total Volume <  $1.5 \text{ mm}^3$
- Total mass – **5 mg**

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Webinar On: SMART DUST SENSORS

By: Dr. H. M. Mahesh

### SMART DUST COMPONENTS

- Microcontrollers
- Processor
- Tiny Operating system
- 3 KB RAM memory

**Smart Dust Includes.....**

- ❖ Accelerometer
- ❖ Magnetic Sensor
- ❖ Light intensity sensor
- ❖ Humidity sensor
- ❖ Pressure sensor
- ❖ Temperature sensor
- ❖ Explosive detection sensor
- ❖ Optical sensor, etc.,

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### SMART DUST MOTE – ARCHITECTURE

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### SMART DUST - WORKING

- The microcontroller,
  - determines the task performed by the mote
  - efficiently manage power to the various components of system to conserve energy.
- Collects the responses / signals due to physical or chemical stimuli from the sensors and store it in the memory.
- Turns on optical receiver to see if anyone is trying to communicate with it.
- This may include new programs / messages from other motes.
- In response to a message or upon its own initiative, the microcontroller will use the corner cube reflector (CCR) or laser to transmit sensor data or message to a base station or another mote.

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### POWER MANAGEMENT

- The size of the mote is very small and has to perform many tasks
- No much space for solar cells and to conserve energy wherever and whenever possible
- Only clock and few timers will be running and rest of the system off most of the time.
- Majority of the mote is powered off with only clock
- Few timers control the sensors which respond to the stimuli such as temperature, ambient light, vibration, acceleration, air pressure, etc.
- When reconing timer expires, it powers up the sensor to take sample and converts to digital signal.
- The data either stored in the SRAM of the microcontroller or the microcontroller is powered to perform further tasks.

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Webinar On: SMART DUST SENSORS

By: Dr. H. M. Mahesh

## FREE SPACE OPTICAL NETWORK

- Downlink communication (BST to dust)- the base station points a modulated laser beam at a node. Dust uses a simple optical receiver to decode incoming message
- Uplink communication (dust to BST)- the base station points an unmodulated laser beam at a node, which in turn modulates and reflects the beam to the BST

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## COMMUNICATION WAYS

There can be three possible ways of communication by the mote.

1. RF – Communications
2. Optical Communication – passive dust mode transmitters
3. Optical Communication – active dust mode transmitters

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## 1. RF COMMUNICATIONS

- RF communications is one of the well developed communication systems
- It is based on generation, propagation and detection of electromagnetic waves with a frequency range from tens of kHz to hundreds of GHz
- It can be used to function as both uplink and downlink

**Pros:**

- ❖ Long range
- ❖ Not severely affected by rain, fog, or atmospheric turbulence

**Cons:**

- ❖ Antenna may be too large for dust motes
- ❖ Require modulator, demodulator, filtering (power consumption)
- ❖ Require complex multiplexing schemes (TDMA, FDMA, CDMA)

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## 2. OPTICAL COMMUNICATION – PASSIVE DUST MODE TRANSMITTERS

**Passive dust mote Optical transmitters**

**Attractive Communication Option for Uplink and Downlink**

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Webinar On: SMART DUST SENSORS

By: Dr. H. M. Mahesh



**2. OPTICAL COMMUNICATION – PASSIVE DUST MODE TRANSMITTERS**

**Pro's :**

- Optical transceivers require only simple baseband analog and digital circuitry; no modulators, active bandpass filters or demodulators needed.
- The short wavelength of visible or near-infrared light make possible for a millimeter-scale device to emit a narrow beam (high antenna gain can be achieved).
- A base-station transceiver (BST) equipped with a compact imaging receiver can decode the simultaneous transmissions from a large number of dust motes at different locations within the receiver field of view, due to Space-division multiplexing.
- The Corner Cube Reflector (CCR) makes it possible for dust motes to use passive optical transmission techniques, i.e., to transmit modulated optical signals without supplying any optical power.

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**2. OPTICAL COMMUNICATION – PASSIVE DUST MODE TRANSMITTERS**


**Con's:**

- It is a single-hop network topology, where dust nodes cannot directly communicate with each other, but only with a base station.
- Communication may suffer from variable delays if the laser beam is not already pointing at a node that is subject to communication with the BST.

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By: Dr. H. M. Mahesh

  
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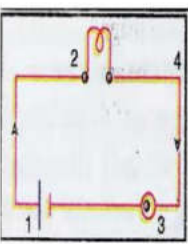
# MICROWAVE COMMUNICATIONS

By  
**Dr. S.N.Mulgi** M.Sc. ALPbtl. Ph.D.  
Professor

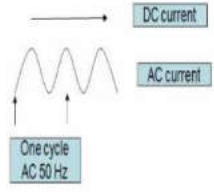


Department of PG Studies and Research in  
Applied Electronics.  
Gulbarga University, Gulbarga – 585 106.

Introduction



1- cell  
2- bulb  
3- switch  
4- conductor



DC current

AC current

One cycle  
AC 50 Hz

The EM frequency spectrum is classified as VLF, LF, MF, HF, VHF, UHF, SHF and ESHF

$\mu W$  range is 1 to 1000 GHz (lies at ESHF)

However, the more commonly used range of  $\mu W$  in is 1 to 100 GHz. This is because after 100 GHz, the EM signal acquires the properties of scattering, just like X-rays.

$\mu W$  signal 1-100 GHz further put in different well known universally accepted band of frequencies

|             |              |
|-------------|--------------|
| L           | 1.0-1.5 GHz  |
| S           | 1.5-3.9      |
| C           | 3.9-8.0      |
| X           | 8.0-12.5     |
| Ku          | 12.5-18.5    |
| K           | 18.0-26.5    |
| Ka          | 26.5-40      |
| Millimeter: | Above 40 GHz |

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By: Dr. S. N. Mulgi

$\mu$ W Signals are Generated by using:

Klystron

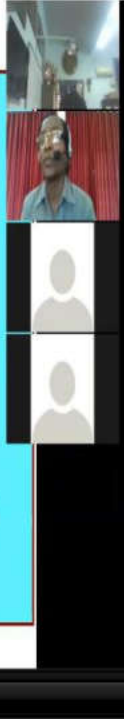
Reflex Klystron

Gyrotron

TWT

Magnetrons etc.

(All are high power sources capable of producing several KW to MWs)



Klystron



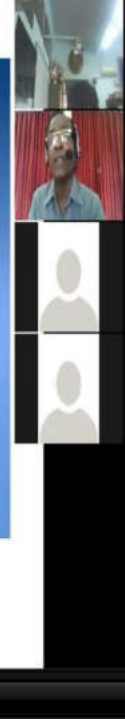
Gyrotron



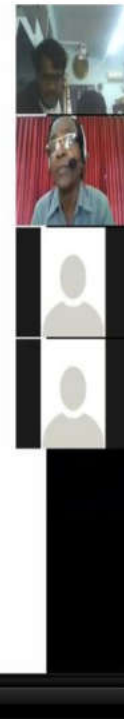
Multibeam  
Klystron



Magnetron



Generation of  $\mu$ waves



•A significant advantage of  $\mu$ W is large B/W.

•A 10% B/W at 3 GHz means 300 MHz spectrum.  
(i.e. 2850-3150MHz).

•Hence all the radio, TV & other communication can be accommodated in 10% of B/W around 3 GHz



Webinar On: MICROWAVE COMMUNICATIONS

By: Dr. S. N. Mulgi

Merits of Microwave :

High freq.  $\mu$ W simplify the design and installation of devices.

e.g. At 10 GHz  $1^\circ$  Beam/W signal will obtained by using 6.9 ft diameter antenna.

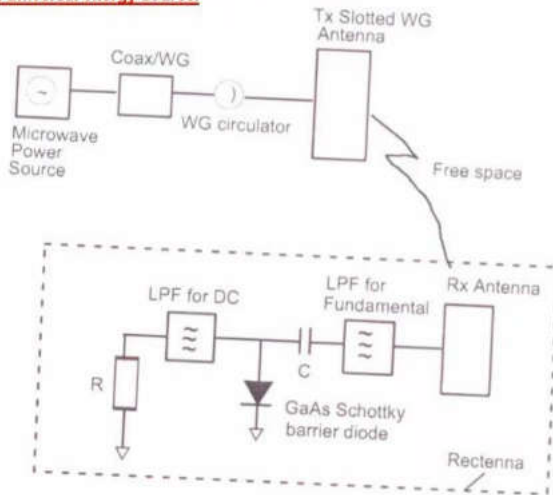
If freq. is 10 MHz, this will require an antenna diameter of 6900 ft. This becomes impractical.

Microwaves are used for:

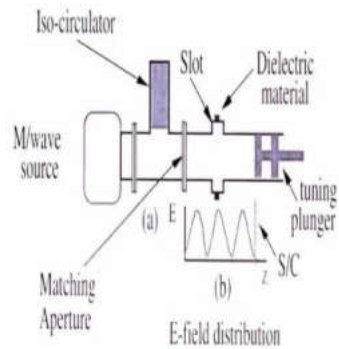
- RADAR
- SATELLITE
- MOBILE
- SCIENTIFIC
- RADIO/TV
- MEDICAL
- WLAN/LAN
- SURVEILLANCE
- HOME APPLICATIONS
- PRODUCT TESTING
- FAULT DETECTION
- INDUSTRY
- REMOETE SENSING
- AGRICULTURE
- FOOD PRODUCT etc.

I: Case Study:

Research: Microwave wireless power transmission System: proposed by Djuradj Budimir and Aleksandar Marincic in 2006 (SPS): Microwave as universal energy source.

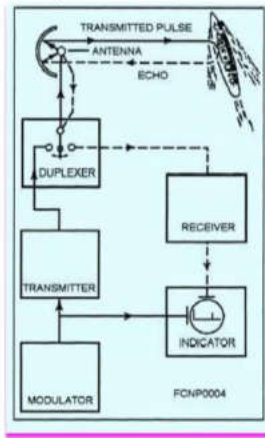


II: Case Study:  $\mu$  Heat can be transferred through conduction/radiation. At the receiving the dielectric losses can recovers the heat.



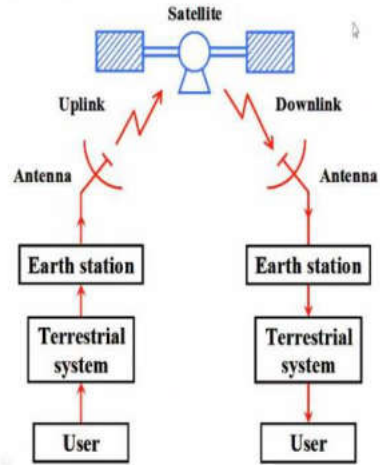
**Why in Radar ?**

•At low frequency shift in freq. from target occurs due to environmental effect causes, erroneous calculation. This is why radar communication is not preferable at low frequencies.

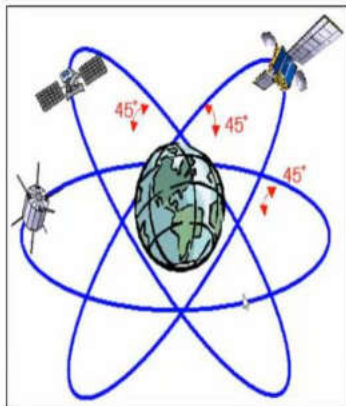


**Why up link Frequency is high?**

•High freq.  $\mu$ W signal are not absorbed by the ionosphere. Hence the uplink and down link freq. is kept usually high in radio, Satellite & DTH communications.

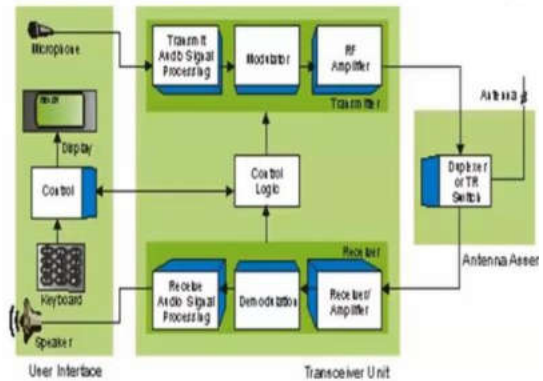


**Satellite communication:**

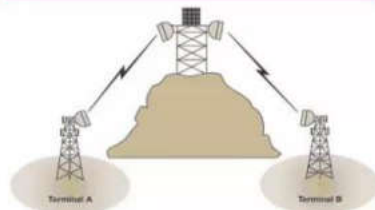
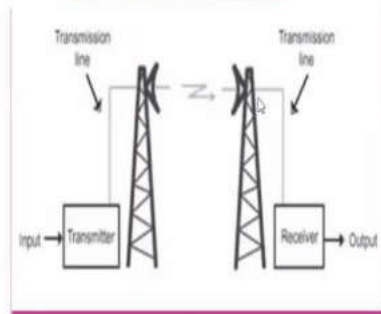


**Mobile communication:**

The communication between the moving transceiver is called as mobile communication.



### Microwave Communications:



1. A microwave repeater link is designed to transfer signals from one terminal station to another without loss of traffic or signal performance.

### Industry:

•In industries as an example,  $\mu$ Ws are used to measure the concentration of different gases to control the emission of pollutants.

The microwave tubes are used to accelerate an electron beam at high energy, to obtain an intense X-radiation.

This radiation is used for:

- Food sterilization
- Decontamination
- Non destructive control

### Medical applications:



### Surveillance Applications:



Webinar On: MICROWAVE COMMUNICATIONS

By: Dr. S. N. Mulgi

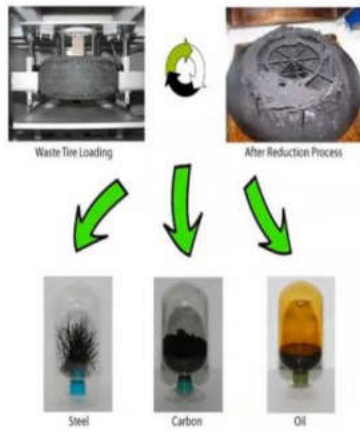
**Home appliances Applications:**



**Product testing:**



**Fault detection:**

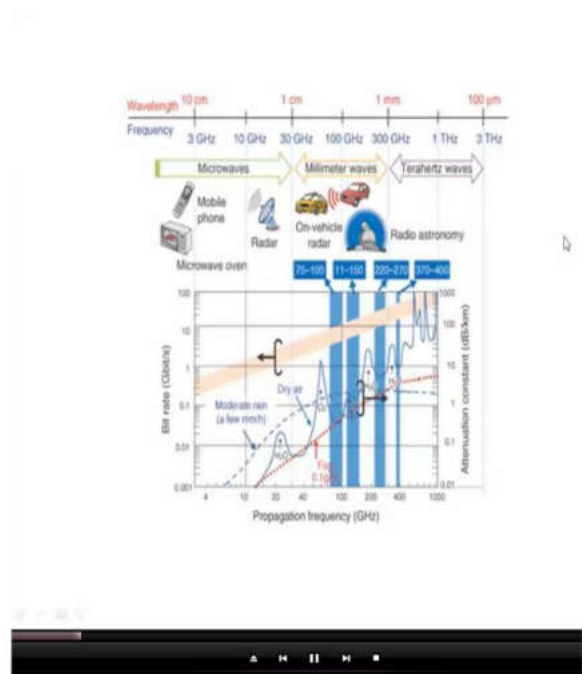


**Automatic monitoring and detection:**



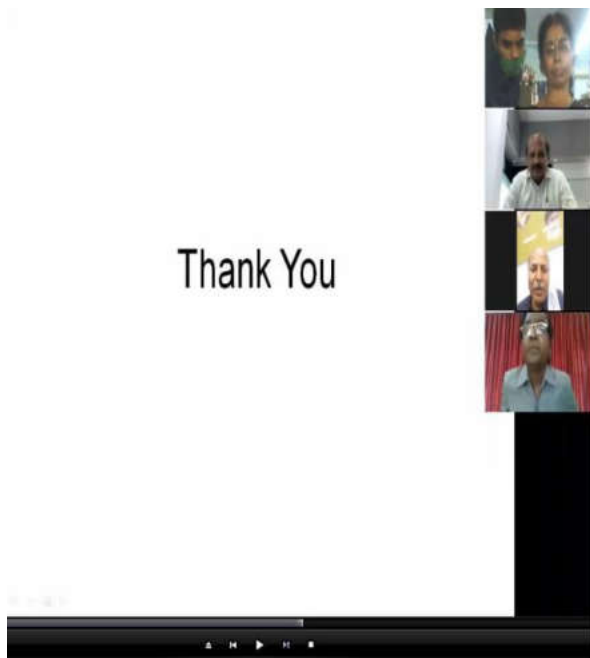
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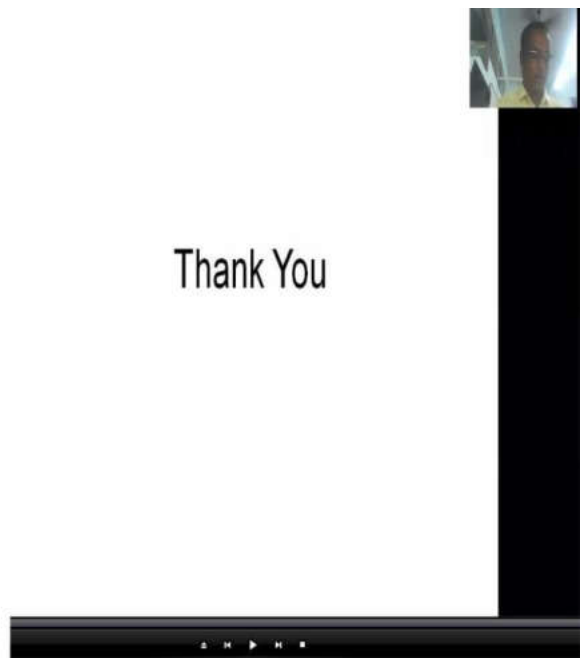


Webinar On: MICROWAVE COMMUNICATIONS

By: Dr. S. N. Mulgi



Presidential Address By: Dr.S.G.Dollegouadar



Vote of thanks By: Dr. S.A. Malipatil



*Feedback from the participants:*

**B Jyoti** Sun, Aug 2, 10:46 PM to me

Sir/madam

The webinar organized by department of Electronics, S.B. science college was excellent. Prof. Mahesh talk on smart dust was very useful and informative. Prof. S.N. Mulgi of Gilbarga university enlightened us on the topic communication technology was really interesting

Thanks to the organizers for facilitating us with informative webinar

From

**Dr. B. JYOTI**

Associate. prof in Electronics

BI BI Raza Degree college for women, kalburgi.

From: **GirijaMangalgatti** <[mangalgatti77@gmail.com](mailto:mangalgatti77@gmail.com)>

Date: Mon, Jul 20, 2020 at 8:53 PM

Sir/madam,

The webinar on both the topics are excellent and informative.

In this covid 19 pandemic, we attended this type of webinar and gained information about smart dust sensors and advanced communication technologies sitting in our place. So thank you for organizing this webinar.

Thank You

From: **Dr. Girija Mangalgatti**

Govt. First Grade College, Bidar

# Sharanabasaveshwar College of Science, Kalaburagi

## Department of Electronics

### Advanced Communication Technology and Smart Dust Sensors Webinar Response Sheet dated 15-06-2020

| Time stamp        | Email Address               | Name                      | Designation         | Organization/ College                              | Department       | Phone Number |
|-------------------|-----------------------------|---------------------------|---------------------|----------------------------------------------------|------------------|--------------|
| 12-06-20<br>15:50 | jagadevigudda@gmail.com     | Dr. Jagadevi C Gudda      | Assistant professor | Sharnbasves hwar college of science Kalaburagi     | Electronics      | 9481171872   |
| 13-06-20<br>12:51 | bhgouda@yahoo.co.in         | Sharnagouda B. H          | Assistant Professor | L. V. D. College, Raichur                          | Electronics      | 91139532188  |
| 13-06-20<br>13:16 | ruchiralata@gmail.com       | Lata Kulkarni             | Assistant professor | Maharanis science college for women, Mysore, m     | Electronics      | 9741166220   |
| 13-06-20<br>13:29 | Jayachalageri@gmail.com     | Dr.jayashree c            | Associate professor | Sb college of science kalaburgi                    | Physics          | 7019980123   |
| 13-06-20<br>13:29 | shivahiremath5072@gmail.com | Shivashankarayya hiremath | Lecturer            | Sharanbasves hwar college of science               | Physics          | 9108388852   |
| 13-06-20<br>13:37 | bsnaraboli@gmail.com        | Dr. Basavaraj S. Naraboli | Assistant Professor | Sharanabasa veshwar College of Science, Kalaburagi | Chemistry        | 9535840850   |
| 13-06-20<br>13:45 | spharish1974@gmail.com      | HARISHARANAPPA S.PADSALGI | Assistant Professor | Sharanabasa veshwar College of Science             | Computer Science | 9741570885   |
| 13-06-20<br>13:46 | omprakash_s60@yahoo.com     | Dr. Omprakash S           | Assistant Professor | Sharanbasves hwar College of Science Kalaburgi     | Physics          | 9880971021   |
| 13-06-20<br>13:57 | panchaksharih21@gmail.com   | PANCHAXRI                 | Assistant Professor | SSA GOVT. FIRST GRADE COLLEGE(A UTO), BALLARI      | Electronics      | 9945202082   |
| 13-06-20<br>14:28 | laxmimaths1@gmail.com       | Mahalaxmi                 | Research scholar    | Gulbarga university                                | Mathematics      | 8762495035   |
| 13-06-20<br>14:51 | bharatisugurkar@gmail.com   | Bharati S R               | Assistant Professor | N.V.Degree College                                 | Electronics      | 8904579722   |
| 13-06-20<br>15:32 | avsomshetty@gmail.com       | A.V.Somshetty             | Associate Professor | C B College Bhalki                                 | Electronics      | 9480252052   |

|                   |                               |                        |                                    |                                                         |                       |            |
|-------------------|-------------------------------|------------------------|------------------------------------|---------------------------------------------------------|-----------------------|------------|
| 13-06-20<br>15:35 | avsomshetty@gmail.com         | A.V.Somshetty          | Associate Professor                | C.B.College Bhalki                                      | Electronics           | 9480252052 |
| 13-06-20<br>15:37 | shailahiremath369@gmail.com   | Shaila Hiremath        | Assistant professor                | Sharanabasveshwar college of science kalaburagi         | Botany                | 9900393298 |
| 13-06-20<br>15:40 | avsomshetty@gmail.com         | A V Somshetty          | Associate Professor                | C B College Bhalki                                      | Electronics           | 9480252052 |
| 13-06-20<br>17:55 | drsmanjuvaish@gmail.com       | Dr. Manjunath S        | Assistant Professor                | SSA Govt First Grade College (Autonomous), Ballari      | Physics               | 8151016101 |
| 13-06-20<br>18:41 | biradarrajendra1864@gmail.com | Biradar Rajendra       | Associate Professor in Electronics | Karnatak Arts, Science and Commerce College, Bidar      | Electronics           | 9449140205 |
| 13-06-20<br>19:43 | nethramohan31@gmail.com       | NETHRA H S             | HOD                                | SEA College of Science, commerce & Arts                 | Electronics           | 9743437476 |
| 13-06-20<br>19:47 | rajbworld@gmail.com           | Dr RAJESHWARI Biradar  | Assistant professor                | Mmcc. Deccan. Pune                                      | B sc computer science | 8805661138 |
| 13-06-20<br>19:53 | mohankeshava@gmail.com        | MOHAN KESHAVA K K      | Assistant professor                | Maharani science College for women                      | Electronics           | 9448976068 |
| 13-06-20<br>20:02 | patilramesh61@gmail.com       | Ramesh B Patil         | Associate professor                | HKES Sree Veerendra Patil degree college sadashiv Nagar | Electronic            | 9448936795 |
| 13-06-20<br>20:07 | raghunanda21075@gmail.com     | Raghunanda             | Asst. Professor                    | Govt. First grade college Bidar                         | Physics               | 9916563111 |
| 13-06-20<br>20:36 | mangalgatti77@gmail.com       | Dr. Girija Mangalgatti | Assistant Professor                | Govt. First Grade College, Bidar                        | Electronics           | 9739475850 |
| 13-06-20<br>20:53 | r.m.setty2k9@gmail.com        | R. Mallikarjuna Setty  | Associate Professor                | Vijaya College, Basavanagudi.                           | Electronics           | 9448341491 |
| 13-06-20<br>21:01 | nageshsogi@gmail.com          | Nagesh A               | Associate Professor                | Govt.First Grade College, kuvempunagar, Mysuru          | Electronics           | 9449262690 |

|                   |                                  |                                |                            |                                                                               |                                                 |            |
|-------------------|----------------------------------|--------------------------------|----------------------------|-------------------------------------------------------------------------------|-------------------------------------------------|------------|
| 13-06-20<br>21:03 | bharatiyh@rediff<br>mail.com     | Dr.Bharathi                    | Assistant<br>Professor     | Maharani's<br>Science<br>College for<br>Women,<br>Bengaluru                   | Electronics                                     | 9611028696 |
| 13-06-20<br>22:12 | shobhagn@achar<br>ya.ac.in       | G N SHOBHA                     | Assistant<br>Professor     | ACHARYA<br>INSTITUTE<br>OF<br>GRADUATE<br>STUDIES                             | ELECTRO<br>NICS AND<br>COMMUNI<br>CATION        | 9731975228 |
| 13-06-20<br>23:17 | bjyoti1967@gmai<br>l.com         | Dr. B .jyoti                   | Associat<br>e<br>professor | Bibi Raza<br>degree<br>college for<br>women<br>kalaburgi                      | Electronics                                     | 9902566243 |
| 13-06-20<br>23:50 | satya.gug@gmail<br>.com          | Dr. B.<br>Satyanarayana        | Assistant<br>Professor     | Bangalore<br>University<br>Bengaluru                                          | Electronic<br>Science                           | 9538429202 |
| 13-06-20<br>23:59 | telkar_prashant@<br>yahoo.com    | Dr. Prashant<br>Ravindra       | Research<br>Associat<br>e  | ADE DRDO                                                                      | Ministry of<br>Defence                          | 9972067674 |
| 14-06-20<br>0:03  | zille.anilkumar@g<br>mail.com    | Anilkumar Zille                | Research<br>Scholar        | Gulbarga<br>University                                                        | Applied<br>Electronics                          | 9972776758 |
| 14-06-20<br>0:37  | msslakshetty@red<br>iffmail.com  | Dr. S. L.<br>MALLIKARJUN       | Assistant<br>Professor     | Maharashtra<br>Udayagiri<br>Mahavidyalay<br>a, Udgir                          | Departmen<br>t of Physics<br>and<br>Electronics | 7026093333 |
| 14-06-20<br>8:09  | jyotig321@gmail.<br>com          | Dr JYOTI G                     | Assistant<br>professor     | Government<br>Science<br>College<br>Bangalore                                 | Electronics                                     | 9901061549 |
| 14-06-20<br>13:36 | vvreddy6@gmail.<br>com           | VENKATESWARA<br>REDDY V        | Associat<br>e<br>professor | PVKKIT<br>ANANTAPU<br>R                                                       | ECE                                             | 8886630026 |
| 14-06-20<br>17:07 | jeetendra.mphill<br>@gmail.com   | JEETENDRA<br>KUMAR ANURAGI     | Assistant<br>Professor     | SRGI,JHANS<br>I                                                               | Applied<br>Science<br>And<br>Humanities         | 9559932314 |
| 14-06-20<br>17:09 | punam16f@gmail<br>.com           | Punam Prabhakar<br>Warke       | Assistant<br>Professor     | Dr. D. Y. Patil<br>Art's,<br>Commerce<br>&Science<br>College,<br>Pimpri, Pune | Electronics                                     | 9890057661 |
| 14-06-20<br>17:23 | mamathaprashan<br>th80@gmail.com | Mamatha A G                    | Research<br>scholar        | Gulbarga<br>university                                                        | Applied<br>electronics                          | 7760046541 |
| 14-06-20<br>17:35 | hardikrakholiya22<br>@gmail.com  | Hardik Devajibhai<br>Rakholiya | BFSc UG<br>STUDEN<br>T     | College of<br>fisheries<br>science<br>veraval                                 | Aquacultur<br>e                                 | 9714419744 |
| 14-06-20<br>17:41 | prabhasm16@g<br>mail.com         | Prabhavati S.<br>Mandalgeri    | Assistant<br>Professor     | S.K. Arts<br>College and<br>H.S.K.<br>Science<br>Institute,                   | Mathematic<br>s                                 | 9886802836 |

|                   |                                         |                           |                                                   |                                                    |                         |            |
|-------------------|-----------------------------------------|---------------------------|---------------------------------------------------|----------------------------------------------------|-------------------------|------------|
|                   |                                         |                           |                                                   | Hubballi                                           |                         |            |
| 14-06-20<br>18:18 | Shilpamulimani77<br>77@gmail.com        | Shilpa BM                 | Student                                           | SB college of<br>science<br>kalburgi               | PME                     | 8095628868 |
| 14-06-20<br>18:46 | ybrevadakundi@<br>gmail.com             | Y B Revadakundi           | Asst<br>Professor                                 | K S S Arts<br>Comm<br>Science<br>College<br>Gadag  | Mathematic<br>s         | 9731320007 |
| 14-06-20<br>19:00 | hphemavathy@g<br>mail.com               | E.Hemavathy               | Research<br>Scholar                               | Bharathi<br>women's<br>college (A),<br>chennai-108 | Geography               | 9003209262 |
| 14-06-20<br>19:01 | ajaykumarmgupt<br>a156@gmail.com        | Ajaykumar                 | Research<br>Scholar                               | Sharanabasv<br>eshwar<br>College of<br>Science     | Dept. Of<br>Electronics | 6366036983 |
| 14-06-20<br>19:06 | soumyalakshetty<br>@gmail.com           | Soumya R L                | Student                                           | S b college                                        | Electronics             | 8088511442 |
| 14-06-20<br>19:14 | pavankumarsdc7<br>20@gmail.com          | Shivani                   | Student                                           | S B college<br>of science                          | PME                     | 7676120747 |
| 14-06-20<br>19:23 | sharat849@gmail<br>.com                 | Sharat GN                 | Student                                           | Sharanabasa<br>veshwar<br>college of<br>science    | Electronic              | 8792318217 |
| 14-06-20<br>19:33 | ganeshsulegav19<br>99@gmail.com         | Ganesh                    | Student                                           | Sharanabasa<br>veshwara<br>science<br>college      | Electronics             | 8884280949 |
| 14-06-20<br>19:33 | malluc518@gmai<br>l.com                 | Mallikarjun<br>chinamalli | Student                                           | S B college<br>of science                          | PME                     | 8050753869 |
| 14-06-20<br>19:39 | anupam_2013@y<br>ahoo.com               | DR.ANUPAM<br>KARMAKAR     | ASSISTA<br>NT<br>PROFES<br>SOR OF<br>COMME<br>RCE | NEW<br>ALIPORE<br>COLLEGE,<br>KOLKATA              | COMMER<br>CE            | 9830280797 |
| 14-06-20<br>19:40 | mahanteshmaha<br>ntesh496@gmail.<br>com | Mahantesh                 | Student                                           | College                                            | Electronics             | 9986455686 |
| 14-06-20<br>19:43 | hanamanthbisgo<br>und@gmail.com         | Hanamanthrao              | Student                                           | Sharnbasave<br>shwar college<br>of science         | Electronics             | 8152089978 |
| 14-06-20<br>19:50 | annapumarathod<br>108@gmail.com         | Annapurna                 | PME                                               | Sb college                                         | Electronics             | 7760153523 |
| 14-06-20<br>19:50 | shushmabadiger<br>46@gmail.com          | Shushma Badiger           | Student                                           | Sharnbasves<br>hwar college<br>of science          | Electronics             | 8095166173 |
| 14-06-20<br>19:52 | shabanaphy@gm<br>ail.com                | Shabana begum             | Asso.<br>Prof in<br>physics                       | Bi Bi RAZA<br>DEGREE<br>COLLEGE<br>FOR<br>WOMEN    | Physics                 | 9886519694 |

|                   |                               |                             |                                                         |                                                    |                      |            |
|-------------------|-------------------------------|-----------------------------|---------------------------------------------------------|----------------------------------------------------|----------------------|------------|
| 14-06-20<br>20:10 | nkr.hsd@gmail.com             | Dr.Naveen Kumar.R           | Assistant Professor                                     | M S Ramaiah college of Arts, Science and Commerce  | Electronics          | 7795827656 |
| 14-06-20<br>20:23 | sangamasharana@gmail.com      | Vijaykumar A Patil          | Associate professor                                     | Basaveshwara College of Commerce Arts & science    | Electronics          | 9481634757 |
| 14-06-20<br>20:28 | madhuvshwa@gmail.com          | Dr. Madhuri G R             | Assistant Professor                                     | Kuvempu University                                 | Electronics          | 9972084448 |
| 14-06-20<br>20:31 | pvj96513@gmail.com            | Priyanka vj                 | Advanced communication technology and small dust sensor | Sb college                                         | Electronics          | 7483607476 |
| 14-06-20<br>20:55 | mm_shankrikopp@rediffmail.com | Dr. M. M. Shankrikopp       | Associate Professor                                     | K.L. E. Society's G. I Bagewadi College Nipani     | Mathematics          | 9480540084 |
| 14-06-20<br>20:56 | ganuredinesh@gmail.com        | Dr. Dinesh B. Ganure        | Assistant Professor                                     | Walchand College of Arts and Science, Solapur      | Electronics          | 9739030470 |
| 14-06-20<br>21:09 | akashpargond9@gmail.com       | Akash Paragond              | Bsc Degree (PME)                                        | SB science College                                 | PME                  | 9380886125 |
| 14-06-20<br>21:20 | mankanigk@gmail.com           | Geeta K Mankani             | Assistant Professor                                     | KLES G H College, Haveri                           | Mathematics          | 9483756283 |
| 14-06-20<br>21:28 | sunitapatil2031@gmail.com     | SUNITA C PATIL              | LECTURER                                                | S.K ARTS AND H.S.K SCIENCE INSTITUTE HUBBALLI      | POLITICAL SCIENCE    | 9731962031 |
| 14-06-20<br>21:30 | vidyanttalageri@gmail.com     | Prof.Vidya N Talageri       | Associate Professor                                     | Dr. A. V. Baliga College of Arts and Science Kumta | Mathematics          | 9980439629 |
| 14-06-20<br>21:40 | ravikolarkarg@gmail.com       | Dr. Ravi Kolarkar G         | Associate professor                                     | Govt. Science College Bangalore                    | Electronics          | 9845766238 |
| 14-06-20<br>21:43 | revati.r1965@gmail.com        | Dr. Revati Ramakrishna Naik | Assistant professor                                     | Dr.A.V.Baliga college of Arts &                    | Chemistry Department | 9845836075 |

|                   |                               |                        |                                                                 |                                                                 |                                                                 |            |
|-------------------|-------------------------------|------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|------------|
|                   |                               |                        |                                                                 | Science College, Kumt a                                         |                                                                 |            |
| 14-06-20<br>21:56 | chaitrakattimani200@gmail.com | Chaitra kattimani      | Bsc                                                             | Sb college of science                                           | Electronics                                                     | 8971165066 |
| 14-06-20<br>22:28 | anilkumar.riem2011@gmail.com  | Dr.ANILKUMAR ALALAMATH | Assistant Professor                                             | S.K.Arts, Commerce & Science College, TALIKOTI                  | English                                                         | 9900292143 |
| 14-06-20<br>22:30 | javeedrahman6@gmail.com       | Javeed Rahman          | Research scholar                                                | Aligarh Muslim University, Aligarh                              | Education                                                       | 9997398180 |
| 14-06-20<br>23:03 | vvrapur@gmail.com             | VEERESH RAMPUR         | Assistant Professor                                             | Government First Grade College Bidar                            | Electronics                                                     | 9739634120 |
| 14-06-20<br>23:16 | premarajc@gmail.com           | Premavani              | Assistant Professor                                             | Government First Grade College, K.R. Puram, Bangalore-36        | Electronics                                                     | 9448214117 |
| 15-06-20<br>0:25  | lprasadbhu@gmail.com          | DR.LALTA PRASAD        | FACULTY OF EDUCATION, BANARAS HINDU UNIVERSITY, VARANASI-221005 | FACULTY OF EDUCATION, BANARAS HINDU UNIVERSITY, VARANASI-221005 | FACULTY OF EDUCATION, BANARAS HINDU UNIVERSITY, VARANASI-221005 | 9451940470 |
| 15-06-20<br>8:02  | goudarajaprasad@gmail.com     | Dr.RAJAPRASAD GOUDA    | Assist professor in Physics                                     | Vaagdevi degree pg college hanamkonda Warangal Telangana state  | Physics                                                         | 9989214113 |
| 15-06-20<br>8:02  | rachayyashivana nd@gmail.com  | Rachayya Hiremath      | Student                                                         | Sharanabasa veshwer collage of science                          | Electronic                                                      | 7411710809 |
| 15-06-20<br>8:05  | bp19609@gmail.com             | Bhagyaprasad           | Kalburagi                                                       | Sb college of science, Kalburagi                                | Electronics                                                     | 9353001217 |
| 15-06-20<br>8:10  | vivekhiremath707@gmail.com    | Vivekanand             | Student                                                         | Sharnbasave shwar college of science                            | Electronics                                                     | 9482226869 |
| 15-06-20<br>9:09  | sudhir.gayathri@gmail.com     | Gayathri               | Vice Principal and HOD                                          | THE OXFORD COLLEGE OF SCIENCE                                   | ELECTRONICS                                                     | 9243125478 |

|                   |                                            |                                      |                            |                                                                |                    |            |
|-------------------|--------------------------------------------|--------------------------------------|----------------------------|----------------------------------------------------------------|--------------------|------------|
| 15-06-20<br>9:47  | naveenkumarkals<br>hetty4567@gmail<br>.com | Naveenkumar                          | Student                    | S B college<br>of science                                      | Electronics        | 6363745828 |
| 15-06-20<br>10:08 | smmruthunjaya6<br>9@gmail.com              | SM<br>MRUTHUNJAYA<br>SWAMY           | Associat<br>e<br>professor | Vijaya<br>college RV<br>road<br>Bangalore                      | Electronics        | 9449217445 |
| 15-06-20<br>10:32 | partapure_mahes<br>h@rediffmail.com        | Dr. Mahesh C<br>Partapure            | Assistant<br>Professor     | Walchand<br>College of<br>Arts and<br>Science,<br>Solapur      | Nanotechn<br>ology | 9739747119 |
| 15-06-20<br>10:38 | mallikarjunmyake<br>l98089@gmail.co<br>m   | Mallikarjun                          | Bachelor                   | Sharanabasa<br>veshwar<br>degree<br>college<br>Gulbarga        | Electronics        | 9380181461 |
| 15-06-20<br>11:00 | pruthvirajmaragut<br>ti@gmail.com          | Pruthviraj S M                       | Student                    | Sharanabasa<br>veshwar<br>College of<br>Science,<br>Kalaburgi  | Electronics        | 9353516671 |
| 15-06-20<br>11:36 | r.m.setty2k9@gm<br>ail.com                 | R.Mallikarjuna Setty                 | Associat<br>e<br>Professor | Vijaya<br>College,<br>basavanagud<br>i, Bangalore              | electronics        | 9448341491 |
| 15-06-20<br>11:37 | avchikkamanur@<br>gmail.com                | A.V.Chikkamanur.                     | Associat<br>e<br>professor | Karnatak<br>Arts,Science<br>and<br>commerce<br>collehe Bidar.  | Electronics        | 9008972884 |
| 15-06-20<br>13:07 | singhmayank991<br>@gnail.com               | Mayank Prasad<br>Singh               | Student                    | SRM                                                            | IT                 | 8090136117 |
| 15-06-20<br>13:49 | pushpa22metri@<br>gmail.com                | Dr. Pushpanjali<br>Gurubasappa Metri | Assistant<br>Professor     | Sangameshw<br>ar College,<br>Solapur<br>(Autonomous<br>)       | Physics            | 9880025493 |
| 15-06-20<br>16:54 | sjphd4seminars<br>@gmail.com               | SUMIT JAISWAL                        | Ph.D.<br>Scholar           | UNIVERSITY<br>OF DELHI                                         | FACULTY<br>OF LAW  | 7579880778 |
| 15-06-20<br>18:04 | chandruvirat123<br>@gmail.com              | Chandrashekhar                       | Student                    | S b clg<br>kalaburagi                                          | PME                | 9741147318 |
| 15-06-20<br>20:04 | malipatilsa@redif<br>fmail.com             | Dr. S. A. Malipatil                  | Asst.<br>Professor         | Sharanabasa<br>veshwar<br>College of<br>Science,<br>Kalaburagi | Electronics        | 9480149723 |



Centenary Celebrated Sharanabasaveshwar Vidya Vardhak Sagha's



## Sharanabasaveshwar College of Science

Kalaburagi - 585 103, Karnataka

Department of Electronics

One Day National Webinar

on

Advanced Communication Technology & Smart Dust Sensors

### Certificate

This is to certify that Dr./Prof./Mr./Ms.....

of.....

has participated in One Day National Webinar on Advanced Communication Technology & Smart Dust Sensors under IQAC initiative organized by Department of Electronics on 15<sup>th</sup> June 2020 at Sharanabasaveshwar College of Science, Kalaburagi, Karnataka.

**Dr. S. A. Malipatil**  
Organizing Secretary

**Dr. T. V. Biradar**  
Academic Activities  
Coordinator

**Dr. Omprakash S.**  
IQAC Coordinator

**PRINCIPAL**  
( Dr. S.G. Dollegoudar )

**PRINCIPAL**  
SHARANBASAVESHWAR COLLEGE  
OF SCIENCE, GULBARGA

