

# Swapnil Mane

ROBOTICS SOFTWARE ENGINEER

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## Summary

A driven innovative robotics software engineer with strong experienced in mechanical, computer science, and electrical engineering. Proven track record in developing cutting-edge robotic solutions for agriculture and sustainability, specializing in ROS/ROS2, computer vision, and AI/ML. Experienced in leading projects from concept to deployment, with multiple patents and hackathon wins. Offers a unique blend of technical proficiency, creativity, and practical problem-solving skills essential for driving innovation in robotics and automation.

## Education

### Masters in Robotics

UNIVERSITY OF BRISTOL, BRISTOL ROBOTICS LABORATORY, UWE ( MERIT )

Bristol, United Kingdom

Sept 2022 - Oct 2023

- **Courses:** Artificial Intelligence, Human-Machine Interface, Machine Vision, Robotic Systems and Fundamentals, Softrobotics
- **Masters Thesis:** Design and Development of a Novel End-Effector for Strawberry Harvesting

### Bachelors in Instrumentation and Control Engineering

VISHWAKARMA INSTITUTE OF TECHNOLOGY ( DISTINCTION )

Pune, India

Aug 2018 - Jun 2022

- **Courses:** Industrial Automation, Signal processing, Sensors and Transducers, Deep Learning, Control Systems
- **Bachelors Thesis:** ROS based Semi Autonomous Robot for agriculture task

## Work Experience/ Internship

### 1] Listt.io

FOUNDING ENGINEER (ROBOTICS SOFTWARE ENGINEER)

London, United Kingdom

15 Aug 2023 - Present

- First full time hire to establish the foundation of the company, delivering projects worth £400K+ as a team.
- Working on two AI projects funded by DEFRA (Department for Energy Security and Net Zero) and Innovate UK to improve grassland productivity, quality, and carbon sequestration.
  - **Grassland AI (Discover Underground - DUG):** Developed navigation algorithms using GPS and IMU for agilex robotics scout mini robotic platform for soil health monitoring using ROS2. Automated data storage on the cloud, displayed data on a dashboard, and mapped sensor data to generate heatmaps. Reading involves soil compaction, moisture, temperature, nitrogen content etc
  - **Regenerative AI:** Currently developing a vision box to collect and store image datasets using think lucid triton camera on the cloud. Training AI models to detect different species for mapping regenerative land. Tasks include designing the design pack, procurement, prototype building, and deployment, with a key role in piloting the system.
- **Mob-Bot:** Developed the first pilot version of an automated rotational grazing system for livestock management. Designed and developed the core driving system for the entire operation, which includes pendant based movement and adaptive grazing patterns to enhance livestock productivity and land sustainability.
- Developing and implementing software solutions for grassland monitoring and management using ROS2, Docker, navigation stack, and machine vision technologies.
- Collaborating with an interdisciplinary team of engineers and farmers to design and test robotic systems supporting decarbonization and sustainability goals.
- Additional responsibilities include:
  - Assisting in evidence gathering for monitoring officer and coordinating directly with the founder for exhibitions such as Groundswell, Innovate UK, Cereals, and LAMMA Show.
  - strategic engagement initiatives and content creation for the marketing purposes

### 2] Neutron Technologies

ROBOTIC CONSULTANT

Pune, India

15 July 2022 - 01 Sept 22

- Conduct a thorough assessment of the current pharmaceutical production process, identifying bottlenecks, inefficiencies, and areas where automation could have a positive impact.
- Work closely with the pharmaceutical production team to gather requirements and specifications for the robotic solution, taking into account the specific needs and constraints of the production process.
- Develop a concept for the robotic solution, taking into account the requirements gathered, the current state of the production process, and the desired outcomes.
- Design the robotic solution, including the hardware components and the control software, ensuring that the solution is optimized for the pharmaceutical production process.

### 3] Drishti Works

PROTOTYPE ENGINEER INTERN

Goa, India

01 Jul 21 - 15 Aug 21

- Responsible for Prototype based on design , assisting Junior and Senior Engineers to gather test data, Robot Testing
- Indus project : wheel attachment , motor testing , gathering test data and Prototype testing
- Triton Project : Worked on setting IP Cam using RTSP Stream for Night Vision Abilities using openCV and python

# Research/Innovation

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## PATENTS

### 1] An Electronic Travel Aid for Visually Impaired People

PATENT NUMBER: 538643

- Designed a smart electronic travel aid system for visually impaired people.

India  
2024

### 2] Multi-Purpose Agriculture Robot for Precision Farming

PATENT NUMBER: FILED (NUMBER AWAITING)

- Designed Mobile Robotic systems for Weed Removing, Soil Health Monitoring seed Sowing, Spraying etc in a single Integrated system

India  
2023

### 3] 3D Printed Low Cost Delta Robot Extension for Mobile Robot

PATENT NUMBER: FILED (NUMBER AWAITING)

- Invented 3D printed Delta Arm (Plug and Play) for Mobile Robots

India  
2023

### 4] Actuator Based Spraying Mechanism for Mobile Robots

PATENT NUMBER: FILED (NUMBER AWAITING)

- Invented 3D printed spraying system (Plug and Play) for Mobile Robots and UAVs

India  
2023

### 5] Multi-Purpose Sanitization Chamber

PATENT NUMBER: AU2021103619

- Invented UV based chamber for quick sanitization

Australia  
2021

## PUBLISHED/UNPUBLISHED PAPERS

### 1] Industry Automation Robotic Arm Governed by MPU9250 and Pot Enclosure (Published)

DOMAIN: ROBOTICS, EMBEDDED SYSTEM, 3D PRINTING

- Designed an Industrial Automation Robotic Arm capable to receive feedback from hand enclosure and perform required operation

Seabold Journal

2022

### 2] A Mechanical Approach to the Design and Development of a Novel Strawberry Harvesting Mechanism. (Unpublished)

DOMAIN: MOBILE ROBOT, AGRICULTURE, GANTRY ROBOT, 4 DOF ROBOTIC ARM, 3D PRINTING, CAD DESIGNS, STRAWBERRY

HARVESTING

- Developed a cost-effective, robotic strawberry harvesting system integrating a gantry mechanism and 4R robotic arm to enhance precision and reduce labor in strawberry farming.

\*Dissertation

2023

### 3] Enhancing Quality of Life for Individuals with Physical Limitations: A Study on the Combined Use of Pepper and a Physically Assistive Robot (Unpublished)

DOMAIN: ASSISTIVE ROBOTICS, QUALITY OF LIFE IMPROVEMENT, PHYSICALLY ASSISTIVE ROBOT, HUMAN-ROBOT INTERACTION

- Conducted a study on the combined efficacy of Pepper Robot and a physically assistive robot to enhance the quality of life for individuals with physical limitations, using a mixed-methods approach to evaluate mobility support and daily activity assistance.

\*Bristol Assign

2023

### 4] A design of soft robotic gripper : Experimental Testing and Improvement Strategies (Unpublished)

DOMAIN: SOFT ROBOTIC GRIPPERS, ADAPTIVE GRIPPING, 3D PRINTING

- Contributed to research on optimizing soft robotic gripper designs, focusing on enhancing adaptability and dexterity for handling thin and delicate items across sectors like agriculture and healthcare.

\*Bristol Assign

2023

### 5] NAO Robots: Personalized Workout Programs for Rehabilitation and Exercise Motivation (Unpublished)

DOMAIN: ASSISTIVE ROBOTICS, NAO ROBOT, PERSONALIZED WORKOUT PROGRAMME, REHABILITATION, USER RESEARCH

- Use of NAO robots to encourage people to exercise by giving personalized workout programmes based on their physical demands and capabilities.

\*Bristol Assign

2023

\* University assignment projects

## Projects

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### Agriculture Robot for Precision farming (Funded by Dassault Systems)

DOMAIN- ROBOTICS, 3D PRINTING, CAD DESIGNING, WIRELESS COMMUNICATION PROTOCOLS

- Multi-Purpose Robot to work in agriculture field for precision farming

Jan 21 - Jul 22

### ROS based Semi Autonomous Robot for agriculture task

DOMAIN- ROBOTICS, ROS, CAD DESIGNING, WIRELESS COMMUNICATION PROTOCOLS

- ROS based simulation to work on actual development of Agriculture Machine Tools

Jan 21 - May 21

## 3D Printed SCARA Robot using PLC (Part of Internship)

Jan 21 - Mar 21

DOMAIN- KINEMATICS ,3D PRINTING , CONTROL SYSTEM ETC

- 3D Printed Own SCARA Robot operated using Industrial Standard protocols

## SAM Robot for Mass Sanitization (Funded by IEEE Region 9)

Aug 20 - Jan 21

DOMAIN- ROBOTICS AND AUTOMATION

- Design of mobile robot from scratch for harvesting capable to navigate autonomously in the agriculture field

## Semi Autonomous Pesticide Sprayer

Jan 20 - May 20

DOMAIN- ROBOTICS ,VISION BASE AUTOMATION, AGRICULTURE ETC

- Pesticides spraying Robot to help farmers in effective spray mechanism using Vision based automation

## Skills

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<b>Programming</b>	Python (Pandas, PyTorch, Boto3, requests, plotly, NumPy, Scikit-learn. etc), Arduino IDE, **C, **Matlab
<b>Robotics</b>	Artificial Intelligence, Machine Learning, Deep Learning, Unet, Yolo, Vision based Systems, Synthetic Dataset Generation, ROS and ROS2, Softrobotics, Kinematics
<b>Robotic Platforms</b>	AgileX robotics, Farm NG
<b>Tools and Technology</b>	**AWS S3 bucket, Google Colab, **Metabase, VESC (Trampa Boards), 3D Printing, Mechatronics,IOT , Embedded Systems, PCB designing, Rapid Prototyping, Laser Cutting, CNC, Latex
<b>Communication Protocols</b>	I2C, SPI, Modbus, CAN, UART/Serial
<b>Simulation Softwares</b>	Gazebo, Solidworks, **Copperlia Sim
<b>CAD Software</b>	Solidworks, Fusion360 , Onshape, TinkerCAD
<b>Soft Skills</b>	Leadership, Time Management, Teamwork, Problem-solving, Documentation, Engaging Presentation.

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## Achievements

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### HONORS AND AWARDS

2023	<b>Recipient</b> , Douglas Bomford Trust (DBT) Studentship	Bristol, UK
2023	<b>Recipient</b> , Narotam Sekhseria Foundation Post Graduation scholarships to study at University of Bristol	Bristol, UK
2023	<b>Recipient</b> , International Society of Automation Educational foundation scholarship	North Carolina, USA
2023	<b>Recipient</b> , D K Bhawe Scholar	Pune, India
2022	<b>Recipient</b> , International Society of Automation PMCD scholarship	North Carolina, USA
2021	<b>Life time Achievement</b> , IEEE Pune Section Innovator of the Year 2020-21	Pune, India
2021	<b>Impactive Idea Award</b> , Universal College London Project Impactive competition	London UK
2021	<b>Research Grant</b> , Research fund from Dassault Systemes to develop agri-robot	Pune, India
2020	<b>Research Grant</b> , Research fund from IEEE HAC SIGHT to develop sanitization robot	Pune, India

### HACKATHONS

2021	<b>Winner</b> , Project Impactive ( Winner Impactful Idea Award )	London, UK
2021	<b>Winner</b> , STAR Hackathon	Pune India
2020	<b>Winner</b> , IEEE region 9 Hacktech Covid hackathon	online - Spain
2020	<b>Winner</b> , Ministry of Human Research and Development AICTE SAMADHAN 2020 Innovation Challenge 2020	Delhi, India

## References

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### Kristof Hayes

listt.io

FOUNDER

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### Prof Dr. Charlie Yang

Bristol Robotics Laboratory

RESEARCH GROUP LEAD, ROBOT TELEOPERATION GROUP

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### Prof Dr. Shilpa Sondkar

VIT, Pune

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### Mr. Prashant Teke

Neutron Technology

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