DAVID PRINCE HOPE

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RESEARCH INTREST

- Computer Vision for Robotics
- Embodied AI
- Scene Understanding and Intelligent Navigation
- Intelligent Embedded Systems for Perception and Automation

EDUCATION

Airforce Institute of Technology **Kaduna, Kaduna State.**

- Programme: B.Eng. Mechatronics July 2025
- Grade: First class (4.71 / 5.00)
- Thesis: Development of an autonomous IED detection robot using rocker-bogie mechanism and computer vision.
  Supervisor: Dr. Yekini Bello

TECHNICAL SKILLS

- **Computer Vision & AI**: YOLO(v8/v11), SSD, CNN
- **Machine Learning Frameworks:** TensorFlow, Keras, PyTorch, scikit-learn, XGBoost
- **Programming**: Python, C++
- **Embedded Systems & IoT**: ESP32, ESP8266, Arduino, Firebase integration, Hardware prototyping
- **Tools:** VS Code, Jupyter Notebook, Arduino IDE, Webots, AutoCAD, SolidWorks
- **Soft Skills:** Team Collaboration, Project Management

EXPERIENCE

Final Year Research Project **Air Force Institute of Technology, Kaduna**
Supervisor: Dr. Yekini Bello . Jan 2025 – July 2025
Development of an autonomous IED detection robot using rocker-bogie mechanism and computer vision

- Designed a mobile robot with NASA-inspired rocker-bogie suspension for stability on rugged terrains.
- Collected and annotated 1,000+ images of IEDs and components to train object detection model.
- Integrated YOLOv11 with ESP32-CAM for real-time detection of IEDs and components (mAP@50:95 = 0.963, 98% precision, 30 FPS).
- Implemented PID-controlled navigation for heading correction with obstacle avoidance.

Research Project **Air Force Institute of Technology, Kaduna**
Advisor Name: Engineer Sheshi . March 2025 – April 2025
Automated Turret with Real-Time Face Tracking

- Implemented Mediapipe face detection with PID control for precise servo actuation.
- Achieved smooth pan-tilt face tracking using MG996R metal gear servos.

Research Project **Air Force Institute of Technology, Kaduna**
Advisor Name: Engineer Sheshi. February 2025
Smart Traffic Light System

- Trained a custom object detection model to classify emergency vs. normal vehicles with model cars.
- Simulated a 3-way intersection with LEDs, implementing emergency priority override.

National Centre for Artificial Intelligence and Robotics **Wuye Abuja.**
Internship *June* 2024- Oct 2024

- IoT-Based ECG Monitoring System: Developed a real-time heart rate monitoring device using ESP32 and AD8232 sensor, enabling wireless data transmission and visualization.
- House Price Prediction Model: Built and evaluated a machine learning model using XGBoost to predict housing prices based on key market features
- Product Design & Prototyping: Designed and 3D-printed functional prototypes using Creality Ender-3, and operated laser cutting equipment for fabrication projects.
- Electronics & Circuit Design: Gained hands-on experience in PCB design and circuit simulation using Altium Designer and Proteus.

Industrial Training Fund (Mechatronics Department) **Maitama Abuja.**
Internship *December* 2023- Jan 2024

- Automated an industrial process using Programmable Logic Controllers (PLCs) and ladder logic with proximity sensors.
- Conducted hands-on training with hydraulic and pneumatic actuators & valve control systems.

TEACHING EXPERIENCE

Capital Science Academy, Nigeria **October 2025 – Present**
Robotics Instructor

PUBLICATIONS

Prince, D. H., Development *of an Autonomous IED Detection Rover Using Computer Vision and Rocker-Bogie Mechanism.* Manuscript in preparation

CERTIFICATIONS

- Machine Learning Specialization – DeepLearning.AI & Stanford Unive rsity *(Aug 2024)*
- Unsupervised Learning, Recommenders, and Reinforcement Learning – DeepLearning.AI & Stanford University *(Aug 2024)*
- Advanced Learning Algorithms – DeepLearning.AI & Stanford University *(Jul 2024)*
- Supervised Machine Learning: Regression and Classification – DeepLearning.AI & Stanford University *(Jun 2024)*
- Feature Engineering – Kaggle
- Intermediate Machine Learning – Kaggle
- Embedded Systems Cohort – National Centre for Artificial Intelligence and Robotics *(2024)*
- Python Cohort – National Centre for Artificial Intelligence and Robotics *(2024)*

REFERENCES

Available upon request.