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**ORGANISED BY**  
**DEPARTMENT OF COMPUTER SCIENCE AND BUSINESS SYSTEMS**  
IN ASSOCIATION WITH  
**DEPARTMENT OF CSE AND AI & DS**

# HACK.IO

CREATE - CODE - CONQUER

**NATIONAL LEVEL HACKATHON**

## PROBLEM STATEMENTS

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# Domain 1: Healthcare

## D1-PS1: AI-Powered Medical Imaging

**Background:** Diagnosing diseases from medical scans such as X-rays, MRIs, or CT scans is a critical yet time-consuming process that heavily depends on human expertise. Radiologists and doctors often face fatigue, increasing the chances of oversight or misinterpretation — especially when dealing with large volumes of data. In resource-limited hospitals, delayed or inaccurate interpretations can significantly affect patient outcomes.

**Problem Statement:** Develop an intelligent software tool that can automatically analyse uploaded medical images and highlight regions that appear abnormal or suspicious. The goal is to assist medical professionals in early detection and decision-making, not replace them.

## D1-PS2: Remote Patient Monitoring Dashboard

**Background:** Chronic diseases such as hypertension, diabetes, and heart conditions require continuous health tracking to prevent emergencies. Yet most healthcare facilities still depend on manual updates or disconnected systems, leaving doctors with fragmented patient data. A centralized monitoring solution — accessible from multiple devices — can help detect early warning signs, streamline response, and improve patient outcomes.

**Problem Statement:** Build a system that simulates real-time monitoring of patient vitals such as heart rate, blood pressure, and oxygen saturation using mock or sample datasets. The platform should allow healthcare providers to visualize multiple patients' vitals simultaneously, receive alerts when values cross safe thresholds, and view historical health data trends.

## D1-PS3: AI Chatbot for Mental Health

**Background:** Stress, anxiety, and depression are rising rapidly across all age groups, yet timely access to mental health professionals remains limited. Many individuals hesitate to seek help due to stigma, distance, or cost, resulting in late intervention and worsening conditions. Technology offers an opportunity to provide early, accessible, and judgment-free support through intelligent tools that can listen, assess, and guide users toward better mental wellbeing.

**Problem Statement:** Create an AI-based system that can understand user input—through text, speech, or other interactions—detect signs of stress or emotional distress, and offer meaningful coping strategies. The solution should be capable of assessing emotional state, providing personalized suggestions, and connecting users to professional or emergency resources in severe cases.

## D1-PS4: Hospital Queue & Appointment Optimizer

**Background:** Long waiting times in hospitals and clinics not only frustrate patients but also reduce the efficiency of medical staff and resources. In many healthcare centres, appointments and walk-ins overlap without proper coordination, leading to congestion, delayed consultations, and patient

dissatisfaction. A smarter scheduling system can help streamline patient flow, balance doctor availability, and enhance overall hospital operations.

**Problem Statement:** Develop an intelligent system that predicts patient waiting times and optimizes scheduling to reduce delays and resource bottlenecks. The solution should manage appointments, estimate queue lengths, and dynamically adjust based on real-time updates such as doctor availability or emergency cases.

## D1-PS5: Disease Progression Predictor

**Background:** In critical care and chronic disease management, timely intervention can make the difference between recovery and severe complications. However, doctors often rely on periodic check-ups and manual review of patient data, which may delay the detection of early warning signs. Predictive analysis of patient vitals and health records can help anticipate deterioration before it becomes critical, enabling faster, life-saving decisions.

**Problem Statement:** Develop an AI-based system that predicts the likelihood of a patient's condition worsening, classifying risk levels as low, medium, or high. The system should analyse historical and current health parameters to identify patterns that indicate potential decline, supporting doctors with data-backed insights for early intervention.

## Domain 2: FinTech

### D2-PS1: Fraud Detection in UPI/Online Payments

**Background:** As digital transactions through wallets, UPI, and online banking continue to surge, so do instances of fraudulent activity. Unusual spending behaviour, rapid transfers, or irregular location-based transactions often go unnoticed until it's too late. Detecting such anomalies early is essential for protecting both users and financial institutions from significant losses.

**Problem Statement:** Design a system that analyses transaction data—such as amount, frequency, location, and timing—to identify suspicious or potentially fraudulent patterns. The solution should be capable of flagging anomalies that deviate from a user's typical behaviour and providing interpretable insights into why a transaction is marked as risky.

### D2-PS2: AI-Based Stock Market Sentiment Tracker

**Background:** In financial markets, investor sentiment plays a major role in driving stock prices. Traders and analysts increasingly depend on real-time data from news articles, social media, and forums to gauge public opinion about companies or sectors. However, manually tracking this information is time-consuming and prone to bias. Automating the process with sentiment analysis can give investors timely insights and a clearer view of market mood.

**Problem Statement:** Build a system that collects and analyses financial news headlines, articles, or social media posts related to specific companies or sectors, classifying them as positive, negative, or neutral. The goal is to help users visualize overall sentiment trends and understand how public perception might influence stock performance.

### D2PS3: Loan Default Predictor

**Background:** Financial institutions face significant challenges in assessing the repayment ability of borrowers. Traditional credit scoring systems often fail to capture subtle behavioural or contextual indicators, leading to inaccurate evaluations and loan defaults. With the growing availability of applicant and transaction data, machine learning offers a smarter, data-driven approach to predict repayment likelihood and reduce financial risk.

**Problem Statement:** Develop a machine learning model that predicts the probability of a borrower defaulting on a loan based on applicant data such as income, credit history, debt-to-income ratio, and other relevant features. The system should generate a clear risk classification (e.g., low, medium, high) and provide basic reasoning or feature importance for each prediction to ensure interpretability.

### D2-PS4: Smart Invoice Digitizer

**Background:** Small and medium-sized enterprises (SMEs) often depend on manual methods for managing invoices, receipts, and billing documents. This approach is time-consuming, error-prone, and inefficient—especially when dealing with large volumes of paperwork. Automating invoice extraction and classification can help businesses streamline accounting, improve record accuracy, and save valuable time.

**Problem Statement:** Develop a system that can read invoices in PDF or image format, extract key details such as invoice number, date, vendor, amount, and tax values using Optical Character Recognition (OCR), and automatically categorize them into structured formats for storage or analysis.

## D2-PS5: Credit Risk Scoring Platform

**Background:** Banks, NBFCs, and digital lenders require quick yet reliable ways to evaluate loan applicants. Traditional credit scoring systems often depend on incomplete data or lack transparency in how scores are derived, leading to unfair decisions or missed opportunities. An AI-driven scoring platform can make the process faster, fairer, and more explainable by analysing a broader set of borrower attributes.

**Problem Statement:** Design a system that generates creditworthiness scores based on simplified borrower profiles, using parameters such as income, repayment history, liabilities, and spending behaviour. The solution should emphasize clarity and fairness by showing how each factor influences the final score.

# Domain 3: Artificial Intelligence

## D3-PS1: Fake News Detector

**Background:** In today's hyperconnected world, misinformation spreads faster than verified facts, often influencing public opinion, elections, and even social stability. The rise of social media and unverified online sources has made it increasingly difficult for users to distinguish authentic news from fabricated content. Combating this challenge requires automated, data-driven systems that can evaluate the credibility of information in real time.

**Problem Statement:** Develop an AI-based system that analyses news articles, headlines, or social media posts and classifies them as *real* or *fake* based on linguistic, contextual, and source-based cues. The system should provide a confidence level or reliability score for each classification, helping users assess the trustworthiness of the content they consume.

## D3-PS2: Human Pose Detection

**Background:** Human pose estimation has wide-ranging applications in fitness tracking, sports analysis, rehabilitation, animation, and augmented reality. By detecting and mapping key body points from images or video frames, pose detection systems can analyse movement, form, and posture with precision. Building such systems bridges the gap between computer vision and real-world motion understanding.

**Problem Statement:** Develop a software tool that can accurately detect and visualize key body joints from uploaded images or short video clips. The system should identify major body landmarks—such as limbs, joints, and torso positions—and generate a clear skeletal overlay that represents human posture or movement.

## D3-PS3: Text-to-Image Generator

**Background:** Generative AI has unlocked new ways to create art, design mock-ups, and visualize ideas from simple textual prompts. Open-source diffusion and transformer models make it possible for creators, designers, and students to prototype visuals quickly without deep graphics expertise. Democratizing this capability helps speed up ideation, lowers the barrier to creative exploration, and supports rapid prototyping across domains.

**Problem Statement:** Build a simplified text-to-image system that converts user prompts into visually coherent images using open-source models and libraries. The solution should focus on usability, responsible content filters, and producing outputs that are relevant to the given prompts.

## D3-PS4: Research Assistant AI Agent

**Background:** Students and researchers spend hours hunting for relevant papers, filtering noise, and extracting the useful bits. The process is repetitive and inefficient: locating high-quality sources, understanding their contributions, and prioritizing which papers to read takes time away from actual research and learning.

**Problem Statement:** Create an AI agent that, given a research topic or query, autonomously finds relevant academic papers, summarizes their key contributions and methods, and ranks them by relevance and quality. The agent should help users quickly grasp which works matter most for a given question and why, reducing the time from topic to insight.

### D3-PS5: Sentiment Analysis for Social Media

**Background:** Online conversations shape brand perception in real time. Tweets, reviews, and posts are a goldmine of customer insight, but volume and noise make manual monitoring impractical. Brands that can quickly read the room gain an edge — spotting PR risks, measuring campaign impact, and discovering unmet user needs sooner.

**Problem Statement:** Build an NLP-based system that analyses social media content (e.g., tweets, posts, comments) for sentiment and emotional tone, and surface actionable insights for a given hashtag, keyword, or brand. The system should handle noisy short-text data, account for context (sarcasm, emojis, slang where possible), and produce aggregated signals that help stakeholders understand public mood and trends.

# Domain 4: Education & Learning Technologies

## D4-PS1: AI Virtual Tutor

**Background:** Many students need one-on-one explanations and practice but classrooms and instructors have limited bandwidth. Personalized tutoring—adapting to a student’s pace, gaps, and learning style—boosts understanding and retention, yet is often expensive or inaccessible. Intelligent tutoring systems can fill that gap by delivering targeted guidance, practice problems, and explanations when students need them.

**Problem Statement:** Build an AI-driven tutoring system that interactively explains concepts, adapts to a student’s pace, and provides practice tailored to their strengths and weaknesses. The solution should support multi-turn interaction, clarify misunderstandings, and present explanations at an appropriate level for the learner.

## D4-PS2: Student Performance Predictor

**Background:** Teachers often realize too late when students begin to fall behind. Early signs like irregular attendance, missed assignments, or declining test scores are easy to miss without consistent tracking. Technology can help educators identify these patterns early and support students before poor performance becomes failure.

**Problem Statement:** Create a system that analyses student-related data to identify those at risk of underperforming. The solution should highlight learning trends and provide clear insights to help teachers or mentors take timely action and offer personalized support.

## D4-PS3: Plagiarism & AI-Generated Content Detector

**Background:** With AI tools becoming widely accessible, students can now generate essays, reports, and assignments in seconds. While such tools can support learning, they also blur the line between original effort and automated output. Educators face growing difficulty in distinguishing genuine student work from copied or AI-generated text, calling for smarter detection systems.

**Problem Statement:** Design a system that analyses student submissions to identify possible plagiarism and detect AI-generated writing. The tool should assess text originality, highlight suspicious sections, and provide clear, interpretable indicators of content authenticity.

## D4-PS4: Coding Practice Assistant

**Background:** Students learning to code often get stuck on small errors or inefficient patterns and need immediate, contextual guidance. Waiting for instructor feedback or searching forums interrupts flow and slows learning. Real-time, helpful hints — not just final answers — accelerate mastery and teach debugging as a skill.

**Problem Statement:** Create an intelligent tool that analyses student code and offers actionable, step-wise suggestions: bug explanation, probable fixes, style or complexity improvements, and hints that nudge learners toward the solution without giving it away. The system should be pedagogically aware

(prioritize learning over giving answers) and produce clear, interpretable feedback that students and instructors can trust.

## D4-PS5: AI Auto-Grader for Code Submissions

**Background:** Instructors face a heavy burden grading large volumes of programming assignments. Manual grading is slow, inconsistent, and often focuses on output correctness while missing style, efficiency, and pedagogical feedback. Students benefit more from fast, constructive feedback that helps them learn from mistakes immediately.

**Problem Statement:** Design an AI-driven auto-grading system that evaluates programming assignments by running tests, checking correctness, and providing actionable, pedagogical feedback. The system should help instructors scale assessment while giving students meaningful, timely guidance to improve their code and understanding.

# Domain 5: Sponsored Problem Statements

## -PYGENICARC

### D5-PS1: Automated Document Verification Portal for Post-Selection Background Checks

**Background:** Organizations face growing challenges in verifying the authenticity of academic, identity, and employment documents during hiring. Manual verification is time-consuming, prone to oversight, and leaves companies vulnerable to fraud through forged degrees, fake experience letters, or tampered certificates. A fast, secure, and automated system can drastically improve accuracy and efficiency in the post-selection background-check process.

**Problem Statement:** To mitigate the risk of hiring based on forged documents (e.g., fake degrees, experience certificates), organizations need a fast, automated solution for background checks. The challenge is to build a portal that automates the verification of a selected candidate's academic and identity documents by securely integrating with authoritative digital sources (like NAD/DigiLocker and government APIs) to provide an accurate, auditable, and instant check before final employment.

### D5-PS2: Secure Online Examination Platform with Browser Lock and Proctoring

**Background:** With remote and hybrid learning becoming the norm, ensuring fairness and integrity in online examinations has become a major challenge. Traditional systems often fail to prevent malpractice such as tab switching, impersonation, or unauthorized resource access. Institutions require a secure, transparent, and scalable solution that maintains exam credibility in virtual environments.

**Problem Statement:** The need for high-stakes exam integrity in remote and online testing is growing. Traditional online exam systems are vulnerable to cheating and fraud. The challenge is to develop a secure online examination platform that ensures fairness and trust by implementing multi-factor candidate authentication and a secure lockdown browser to prevent unauthorized actions (like tab switching or copy/paste), along with real-time, webcam-based AI proctoring to monitor and flag suspicious candidate behaviour.

## -QUORUM CHAIN

### D5-PS3: Decentralized Trust for Smart Agriculture

**Background:** In modern agriculture, critical data like soil moisture, weather and crop health are collected using IoT sensors and smart devices. However, most of this data is stored in centralized systems that are prone to manipulation or inaccessibility. Farmers, suppliers and consumers need a trusted, transparent system that ensures the data they rely on is accurate, verifiable and securely shared.

**Problem Statement:** Design and prototype a decentralized data platform that ensures the integrity, transparency and traceability of agricultural data. Your solution can integrate blockchain principles (immutability, distributed validation and cryptographic proof) to build a trust layer between farmers, researchers and consumers without depending on complex blockchain infrastructure.

## -VTRICKS TECHNOLOGIES

### D5-PS4: Intelligent Resume Filtering

**Background:** Hiring teams sift through large volumes of resumes to find suitable candidates, wasting time on manual screening and risking biased or inconsistent shortlisting. Recruiters need tools that can quickly surface relevant applicants while preserving fairness, transparency, and auditability in the hiring pipeline.

**Problem Statement:** Build an intelligent resume filtering system that helps recruiters prioritize applicants by extracting structured information (skills, experience, education), matching profiles to job requirements, and surfacing the best-fit candidates with interpretable reasons. The solution should support scalable pre-screening while reducing unconscious bias and improving hiring efficiency.

### D5-PS5: AI-Based Job Description Matching

**Background:** Recruiters often struggle to align job descriptions with the most relevant resumes. Manual comparison is slow, inconsistent, and prone to human bias. Candidates may also misinterpret job requirements, leading to mismatched applications. An intelligent system that automatically compares resumes against job descriptions can make recruitment faster, fairer, and more precise.

**Problem Statement:** Develop an AI-driven system that matches candidate resumes to job descriptions by analysing skill relevance, experience alignment, and role fit. The system should evaluate both textual and contextual similarity, helping recruiters identify the most suitable candidates and assisting applicants in understanding their compatibility with listed roles.

## **Domain 6: Student Innovation**

Participants are allowed to propose solutions to already existing problems which are not included in any of the above Domains.

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