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STRATEGIC HANDLING AND KNOWLEDGE FOR TACTICAL INTELLIGENCE

SHAKTI AI

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OUR TEAM

Ryan (Leader & Core AI Development)

Ronit (Core AI Development)

Udit (Backend & Web Developer)

Anukrati (Frontend & Design)

Murtuza (Data Collection)

Kushal (Data Testing & Validation)

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THE CHALLENGE OF MODERN TACTICAL INTELLIGENCE

- Difficulties in integrating multimodal data for real-time decision-making.
- Lack of AI systems optimized for military applications (e.g., threat detection, situational awareness).
- Problems like false positives, inefficient data handling, and lack of resource-efficient solutions.
- Statistics or real-world examples (e.g., challenges faced in dynamic battlefield environments).

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AI FOR DEFENSE & TACTICAL APPLICATIONS

OBJECTIVES

01 To develop a modular, resource-efficient AI capable of processing and integrating multimodal data.

02 Enhance decision-making, threat detection, and situational awareness in military contexts.

03 Minimize computational costs while maximizing tactical intelligence accuracy.

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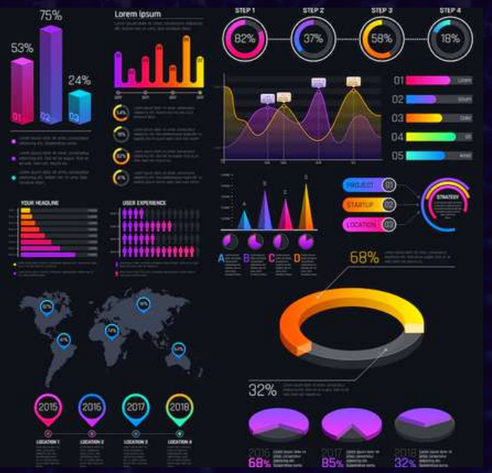

OVERVIEW

01

Modular AI system combining Drishti Vision Module (visual data), Chakravyuha Text Module (language processing), and Airavata Framework (pipeline management).

02

- Cross-hyper attention for vision-language fusion.
- Iterative and parallel reasoning for complex decision-making.
- Lightweight design optimized for hardware with limited resources.

03

- Cross-modal integration.
- Flash attention and hyper-attention for efficient processing.

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CORE FEATURES

01 Iterative & Parallel Reasoning: Step-by-step and multi-stream processing.

02 Rotary Positional Encoding (RoPE): Improved spatial and temporal reasoning.

03 Camouflage Detection: Distinguishing hidden threats.

04 Friend/Foe Classification: Military-specific feature for battlefield clarity.

05 Supported RAG as well as long sequence queries along with OCR detection.

06 Low-Rank Adaptation (LoRA): Efficient model training and deployment.

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Benchmark	Shakti (2B)	Top Model 1	Top Model 2	Top Model 3
Visual Question Answering				
VQAv2	80.1	GPT-4V (1.8T): 87.6	LLaVA-1.5 (7B): 85.4	Qwen-VL-Plus (4.4B): 79.8
OK-VQA	54.2	BLIP-2 (4.4B): 62.8	InstructBLIP (7B): 58.6	Kosmos-2 (2.7B): 56.7
TextVQA	62.9	GPT-4V (1.8T): 76.5	LLaVA-1.5 (7B): 73.2	MPLUG-Owl2 (7B): 68.4
Zero-Shot Multimodal				
MMB-EM	66.3	GPT-4V (1.8T): 76.8	Gemini Pro (175B): 72.5	LLaVA-1.5 (7B): 69.1
POPE	87.4	Qwen-VL-Plus (4.4B): 90.1	BLIP-2 (4.4B): 88.7	InstructBLIP (7B): 87.6
AI2D	63.2	GPT-4V (1.8T): 72.5	Gemini Pro (175B): 69.8	LLaVA-1.5 (7B): 67.3
Video Understanding				
NextQA	73.6	VideoChat2 (7B): 81.3	BLIP-2 (4.4B): 78.5	MPLUG-Owl2 (7B): 76.9
MLBU	60.1	VideoChat2 (7B): 68.4	BLIP-2 (4.4B): 65.7	LLaVA-1.5 (7B): 63.2
Multi-Image Benchmarks				
NLVR2	85.6	GPT-4V (1.8T): 92.3	LLaVA-1.5 (7B): 89.7	Qwen-VL-Plus (4.4B): 87.2
BLINK	42.7	BLIP-2 (4.4B): 51.6	InstructBLIP (7B): 48.9	Qwen-VL (4.4B): 45.3

Table 5: Multimodal Model Performance Comparison

METRICS

- Image processing speed: 15-20 FPS for single images, 5-7 FPS for multi-image grids.
- Accuracy: 80%+ on vision-language benchmarks.
- Resource requirements: Runs on GPUs with as little as 5GB VRAM.
- Resource-efficient yet achieves good results in multi-image and video scenarios.

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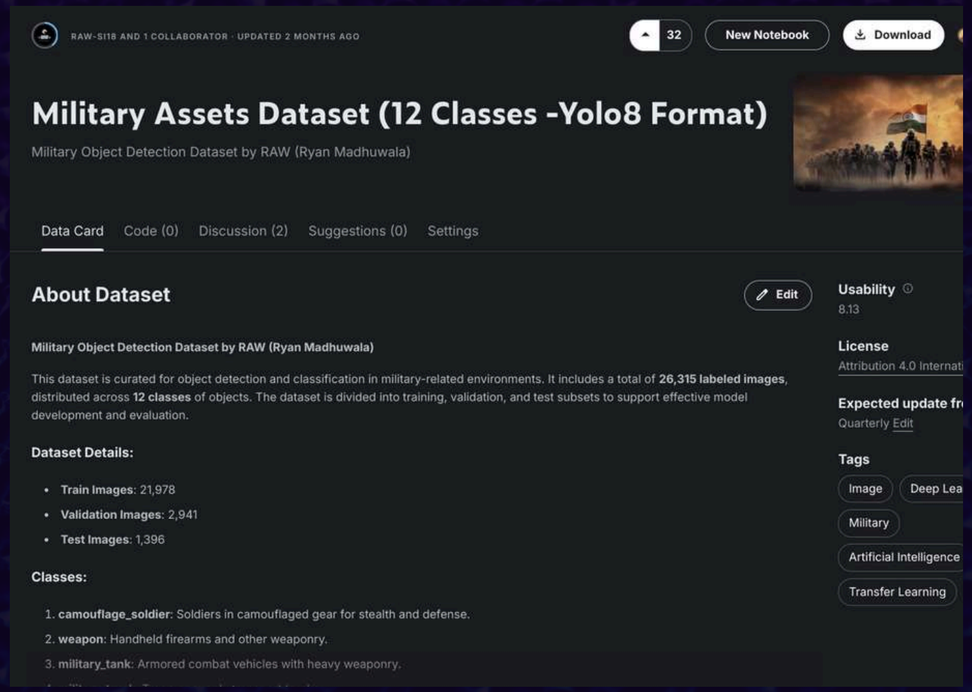
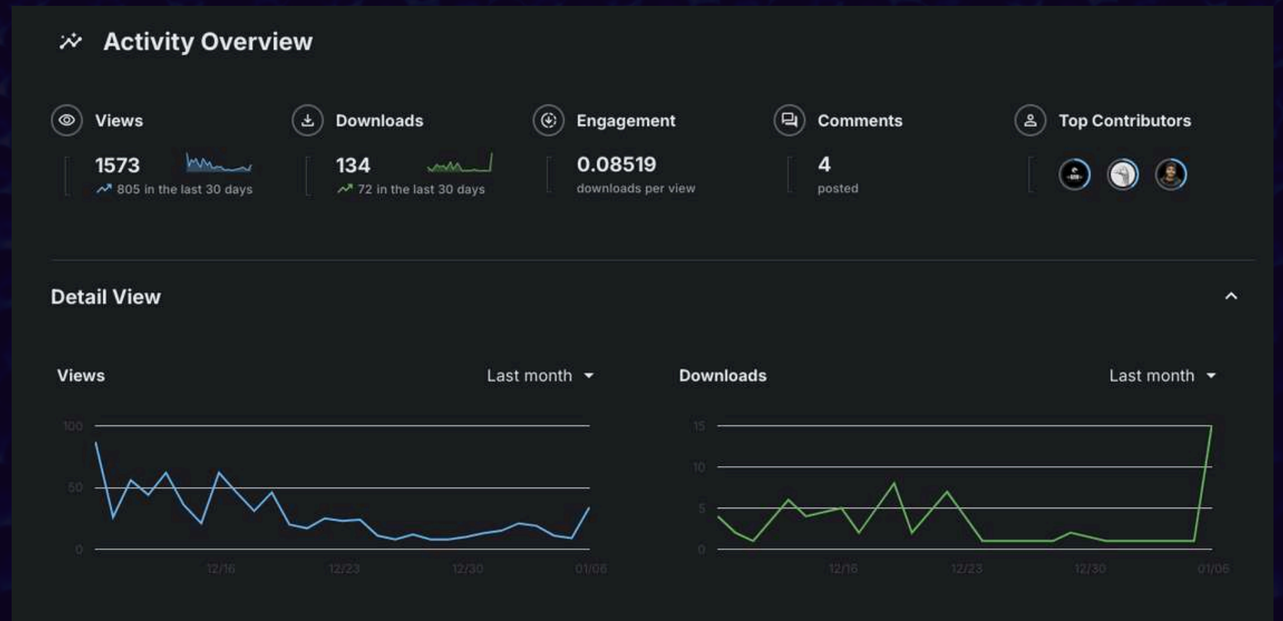
TRAINED DATASETS



- 17,000 Military Assets Images: Tanks, aircraft, ships, and other vehicles.
- 9,000 Camouflage Detection Images: Hidden objects for threat identification.
- 2,000 OCR Documents: Military text for document analysis.
- 1,500 Tactical Scenarios: Multi-modal cases combining images, videos, and text.



OWN MADE (KAGGLE BRONZE MEDAL) DATASET

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CURRENT SOLUTIONS:

- Lack integration of multimodal data streams for holistic analysis.
- Focus on single-task analysis (e.g., object detection or text reasoning).
- High resource demands, making them impractical for on-field deployment.

SHAKTI AI SOLUTION:

- Fully multimodal (images, videos, and text).
- Tailored for military applications with domain-specific optimizations.
- Lightweight and deployable in resource-constrained settings.
- Innovative attention mechanisms to ensure minimal latency and high accuracy.

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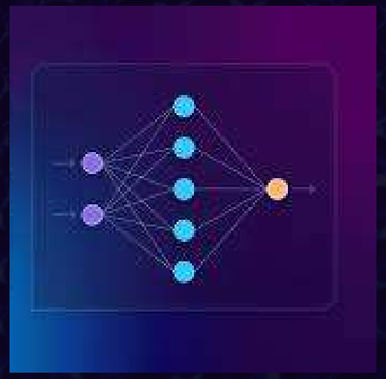
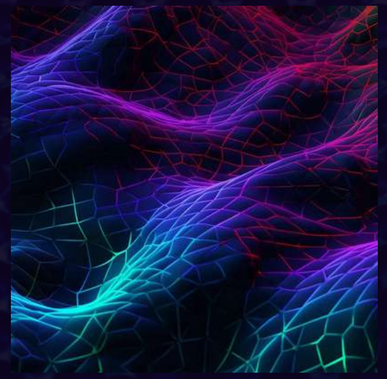
TECH STACK

Frameworks: PyTorch, TensorFlow, Hugging Face Transformers.



Models: Vision Transformers (Drishti), Text Reasoning Models (Chakravyuha).



Attention Mechanisms: Cross-Hyper Attention, Flash Attention, Iterative & Parallel Reasoning.

Optimization: Low-Rank Adaptation (LoRA), Rotary Positional Encoding (RoPE).

Backend & Infrastructure: Airavata Framework, Python APIs, NVIDIA GPUs (5GB+).

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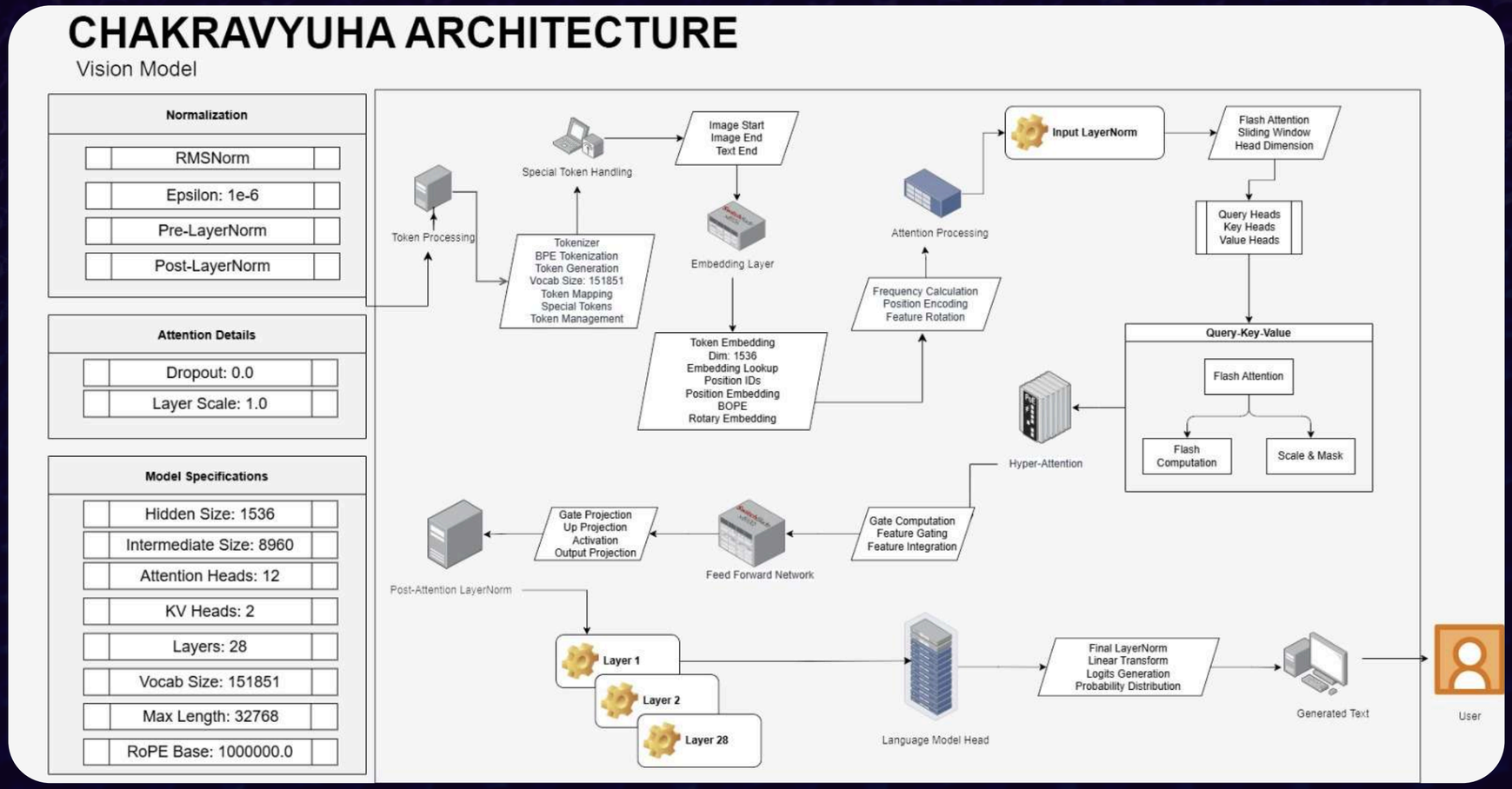
CHAKRAVYUHA MODEL



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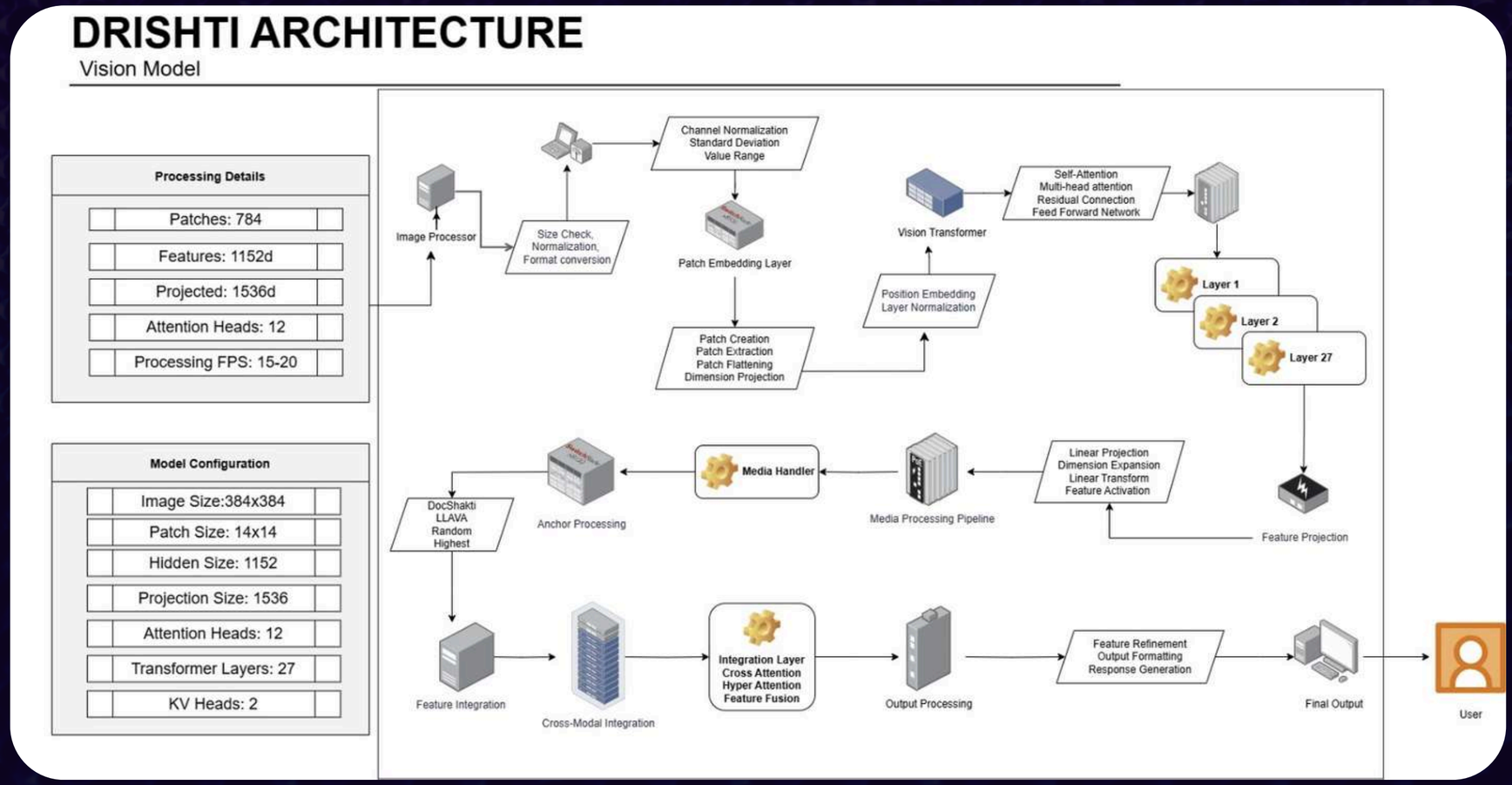
DRISHTI MODEL



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WORKFLOW

- Input data: Images, videos, pdf, and textual commands.
- Data processing: Vision and language fusion via hyper cross-modal layers.
- Output: Tactical insights like threat levels, camouflage detection, and decision support.

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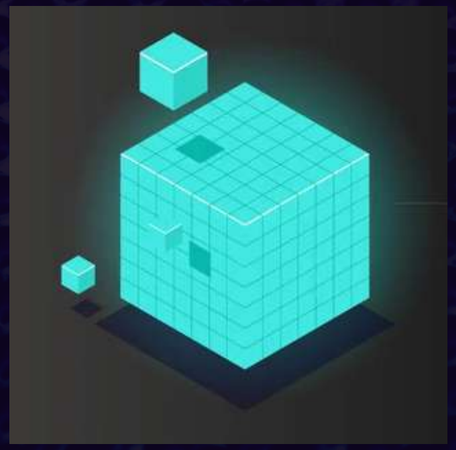
SPECIALITY

First-of-its-kind military-specific multimodal intelligence.



Modular and scalable architecture.

Lightweight design capable of running on 5GB VRAM GPUs.

Use cases in dynamic and resource-constrained environments

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THANK YOU

DEV.BEGANS@GMAIL.COM