Sriranjan Rasakatla

- PhD student (Dec 2019 - Sept 2022), Mizuuchi lab, Tokyo University of Agriculture and Technology
- D.O.B: 30th Nov, 1986
- Email ID: infibit@gmail.com
- Website: https://sriranjanrasakatla.com

About me:

Multi-skilled and experienced (14 years) robotics engineer with 7 patents and 18 publications in world-renowned international conferences across the world.

Summary:

My core strength lies in system development and integration. I have developed all the software, embedded systems and mechanical hardware for my robotic systems whether it is a high-performance kitchen robot cooking Japanese noodles (that did not even fail once after installation with the customer, 99.99% success rate) or it is the highest degree of freedom robotic hand in the world. I like to solve critical problems through system engineering (design and integration). I also developed a wireless phone charging system which is unlike anything in the current state of the art out there. The cell phone gets charged wirelessly by WiFi from a distance of 6 meters from the transmitter. I have worked on the hardware development of ADAS systems where we just used a low computing resource computer like a Raspeberry Pi to monitor the gaze of a driver and keep him on track. I also developed legged robots, snake robots and a GPS-guided laser flashlight. I also developed a 5$ Kinect camera-like system in the year 2010. I also developed the world's first HD insect camera system where a cockroach carries a camera backpack and neural stimulator over WiFi. And developed the world's first bike gear control prosthetic leg for amputee bike riders.

- Way-Go flashlight uses lasers to light your path, and GPS to tell you where to go, Michael Gorman, Engadget Online Magazine, January 17, 2012 https://www.engadget.com/2012-01-17-way-go-flashlight-uses-lasers-to-light-your-path-gps-to-tell-yo.html
- A robot that slithers like a snake, T.Lalith Singh, Hindu National Newspaper, Hyderabad, India, Snake Robots to the Rescue, Seeker Online Magazine, By DNews, August 23, 2010, at 9:00 AM https://www.seeker.com/snake-robots-to-the-rescue-1765089584.html
- GPS Flashlight Shows You The Way The humble flashlight gets a serious makeover, By DNews, January 18, 2012, at 9:42 AM https://www.seeker.com/gps-flashlight-shows-you-the-way-1765596727.html
- Intelligent Flashlight Will Literally Show You The Way, Mike Szczys, Hackaday, January 16, 2012
- https://hackaday.com/2012/01/16/intelligent-flashlight-will-literally-show-you-the-way/
- Finally, A Practical Use For The Leap, Brian Benchoff, Hackaday, September 3, 2013, https://hackaday.com/2013/09/03/finally-a-practical-use-for-the-leap/
- The robots that I built: https://www.youtube.com/user/sriranjanr/videos
- My blog with my paintings https://sriranjan.wordpress.com/2010/12/10/research/
- My portfolio website (watch my kitchen cooking robot): https://www.sriranjanrasakatla.com

Experience Summary:

- Developed a wireless power system using Wifi for 15-foot range at Impressive applications ltd.
- Developed SMART mute intelligent sound localization and muting technology for impressive applications ltd
- Worked for UURMI Systems Pvt Ltd –HYD as a senior engineer
- Have integrated a factory automation AGV for automated delivery of goods in a factory.
- Been building robots for 13.5 years, I have built snake robots, legged robots, humanoid hand
- Built a robotic hand which has the highest degree of freedom in that world and can move in more ways than a human hand.
- Developed a drive-by-wire system for an in-progress autonomous car.
- Developed a system for eye-tracking technology.
- Ability to learn quickly and to correctly apply new tools and technology.
- Ability to develop software independently and work well in groups.
- 8 years of experience in robotic and embedded software and hardware design.

Areas of Expertise: Robotics, Mechatronics, embedded electronics, robot system design, robot system integration, robot software

Technical Skills:

- Operating Systems Win, Linux,
- Languages & Scripts C,C++
- Processor Atmel Atmega 128,168,328,2560,ARM7SAMXE,Intel Edison, Pcduino3
- Interfaces Arduino, Intel Edison, Pcduino, Wiring, Raspberry PI
- Technologies Wireless power, sound localization, Motion sensors, accelerometers,gyros,IMU,Infrared,optical encoders,robotics and human-computer interfaces
- IDE Tools Visual studio 6,2008,2010

Employment History

- **SONY AI lab- Research Assistant, November-2021 to Present**

    - Working on food robotics and tactile sensor technology.

- **Research Assistant, Tokyo University of Agriculture and Technology-** Jan **2020-Present**

    - PhD thesis: Search and Rescue and Rehabilitation through Robotics and HRI

- **Telexistence, Part-time, Dec 2020 – March 2020**

    - Hardware evaluation of Logistics robot.
    - Developed camera rig for Logistics robot for vending drinks.

- **Connected Robotics, Internship, Dec 2019 – May 2020**

    - Developed a robot that cooks Soba noodles with a team of other two colleagues. Worked on the magnetic end-effector design with IO control on

Collaborative robotic arm- Omron TM5, TM9. Also have filed 2 patents with the company on Magnetic end effector and Soba cooking system.

- **Soba Cooking robot system**

  - Developed a Soba cooking robot system. I also developed the magnetic end effector. We used proximity sensors to detect metal plates and engage the cooking basket holder with the robotic arm. I worked on TM-5 OMRON collaborative robot and wrote software for it.

- **Dosage mechanism for Octochef (octopus ball cooking robot)**

  - Developed a dosage mechanism for putting the batter in a cooker for making octopuss balls. A similar dosage mechanism is found in coffee vending machines. Using a flow sensor, an electromechanical valve and a microcontroller we estimate the amount of fluid that is to be poured into the cooker and automate the dosing.

- **Customer interface for Soba noodles robot**

  - I designed the LED interactive cook-user interface system and customer front interface system showing the cooking process and order management.

- **In Impressive applications Research and Development Consultant, Hyd, UK - Nov-16,2016 to Sept 2019,**

  - Full system development for a 15 feet range wireless power system using wifi.
  - Smart Mute smart audio technology for safe bike and Formula-1 car helmets
  - Smart App of Samsung phone.

- **Uurmi Systems (currently Mathworks Hyderabad) - September 2, 2013 to Nov 15, 2016**

  - Mathworks Hyderabad, Madhapur, Near InOrbit mall, Gachiwbowli, Hyderabad, Telangana

- **Autonomous car**

  - Duration: 24 months
  - Designation: Senior Engineer
  - Project Description: **To make an autonomous car** which can navigate in Indian conditions
  - Role: I am one of the team members out of 13 who made the drive-by-wire technology on Maruti Zen car.
    - Built a drive-by-wire car
    - The big Maruti zen car can be controlled with an RF transmitter just like a Toy car

- **Mahindra/Maini factory AGV** (autonomous ground vehicle)

  - Duration: 8 months
  - Designation: Senior Engineer
  - Project Description: Making an AGV which can carry loads in a factory

- I integrated path-following technology with a custom PID controller for making an AGV move in a factory.
  - The robot moves autonomously from point A to B using Hall sensors on a magnetic path   defined by a magnetic tape
  - It can autonomously detect and avoid obstacles.

- **Eye-tracking technology for ADAS- Advanced driver assistance systems**

  - Duration: 6 months
  - Designation: Senior Engineer
  - Project Description: A project to measure driver attention while driving a car
    - I provided the hardware support for building an eye tracking system.
    - The tracker successfully resolves the driver's gaze in 5 directions
    - It is a work in progress and in the future can be used in cars to detect driver distraction.

- **Rhex robot**

  - Duration: 12 months
  - Designation: Engineer
  - Project Description: Built an all-terrain rhex robot for moving on rough terrain.
  - I built a robot with 6 legs that can move on rough terrain.
    - Executes a tripod gait to move on the floor
    - Developed a custom PID and gait software with GUI to control the robot.

- **April 2009 to September 2013**

  - **Research assistant robotics and HCI (April 2009 to September 2013): IIIT-H**
    - Robotics research center, IIIT-Hyderabad Gachibowli, Hyderabad, Telangana
    - Part-time Researcher (2007-2009): Robotics and HCI.
    - Total 8 years of experience in managing and executing robotics projects.

- **2007 and 2008 summer Microsoft internship at IIIT - Hyderabad**

  - **Farming robot**: Integrated a PC driven and cell phone based control for a farming robot which won 1st prize nationally in Intel imagination cup.

  - **RAMA-1 Robotic hand**: I developed a robotic hand with the highest degree of freedom in the world. The hand can move in more ways than compared to any other robotic hand in the world. It uses magnetic spherical joints to mimic the joints in the human hand. It has an opposable thumb that has more range of motion than the human thumb. It can also sense objects placed in its palm automatically and grip them.

  - **Snake robots**: I developed a series of snake robots and each type has an added capability.

  - Developed a semi-autonomous snake robot which can change its gait from a caterpillar-like motion to a desert snake-like motion by sensing the terrain. Also, the snake robot can be controlled with gestures using a custom-built

data glove. The idea of developing modular snake robots is to use them for search and rescue.

- **Way‑go Torch**: Developed a flashlight which projects an intuitive arrow that guides a place from one person to another using GPS and compass data. The torchlight uses a custom-built laser LCOS projector. Uses onboard GPS path calculation, IMU and AHRS measurement. Calibration of gyros and accelerometers is involved in this project. Uses Arduino IMU calibration stack.

- **Fire n Ice Hovercraft**: I along with a team of students from Mechanical engineering built a hovercraft for Shaastra technical fest – IIT madras. It stood 3rd in the first round of the competition among 100+ models from other colleges.

- **Camera mouse**: I developed a camera mouse software and applications. The applications include a photo browser, a jet plane game and a voice-enabled mouse which can all be controlled with a user's head motion. The camera tracks the optical flow of a person's face and uses this as the input for the customs face tracking applications.

- **ARM‑1**: Developed a 3 DOF robotic gun platform that can track targets like a color balloon and shoot them. This project won all India 3rd prize at IIIT-H Robocamp.

- **Object following robot**: I developed a 3 dof object following robot as the final year project during my engineering. I custom developed the Atmel microcontroller board, motor driver and power management boards for the robot. It can track a colored ball in 3 degrees of freedom and follow it.

- **Modular legged robotic system**: I designed a modular legged robot which can work as a 4 legged robotic dog, a 6 legged hexapod or a caterpillar and a snake. The hexapod robot which has a robotic servo-controlled spinal cord could easily move over terrain with different slopes by adjusting the current that goes into its robotic spinal cord.

- **Universal simulator and controller**: I developed a simulation environment for robots using Google sketchup and ruby. The robots in the simulator would closely replicate the real prototype robot. This reduced the development time and the wear and tear in the robot. A universal API was designed which gave single point control of the simulated model and the real prototype.

- **Low-cost 3D Perception Sensors**: It is a huge problem in microrobots to learn about the immediate environment in 3D. I developed an Infrared –camera sensor which can learn about the depth in the environment using infrared projected patterns. The system costs under 5-10 dollars to build.

- **Muscle Actuation Measurement**: I used differential capacitance to measure the motion of muscles in the face. This in turn can be used as input to play video games. I also was the first in designing a skin for a snake robot which can measure the force with which it hits the floor or if it is gently touched.

- **Leapulator and Le‑sur:** Leap is a 3D input device. I developed a virtual 6DOF robotic arm which can be controlled with gestures using the leap device. I also devised a surgical simulation environment which can help reduce a doctor's training time with robotic surgical devices like the Da-Vinci.

- **Quadrotor**: I also worked on an open-source project called Aeroquad.We built a quadrotor within one week and made it fly. Hope to revolutionize delivery through drones.

- **Sound Source Localization**: Developed a 2mic and 4 mic sound source localization hardware and algorithm.

Personal Projects:

September 2012 to Aug 2013/till date

- **Robotics leg for amputees**: Built a robotic leg which can be used as prosthetics for amputees. Uses IMU and advanced digital electronics and algorithms for controlling the robotic leg.

- **Enhanced Source Localization**: Ported sound localization to Maple ARM board, Teensy board and a smart cell phone as well.

- **EMG-based Home Automation**: Developed a home automation system which can be controlled by an EMG sensor embedded in the body.

Publications

1. "Sound source localization through shape reconfiguration in a snake robot". Accepted BioRob, 2022 IEEE

2. Sriranjan Rasakatla, K. Madhava Krishna: RAMA‑1 highly dexterous 48DOF robotic hand using magnetic spherical joints. In the proceedings International conference on Robotics and Biomimectics, ROBIO 2013 Shenzhen, China

3. Sriranjan Rasakatla, K. Madhava Krishna: WAY‑GO torch: An intelligent flashlight. In the proceedings International Conference on Robotics and Biomimectics- ROBIO 2013 Shenzhen China

4. Sriranjan Rasakatla, K. Madhava Krishna, Bipin Indurkhya: Design, construction and a compliant gait of "ModPod": A modular hexpod robot. In the proceedings International Conference on Robotics and Biomimectics ROBIO 2010, Tianjin China

5. Sriranjan Rasakatla, K. Madhava Krishna: Snake P3: A semi‑autonomous Snake robot. In the proceedings International Conference on Robotics and Biomimectics ROBIO 2010, Tianjin China

6. Sriranjan Rasakatla, Multi‑touch based on the metaphor of persistence of vision,In the proceedings, SIGGRAPH ASIA-2010(posters) Seoul, South Korea

7. Sriranjan Rasakatla,Bipin Indurkhya.Optical flow-based head tracking for camera mouse, immersive 3D and gaming, In the proceedings, SIGGRAPH ASIA-2010 (posters) Seoul, South Korea

8. Sriranjan Rasakatla, Madhava Krishna Gesture-based control of snake robot and its simulated gaits, In the proceedings SIGGRAPH ASIA-2010(posters) Seoul, South Korea

9. Sriranjan Rasakatla. Solar system and gravity using visual metaphors and simulations. In the proceedings SIGGRAPH ASIA 2010 Seoul, South Korea

10. Sriranjan Rasakatla, Kashyap Kompella, Krishna Koudinya. Car tracking and vibration test rig using Neo‑Freerunner In the proceedings SIGGRAPH-2010(posters) Los Angeles USA

11. Sriranjan Rasakatla, Madhava Krishna,Bipin Indurkhya. "Mod‑Leg" is a modular legged robotic system, In the proceedings SIGGRAPH-2010(posters) Los Angeles USA

12. Sriranjan Rasakatla, Low-cost 3D perception sensors, In the proceedings SIGGRAPH-2010 (posters), Los Angeles, USA

13. Sriranjan Rasakatla, Ikuo Mizuuchi, Bipin Indurkhya: "Robotic Surgical training simulation for dexterity training of hands and fingers (LESUR)". SIGGRAPH Posters 2020

14. Sriranjan Rasakatla, Ikuo Mizuuchi, Bipin Indurkhya, " Sound Reactive bio-inspired snake robot simulation", to appear in SIGGRAPH ASIA 2020 posters

15. Sriranjan Rasakatla, Ikuo Mizuuchi, Bipin Indurkhya," An EMG leg for biker amputees with gear control", to appear in BioRob (International conf. on Biomedical robots) 2020 Late-breaking work.

16. Sriranjan Rasakatla, Takeshi Suzuki, Wataru Tenma, Ikuo Mizuuchi and Bipin Indurkhya CameraRoach: various electronic backs packs for Search and Rescue, Accepted, ROBIO 2021, IEEE

17. Sriranjan Rasakatla, Azumi Ueno, Antonio Galiza and Takahiro Ario, Ikuo Mizuuchi, Bipin Indurkhya, An anthropomorphic surgical simulator arm based on series elastic actuators with haptic feedback, Accepted, ROBIO 2021, IEEE

18. Sriranjan Rasakatla, Wataru Tenma, Takeshi Suzuki, Ikuo mIzuuchi, Bipin Indurkhya, "CameraRoach: A WiFi- and camera-enabled cyborg cockroach for search and rescue", Journal of Robotics and Mechatronics, Feb Vol 1, No:34.

Patents:

1. Aircraft stabilization system WO EP US CN US20200086978A1 Sriranjan Rasakatla, Sandeep Kumar Chintala

2. Aerial vehicles with bladeless propellers WO EP US CN US20200086988A1 Sriranjan Rasakatla, Sandeep Kumar Chintala

3. Energy efficient power system WO WO2019197846A2 Sriranjan Rasakatla, Sandeep Kumar Chintala

4. Noise cancellation in voice communication systems WO WO2018229464A1 Sriranjan Rasakatla, Sandeep Kumar Chintala

5. Thermoelectric power generation   WO WO2019116039A1 Sriranjan Rasakatla, Sandeep Kumar Chintala

6. System and method for contactless control of an appliance technical field WO WO2019053399A1 Sriranjan RASAKATLA, Sandeep Kumar Chintala

7. Systems and methods of galactic transportation WO EP WO2018167473A1 Sriranjan Rasakatla, Sandeep Kumar Chintala

Educational Qualifications

- **MS by Research (in robotics and HCI)**

  - IIIT-H, The International Institute of Information Technology, Hyderabad, 2009-13: 7.1 GPA
  - **Thesis:** Towards Search and rescue through modular robots and human-computer interfaces
  - **MS by Research, Thesis:** Towards Search and Rescue and Rehabilitation through Modular Robots and Human-Computer Interfaces- Sriranjan Rasakatla International Institute of Information Technology Hyderabad (IIIT-H), April 2014 http://web2py.iiit.ac.in/research_centres/publications/download/mastersthesis.pdf.b6a3e63c794eeaad.73726972616e6a616e2074686573697320746f2075770 6c6f61642e706466.pdf

- **B.E in Information Technology CBIT**, Osmania University, 2006-2009, 78.6%

  - Final year Bachelors project: Object following robot.Other Achievements Best innovative group UURMI award for 2014.