

# Harshil Bhatt

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## EDUCATION

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### Manipal Institute of Technology

*BTech in Electronics and Communication Engineering*

Manipal, KA

*Expected Graduation: May 2023*

## EXPERIENCE

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### ReTiSense

*Embedded Systems Engineer*

Bengaluru, KA

*Aug 2021 - Oct 2021*

- Worked with BLE 5.0
- Added support for various peripherals to firmware
- Power management of nRF52 microcontrollers
- Optimised memory management and data compression onboard nRF52

### Mars Rover Manipal

*Senior Research Engineer*

Manipal, KA

*May 2020 - Present*

- Published a paper on wireless sensor networks at a flagship conference organized by IEEE.
- Developed system drivers for sensors and actuators for ROS1/2 and freeRTOS
- Guided a team of juniors towards research and academic publications

### Sensegrass

*Firmware Engineer Intern*

Bengaluru, KA

*Jan 2021 - Mar 2021*

- Diagnosed feasibility of new products
- Prepared BOM for upcoming products
- Analyzed working of existing products and devised improvements

## PUBLICATIONS

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### Wireless Sensor Networks for Search and Rescue Management in Floods

*IEEE-CONECCT*

- Proposed novel routing algorithm with over twice better throughput in sensor networks
- Designed cost-effective sensor node capable of human detection
- Developed scalable solution able to support 512 nodes over  $7.5km^2$

### Energy Balancing in Swarm Robots using Wireless Power Transmission

*Peer-Review*

- Built custom wireless charging circuit based on magnetic induction
- Programmed low level drivers of sensors and actuators for ROS2
- Devised novel algorithm for peer-to-peer charging
- Designed navigation and path planning algorithm for swarm control

### Increasing Physical Layer Security through Hyperchaos in VLC Systems

*Peer-Review*

- Proposed a system utilising a 4D Henon Map to generate hyperchaos in the transmitter.
- Designed a sliding mode controller for chaos synchronisation between the transmitter and receiver.
- Increased physical layer security in VLC systems to prevent eavesdropping.
- Achieved satisfactory BER and throughput using a single channel regular LED

## Honor & Award

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### IEEE ComSoc Bangalore "Protsahan"

Dec 2021

*IEEE*

The Bangalore ComSoc chapter, Protsahan drive, was launched to recognize contributions in the Communication Sector by granting awards to any paper published / Tutorial offered in recognized conference/journals (during Jan 2020 - Sep 2021) by IEEE student member/member/non-member (as the first author to be IEEE member, non-Member).

## PROJECTS

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### Improving Security in Wireless Body Area Networks

*Oct 2021 – Present*

- Formulated novel algorithm for encrypting sensor data
- Designed a scalable sensor network
- Optimised the sensor nodes for low power

### 7 Degree of Freedom Robotic Arm

*May 2020 – Oct 2020*

- Built motor control interface
- Designed end-effector position control system
- Developed firmware for PIC18 and ATtiny

### Self-Balancing Inverted Pendulum

*Apr 2020 – May 2020*

- Designed control system using Simulink
- Simulated in Gazebo with ROS1 interface
- Implemented controller on STM32

## TECHNICAL SKILLS

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- Programming Languages: C, C++, Python, Rust, Verilog, ARM Assembly
- Protocols/Interfaces: UART/USART, SPI, I<sup>2</sup>C, CAN, MQTT, FreeRTOS
- Software: MATLAB, Simulink, Altium Designer, EagleCAD, LabVIEW, Proteus Design Suite, ROS, Gazebo

## EXTRA CURRICULARS

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### Manipal Open Source Society

*Technical Moderator*

*Oct 2021 - Present*

- Mentor and guide community members in their area of expertise.
- Worked with other members to incubate projects, contribute to new projects.
- Coordinate any and all events held by the society.

### Research Society Manipal

*Robotics division*

*Sep 2021 - Present*

- Worked with multi-agent systems and swarm robotics
- Organization aims to promote research, provide resources and research guidance to students and form a stronger connection with professors and alumni.

### RedX Manipal

*Volunteer*

*Sep 2019 - Present*

- Conducted drives for at-risk population