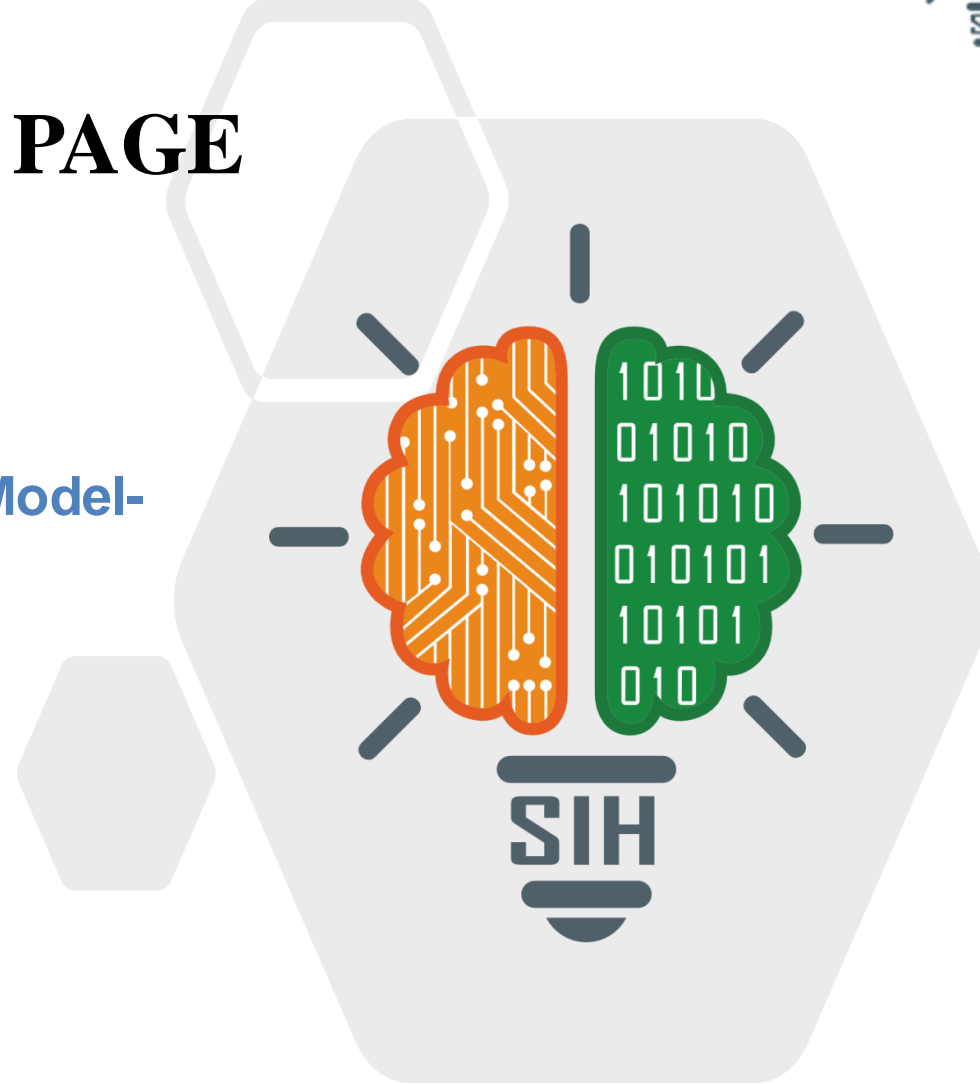# SMART INDIA HACKATHON 2024

TITLE PAGE

- **Problem Statement ID –** 1672

- **Problem Statement Title -** Define a ML Model-based solution to refine CAPTCHA

- **Theme-** Smart Automation

- **PS Category-** Software

- **Team ID-**

- **Team Name:** CapPix

IDEA TITLE

Proposed Solution

•**Image Manipulation CAPTCHA**: Combines high- and low-quality image sections to confuse bots and make it easy for humans.

•**Human-Centric Design**: Leverages natural human pattern recognition while preventing bot success.

•**Dynamic Generation**: Randomizes images and questions to avoid bot learning.

How it Addresses the Problem

•**Bot Resistance**: Exploits bot reliance on pooling, making them miss key details while humans easily identify them.

•**Enhanced Security**: Regular updates to CAPTCHA patterns keep bots from adapting over time.

•User Privacy : The solution do not compromise with user's privacy unlike traditional solutions

Unique Features

•**Adaptive Image Quality**: Targets bot vulnerabilities using dynamic image quality adjustments.

•**User-Friendly**: Simplified for humans, avoiding complex reCAPTCHA-style puzzles.

•**Dynamic Image Generation**: Ensures unique CAPTCHA experiences, reducing bot pattern recognition.
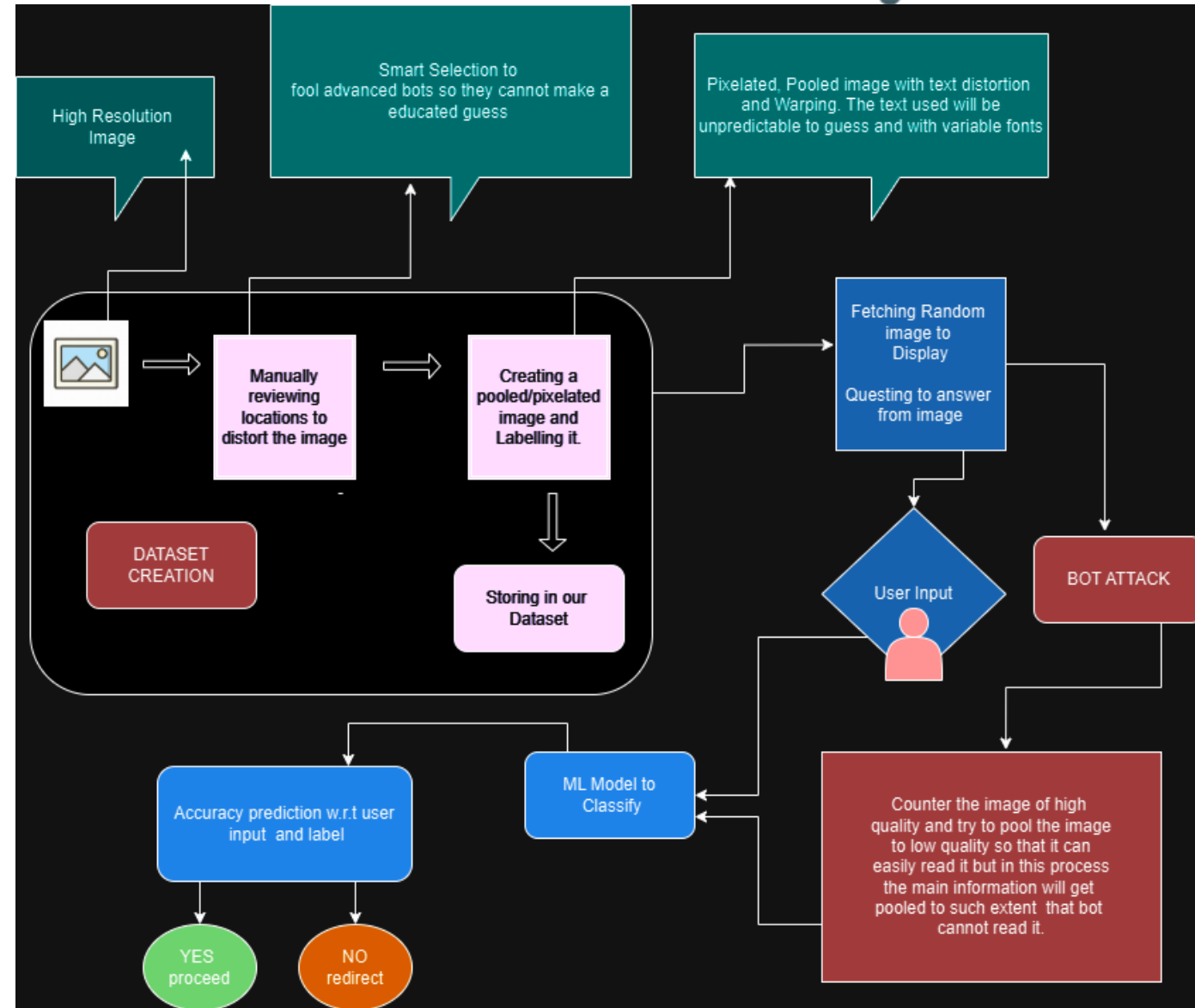
TECHNICAL APPROACH
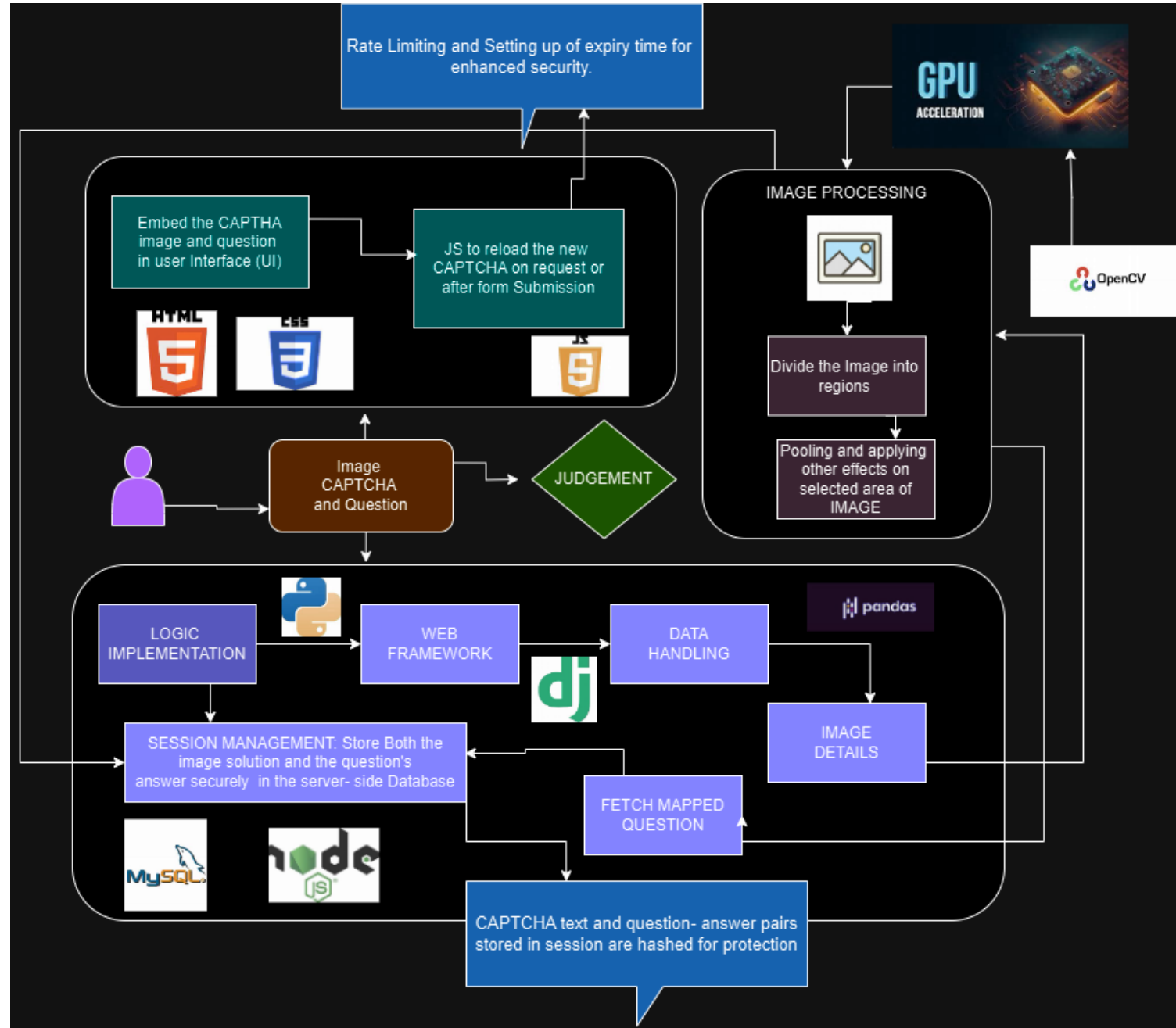
FEASIBILITY AND VIABILITY

1. Feasibility Analysis of the Idea:
- **Market Demand**: Increasing need for user-friendly, bot-resistant CAPTCHA solutions.
- **Technological Feasibility**: AI/ML allows complex image questions decipherable by humans.
- **Scalability**: Adaptable across industries through customizable complexity.
- **User Experience**: Simple for humans; improves security without sacrificing usability.

2. Potential Challenges and Risks:
- **Bot Evolution**: Bots may evolve to handle complex images over time.
- **User Frustration**: Complex CAPTCHAs may frustrate users, increasing bounce rates.
- **Competitor Pressure**: Major players like Google reCAPTCHA dominate the market.
- **False Positives**: Humans could be mistakenly flagged as bots.

3. Strategies for Overcoming Challenges:
- **Adaptation**: Monitor bot trends and update CAPTCHA designs using AI.
- **User Testing**: Regular usability tests to balance security and user-friendliness.
- **Differentiation**: Customizable, region-specific CAPTCHAs to stand out in the market.

IMPACT AND BENEFITS

Target Audience: Our primary audience consists of businesses that rely heavily on secure, automated user interactions. This includes:

•**Financial Institutions**: Banks and fintech companies that require secure authentication methods for online transactions.

•**E-commerce Platforms**: Companies needing to protect checkout and login processes from bot attacks.

•**Government Services**: Ensuring security for citizen data and automated services provided by governments.

•**Healthcare**: Protecting patient data from automated scraping or cyberattacks.

- Advanced Bots go unnoticed on websites
- What exactly is a bot attack?
- Working of CAPTCHA and reCaptcha with flaws
- How and where traditional CAPTCHA's fail?
- Video Captcha's that could exist but is difficult to process
- Challenges of Video Captcha
- CAPTCHA Analysis and Breaking Techniques