

# KAKAIRE steven

Machine Learning and Software Engineer

## EDUCATION

**Makerere University, College of Computing and Information Science,**  
**Candidate** — *Masters of Science in Data Communication and Software Engineering (Candidate)*

**OCT 2022 - MAY 2024**

Writing a research dissertation. Research topic: Automated vulnerability repair of security vulnerabilities in python source code.

**Makerere University, College of Engineering, Design, Art and Technology**  
— *Bachelors of Science in Computer Engineering (Second Class Upper Honors)*

**AUG 2016- MAY 2020**

**Iganga High School**— *Uganda Advanced Certificate of Education*

**JAN 2014- DEC 2015**

Studied Physics, Mathematics and Chemistry. Scored 16/20 points  
(Distinction)

**Iganga High School**— *Uganda Ordinary Certificate of Education*

**JAN 2014- DEC 2015**

Scored 19 aggregated in 8 subjects (Distinction)

**Iganga Central Primary School**— *Uganda Primary Leaving Examination*

**DEC 2009**

Scored 8 aggregates in 4 subjects (Distinction)

## **EXPERIENCE**

### **Quality Assurance Directorate, Makerere University, Machine Learning & Software Engineer**

**JAN 2021 – UPDATE**

This role focused on in-depth analysis of academic data to glean insights about application, enrollment, academic performance, student dropout, graduation and employability of the University graduates. It required deep analysis of student lifecycle through use of Probabilistic Programming using PyMC, Machine Learning Models, Visualization, Automation, and integration and deployment of models in various University Information Systems.

#### **Key Achievements**

- Conducted comprehensive data analysis to model and understand the full student journey, from admission to post-graduation outcomes.
- Employed Probabilistic Programming (using PyMC) to model uncertainty and make robust predictions about student behaviors and outcomes.
- Developed and implemented machine learning models to identify patterns and trends in student performance and retention.
- Designed data visualizations to communicate complex insights to academic and administrative stakeholders.
- Automated data pipelines and reporting processes to enhance efficiency and data reliability.
- Integrated and deployed predictive models into various University Information Systems, enabling real-time decision-making and operational improvements.

#### **Skills**

- Programming and Scripting  
Python, NumPy
- Data analysis and Visualization  
Pandas, Seaborn, Matplotlib, Plotly
- Numerical Computing  
NumPy, Numba
- Database Systems

MySQL, Administration, Cloud, Optimization,

- Software Engineering

Quality Assurance and Testing, Software Architecture and Security,

- Machine Learning and Mathematics

Scikitlearn, statsmodels, Xgboost, Mathematics and Statistics for Data Science, Tensorflow, PyMC and Bayesian Modelling

- DevOPs

Docker

### **USAID Feed The Future Uganda-ISS Activity, Kampala —Software and Data Engineer (Part Time, Remote)**

**DEC 2022 – DEC 2024**

- Design and Development of data systems.
- Implementation of recommendation Systems for Agricultural Farmer Institutions in Uganda.
- Design and development of data analysis and visualization dashboards.
- Development of Web Content Management System

**Skills:** OOP (Python and Flask), HTML, CSS, JavaScript, MySQL, SQLite, SQLAlchemy, Pandas, Scikit-learn, Statmodels, Keras, Tensorflow, Matplotlib, Seaborn, Docker, Plotly

### **PyData Kampala, Uganda — Open Source Lead**

**NOV 2022 – UPDATE**

I lead a group of open source developers that develop data, science and engineering tools and solutions for everyday real world problems. The focus areas are Education, Research, Agriculture and Health.

**Skills:** CI/CD, Problem-finding, Scientific Computing, Collaboration, Mentorship, Intensive Data Systems, Machine Learning, Software Engineering, Version Control

### **Directorate for ICT Support, Makerere University, Kampala —Graduate Intern**

**MAY 2019 – DEC 2020**

Being a part of the Unit, I have actively contributed to planning and maintenance initiatives that have enhanced the University's ICT environment. We successfully strengthened the University's e-learning

systems through the introduction of advanced technologies, the installation and support of modern eLearning studios, the implementation of robust risk management and security measures, and the optimization of asset acquisition and lifecycle management. These efforts have resulted in a more resilient, efficient, and technology-driven University environment.

**Skills:** Network design and administration (LAN, WAN, VPN), Server and data center management, IT capacity planning and resource optimization, Systems monitoring and performance tuning, Security management and risk assessment, Backup, disaster recovery, and business continuity planning, Hardware and software procurement planning, Fiber Optical Networks

## **PROJECTS**

### **USAID Feed The Future Uganda-ISS Activity, Kampala —Software and Data Engineer (Part Time, Remote)**

- Designed and maintained software solutions to support agricultural data collection, processing, and reporting systems.
- Developed data pipelines and ETL processes to integrate information from multiple sources for program monitoring and evaluation.
- Built dashboards and visualization tools to track key performance indicators for decision-making.
- Implemented database management solutions ensuring data accuracy, security, and accessibility.
- Collaborated with cross-functional teams to design digital tools supporting farmers, extension workers, and program managers.
- Applied data science and statistical methods to analyze program outcomes and generate actionable insights.
- Supported automation of reporting workflows to streamline donor and stakeholder reporting requirements.

### **Application, enrollment, Student Retention, Dropout and Graduation Data Projects, Quality Assurance Directorate— *Makerere University***

These projects aimed at gleaning insights from Makerere University academic data such as application, admission, enrollment, student retention and dropout. The following roles were performed;

- Data cleaning and Wrangling

- Descriptive and Predictive Analysis
- Data Visualisation
- Data Systems Engineering
- ML Model Development and Optimization
- Deployment

### **Automatic Repair of Software Security Vulnerabilities in Python Source Code— *Makerere University***

As a requirement for the award of Master of Science in Data Communication and Software Engineering, I researched automatic vulnerability repair in Python Source Code. This project aimed at building a Machine Learning model to repair security vulnerabilities in Python Source Code so as to patch them before they are exploited thus preventing security breaches in software systems.

### **Uganda Data Project— *PyData Kampala***

The PyData Kampala Uganda Data Project aims to make Uganda's data more accessible, clean, and actionable for research, industry, and public use. By tackling challenges like fragmented, inconsistent, and non-machine-readable datasets, the project brings together data scientists, developers, and enthusiasts to collect, clean, analyze, and visualize data. The following were achieved;

- Data Cleaning & Standardization – Transform fragmented and inconsistent datasets into clean, structured, and machine-readable formats.
- Data Accessibility – Make Uganda's public and research data easily available for analysis, visualization, and reuse.
- Capacity Building – Train local data scientists, researchers, and developers in modern data science tools and practices.
- Data-Driven Decision Making – Enable organizations, policymakers, and communities to leverage data for informed decisions.
- Innovation & Research Support – Provide reliable datasets to stimulate research, innovation, and evidence-based solutions.

### **EAC Food Waste and Data — *NumFocus, USA***

Address Global Food Insecurity through analysis of World Datasets on Food Demand and Wastage in Africa

- Cleaned and Wrangled EAC countries' food production and waste data.
- Data analysis (descriptive, inferential, and predictive)

- Data Visualisation
- Data System for analysis, visualisation and prediction of food waste in EAC countries.

Link: <https://pydata.org/numhack#prizes>

### **Deep Learning for Structured Data. Feb 2024-Todate**

Built a deep learning system for structured data to analysis and predict graduation for students of Makerere University from 2014-2020 admissions

The following tools were used; Pandas | Numpy, Keras | Tensorflow, Scikitlearn | Statsmodels, Matplotlib | Seaborn, Python | Flask | CSS | HTML | MySQL. This project required Machine Learning System Design Principles, Statistical methods, Deep Learning, Building Data Pipelines in Keras, Deployment using Flask and Docker.

### **Development of a machine-learning based System for evaluation of Handwritten Mathematical Solutions**

#### **Undergraduate Research Project, Makerere University**

**2019-2020**

- This project was done for the fulfillment of the award of the degree of Science in Computer Engineering of Makerere University. It achieved recognition and evaluation of handwritten mathematical solutions with an accuracy of 78% on basic mathematical solutions for first and second degree polynomials. The project was built using keras, Tensorflow, Numpy, Pandas, Matplotlib, Seaborn, Flask, HTML, CSS, OOP principles.Link:

<https://dissertations.mak.ac.ug/handle/20.500.12281/11636>

## **AWARDS**

### **NumHack Data Hackathon—Winner of Data Analyze**

**2024-Nov**

I led a team of data scientists that participated in the NumHack hackathon and emerged winners in three

categories. The event was organized by NumFocus, USA. Our project addressed the analysis, visualization and prediction of food production and waste in East African Countries. Project link: <https://pydata.org/numhack>

## **SOCIAL RESPONSIBILITY AND VOLUNTEERSHIP**

### **NumFocus, USA — Security Committee Member**

**OCT 2023 – PRESENT (Remote)**

- Carryout Software Vulnerability audits of NumFocus Sponsored Projects.
- Develop Security Policies and best-practices
- Propose Risk and Exploitation mitigation plans.
- Document Security Vulnerabilities
- Triage vulnerabilities
- Software Security Engineering

**Skills:** Software Security Engineering, Data Analysis for Software Security, Pandas, SQL, Python, Team work, Data Privacy, ML engineering, Critical Thinking

### **Python Software Society of Uganda, PSSU—Director, Python Communities**

**JAN 2025 - TODATE**

I am a Director, Python Communities at PSSU, a non-profit organization that promotes the use of Python programming language. PSSU organizes the largest technology conference in Uganda (PyCon Uganda) and one of the largest in Africa (PyCon Africa). Link: <https://ug.pycon.org/>

### **PyData Kampala—Organizer**

**FEB 2022-TODATE**

PyData is a group for users and developers of data and data science tools to share ideas and learn from each other. PyData Kampala is part of PyData Global. We gather to discuss how best to tackle the evolving challenges in data management, processing, analytics, and visualization. I am part of a team that organizes PyData meetups and plans for community activities and growth. I am in charge of Community building, Education and Training. I lead the weekly Math and ML sessions aimed at improving the community's knowledge of Math and ML concepts and application. Link: <https://kampala.pydata.org/>

### **The Daily Monitor—Guest Editor**

**2020-TODATE**

I write and publish articles in the Daily Monitor Newspaper on topics such as cyber security, education, innovation, software engineering, Digital Infrastructure, leadership, etc. These articles are both in paper print and published on Daily Monitor Website. Links:

<https://www.monitor.co.ug/uganda/oped/letters/on-advanced-education-in-africa-4530776>,

<https://www.monitor.co.ug/uganda/oped/letters/technology-and-our-vision-2040-4338988>

**Cell leader**—St. Francis Chapel, Makerere University

**AUG 2022-TODATE**

St. Francis Chapel is an Anglican Church at Makerere University which exists to make disciples that make disciples for Christ. I lead a small group of Christians in weekly cell fellowships.

**REFEREES**

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