

R K Venkatesan

Indian Institute of Technology Madras (India)

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Education

Program	Institution/Board	%/CGPA	Year
M.S. (Biomedical Engineering.)	Indian Institute of Technology Madras Chennai, Tamil Nadu	8.11/10	2020-23
B.E. (Electronics and Comm Engg.)	Adhiparasakthi Engineering College Melmaruvathur, Tamil Nadu	6.51/10	2014-18
10th + 2(Higher Secondary.)	S.B.O.A Matric Higher Secondary School Madurai, Tamil Nadu	80.7%	2011-13
10th(Matriculation)	S.B.O.A Matric Higher Secondary School Madurai, Tamil Nadu	89.6%	2011

Area of interest

Wearable haptics (tactile and kinaesthetic)	Human Computer Interaction	Psychophysics
Sensors and Actuators	Electro-adhesion display	Signal processing
Virtual Reality	Embedded Systems	Robotics
Mechatronics	Analog and Digital Circuits	Control Systems

Technical Skills

- Microcontrollers: ESP32, STM32, ESP8266, Raspberry pi, Atmega328P, ATtiny85.
- Communication Protocols : I2C,SPI,UART.
- Design : **PCB** - KiCad, Eagle,Soldering. **3D Printing** - SolidWorks, Fusion 360.
- Prototyping : Drone Building, Tactile and Force Feedback actuators, Electro-adhesion display.
- Tools and technologies: MATLAB, Unity3D, Arduino IDE, Keil uVision, LabVIEW, Multi-Sim.
- Programming Language: C, C++, Python.

Course Projects

- Haptic course Project - inertially grounded 1 DOF torque feedback device** Jan-May 2020
(M.S (Sem 1) / Faculty: Prof.M.Manivannan) IIT Madras
 - Arduino controlled 1 DOF(Roll) Torque feedback Device
 - High RPM Flywheel - stopped suddenly using belt-brakes or rheostatic braking system - Impulsive Torque feedback.
- Virtual Reality Course Project - VR cycling with arduino controller** July-Nov 2020
(M.S (Sem 2) / Faculty: Prof.M.Manivannan) IIT Madras
 - VR Cycling Game designed in Unity 3D.
 - Pedal assist sensor (for accelerate or brake) and potentiometer(for left or right) interfaced to unity game via Arduino Serial Communication to control the game.
 - Google Card Board is used to give user immersive VR cycling experiences
- Augmented Reality using Vuforia tool** July-Nov 2020
(M.S(sem 2) / Faculty: Prof.M.Manivannan) IIT Madras
 - Marker based AR implementation on patterned surfaces(box in this project)
- Psychophysics Course Project - Tactile frequency response of each fingertip** Jan-May 2022
(M.S(sem 5) / Faculty: Prof.M.Manivannan) IIT Madras
 - Conducted psychophysical studies among 20 participants to find average resonance frequency of each fingertips.

Course Work

Key Courses (Core and electives)

Haptic in Biomedical Engineering
Virtual Reality
Statistics for Biomedical engineering
Lab: Transducers lab

Psychophysics
Transducers
Nurturing Women Leadership

Jan 2020-June 2022

Publications

1. **Force Feedback in a Virtual Crowd Scenario Improves Emotional Response**

June 2023

Authors: Venkatesan RK, Domna Banakou, Mel Slater and Manivannan Muniyandi

IIT Madras

- Submitted to Frontier of virtual reality- Haptics on June 20th 2023, currently in review process
- Keywords: virtual reality, kinaesthetic feedback, haptic display, 360-degree video, Virtual collisions, Virtual crowd, Simulating emotions, Multimodal Virtual environment

2. **ImpActuator: Wearable Torque Feedback Device for Impact Rendering on Body in VR**

July 2023

Authors: Venkatesan RK and Manivannan Muniyandi

IIT Madras

- Submitted to ACM International Conference on Tangible, Embedded and Embodied Interaction (TEI) on July 20th 2023, currently in review process
- Keywords: Embedded Interaction ; Embodied Interaction ; Impact / Implications ; Multimodal Interaction ; Novel Actuators / Displays ; Tactile / Haptic Interaction ; Tangible Interaction ; Wearable technologies / Textiles

3. **Finger Induced Auto-Thermogenesis**

May 2021

Authors: Debadutta Subudhi; R. K. Venkatesan; Kalpana Devi; M. Manivannan

IIT Madras

- Published in: 2021 IEEE 3rd Eurasia Conference on Biomedical Engineering, Healthcare and Sustainability (ECBIOS)
- Keywords: Hand clasping, heat, immune system response, ECG, Body Temperature, HRV, RMR, PSNS

Work Experiences - Merkel Haptics, India

1. **2 DOF Inertially Grounded Torque Feedback**

June - Sept 2022

H/W : ESP32, Servo motor, BLDC motor | S/W : Unity3D, Arduino IDE | Comm Protocol : UART

- Developed an inertially grounded torque feedback device which can be both wearable (attached to user body) and Hand-held (attached to game controller) to deliver 2 DOF Torque feedback synchronized to the virtual forces in the VR environments or games like recoil of gun shot, catching an object, etc.,

2. **Impulsive force Feedback to simulate hit of ball on bat in VR Tennis**

Oct - Dec 2022

H/W : ESP32, Servo motor, BLDC motor | S/W : Unity3D, Arduino IDE | Comm Protocol : UART

- Combined mechanical (belt) brake and rheostatic brake on high RPM flywheel to simulate an impulsive hit force for VR tennis game.

3. **Compact Electrode Adhesion Display for mobile devices**

April - June 2023

H/W : Atmega 328P, HV power supply, HV amplifier | S/W : Python | Comm Protocol : UART

- Developed Flexible screen capable of delivering electrostatic friction on compact mobile (less than 6 inches) display devices
- Uses: Digital braille, Texture rendering of macro photography,

Workshops

- Participated in the webinar, [AICTE Training And Learning \(ATAL\) Academy FDP on "Artificial Intelligence"](#) from 04-12-2019 to 08-12-2019 at IIITDM Kancheepuram

Online Courses

- PCB Design: [Learn KiCad. Printed Circuit Board Design.](#) (May 2021), [PCB Design with EAGLE](#) (June 2021),
- MathWorks: [Master MATLAB through Guided Problem Solving](#) (June 2021), [MATLAB/SIMULINK Bible/Go From Zero to Hero!](#) (May 2021), [Matlab Onramp](#) (May 2020),
- Signal Processing: [Signal processing problems, solved in MATLAB and in Python](#) (May 2022)
- Unity3D - Game Development: [Complete C Unity Game Developer 3D](#) (May 2021)

Positions of Responsibility

- *Teaching Assistant for NPTEL's Foundational course on AR/VR, IIT Madras (July-Nov, 2022).*
- *Teaching Assistant for Haptic Course project, AMBE Department, IIT Madras (Jan-May, 2021).*
- *Teaching Assistant for Engineering Skills Practice lab, IIITDM Kanchipuram (July-Nov, 2019).*
- *Teaching Assistant Electrical Drives Practice lab, IIITDM Kanchipuram (July-Nov, 2019).*

Achievements/Awards

- Successfully qualified [GATE- 2019](#) with 92.15 percentile score.
- Received [Best Paper Award](#) in: 2021 IEEE 3rd Eurasia Conference on Biomedical Engineering, Healthcare and Sustainability (ECBIOS) .
- Competed in 54th International Mathematical Olympiad (2013) and [received 1st place\(gold\)](#) in my Madurai Zone in my high school
- Competed in International Olympiad of Science in 2013 and [received 2nd place\(Silver\)](#) in my Madurai Zone in my high school
- Received the [1st place](#) in design of own telescope in my 9th grade.

Others

- Hobbies: Travelling, Cooking, Music
- Languages: Tamil, English.

Declaration

I do hereby declare that all the details furnished above are true to the best of my knowledge and belief.

Place: Madurai, Tamil Nadu (India)

(R.K.Venkatesan)

Date: 27th July, 2023

Note: Highlighted are link to proofs and validation (if required).