PANIMALAR ENGINEERING COLLEGE

An Autonomous Institution

[JAISAKTHI EDUCATIONAL TRUST]

Approved by AICTE | Affiliated to Anna University | Recognized by UGC

All Eligible UG Programs are Accredited by NBA

Bangalore Trunk Road,Varadharajapuram, Poonamallee, Chennai- 600 123

INDIA'S WOMEN CENTRIC NATIONAL LEVEL 24 – HOUR HACKATHON

TECHDIVATHON – 2.0

She blooms. She leads. She conquers

Domain: MEDICAL ROBOTICS

Problem Statements:

S.No	Title	Problem Statement	Description
1	Multi-Robot Sterile Logistics Automation	Hospital logistics lack automated, sterile transfer of biohazard samples.	Develop an intelligent multi-robot system for efficient, real-time, sterile transportation of biohazard samples and pharmaceuticals in hospital environments.
2	Emotion Recognition Robot Companion	Patient mental health monitoring is limited in long-term care.	Design a robot capable of detecting and responding dynamically to patient emotional states using multimodal sensors, promoting therapeutic engagement in wards and remote care.
3	AI-Driven Surgical Skill Assessment Bot	Current surgical training lacks unbiased, real-time skill assessment tools.	Build a robotic platform integrated with sensor arrays and AI models to objectively measure trainee performance, feedback, and learning progress during simulated or live procedures.
4	Robotic Language Interpreter for Global Health	Language barriers limit global medical collaboration.	Invent an OR-assist robot that provides live, context-aware translation (speech, gestures, and critical medical jargon) for multicultural surgical and emergency teams.
5	Micro-Robotic Vascular Mapping System	Difficult vascular access hinders certain surgical interventions.	Develop micro-robots that autonomously survey, map, and provide real-time navigation of patient vasculature for surgeons and interventional radiologists.
6	Swarm Nanorobotics for Complex Tumor Ablation	Multi-site cancer ablation procedures remain invasive and slow.	Engineer programmable nanorobotic swarms that coordinate for simultaneous, targeted ablation of multi-focal tumors, allowing rapid, minimally-invasive procedures.
7	Autonomous Mobile PPE Recycling Robot	PPE recycling inside healthcare still needs labor and is prone to contamination.	Create a mobile robot that collects, sterilizes, categorizes, and facilitates recycling of PPE, reducing environmental impact.

8	Adaptive AI-Powered Limb Fitting Robot	Prosthetic limb fitting is time-consuming and prone to errors.	Develop a robot equipped with adaptive AI that automatically customizes fit for prosthetic limbs at the point-of-care using 3D scanning and real-time adjustment.
9	Robotic Breath-Based Disease Detection Platform	Early infectious disease diagnoses often require invasive tests.	Invent a robot platform that performs rapid, non-invasive diagnostics using analysis of patient exhaled breath for pathogen signatures.
10	Infectious Disease Isolation Robot	Isolation precautions reduce critical human contact.	Design a robot that creates, monitors, and maintains personalized physical isolation zones in hospitals, with automated communications and contactless supply delivery.
11	Vision-Based Patient Mobility Coach	Current rehab lacks real-time movement coaching for remote patients.	Build a robot with computer vision and haptic feedback to coach physical rehab, correct patient form, and optimize personalized recovery protocols.
12	Nano-Robot Targeted Antibiotic Release	Current antibiotics spread systemically, increasing side effects.	Design nano-robots for highly targeted on-site drug release only at infection loci, reducing antibiotic resistance and collateral damage.
13	Smart Hospital Inventory Drone	Manual hospital inventory and asset tracking is inefficient.	Develop indoor flying robots (drones) with AI-based object recognition for automated supply tracking and restocking in hospital environments.
14	Robotic Food Preparation for Dietary Compliance	Ensuring precise patient diets is labor-intensive and error-prone.	Create an autonomous robot chef that prepares meals tailored precisely to each patient's medical needs, allergies, and dietary restrictions in hospitals.
15	AI-Integrated Preoperative Planning Robot	Surgical preplanning often lacks patient-specific simulation.	Invent a robot that collaborates with clinicians to simulate procedures, test different intervention outcomes, and optimize approaches for individual patients using predictive modeling.
16	Robotic Waste Sorting for Hospital Sustainability	Hospital waste management is a major environmental challenge.	Design vision-equipped robots for autonomous sorting and recycling of mixed hospital waste, with attention to hazardous materials.
17	Biofilm-Detecting Implant Inspection Robot	Surgical implants often cause undetected biofilm infections.	Create a miniaturized robot that can inspect internal implants for biofilm via imaging and release targeted antimicrobials if needed.
18	AI-Robot Assisted Clinical Trials Logistics	Multi-location trials face logistical complexity and data gaps.	Develop a robotic platform to automate collection, transport, anonymization, and digital integration of clinical trial samples/data in real time.
19	Autonomous Medical Documentation Robot	Manual EHR entry burdens staff and risks inaccuracies.	Build a robot employing voice, gesture, and vision processing to transcribe and annotate all patient interactions directly into electronic health records.
20	Wearable Biofluid Sampling Robot	Sampling biofluids (e.g., interstitial fluid, sweat) requires skilled staff.	Invent a wearable microrobot system to collect and analyze biofluids painlessly, providing real-time patient biochemistry data to clinicians

21	Real-Time Disaster Triage Swarm Robotics	Disaster triage response time is a critical bottleneck.	Engineer swarm robots for rapid patient location, severity assessment, and dynamic prioritization during natural disasters or mass casualty events.
22	Personalized AI Robot Mental Health Coach	Mental health support lacks real-time, continuous feedback.	Develop a personalized robot employing cognitive behavioral AI to guide and monitor mental health regimens, providing support and crisis intervention anytime.
23	Robotic Fall Prevention for Elderly Outpatients	Geriatric falls remain a major outpatient risk.	Design autonomous assistant robots for elderly outpatient clinics that monitor, predict, and physically intervene in case of fall risk.
24	3D-Printed Implant Sterilization Chamber Robot	On-demand printed implants need safe, rapid sterilization.	Invent a robotic sterilization chamber for instant disinfection and approval of newly 3D-printed implants and surgical parts at the hospital.
25	Human Factors Evaluation Assistant Robot	Assessing usability and behavioral impact of new robotic devices is hard.	Create a robot assistant to objectively measure human factors (fatigue, trust, collaboration) during evaluation and rollout.

Reviewer's Digital Signature

Reviewer's Name:
Position:
Organization:
Date:

Digital Signature: