

# Hadero Besufekad Tadele

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## SUMMARY

Master's student at NWPU's Robot Vision Lab with extensive experience in computer vision and AI, focusing on visual SLAM, 3D reconstruction, and perception systems. Proficient in Python and C++ with hands-on projects in autonomous driving applications, I am passionate about advancing NVIDIA's AV perception technology through my expertise in DNNs, ground-truth data processing, and performance optimization.

## EDUCATION

**Northwestern Polytechnical University(NWPU), MS in Computer Science and Technology** | Xi'an, China

Here is our Lab website

GPA: **91.86/ 100**

Feb 2024

**University of Electronic Science and Technology of China(UESTC), Bsc in Mechatronics** | Chengdu, China

GPA: **3.72 / 4.0**

Jul 2021

## PROJECTS

**Thesis project – Enhancing SLAM with Novel Scene Representation Techniques for Drones**

Sep 2024 - Present

- This thesis aims to enhance Simultaneous Localization and Mapping (SLAM) techniques for drone-based applications. By introducing novel scene representation methods, we aim to improve the accuracy and robustness of SLAM algorithms, especially in challenging environments. A key focus is on utilizing rendered novel view images to facilitate relocalization in resource-constrained scenarios, enabling drones to operate more autonomously and efficiently

**Review Paper – Beyond Implicit Representations: Exploring Gaussian Splatting for**

*Next-Generation SLAM, Introduction and Review,*

*under review*

Aug 2024

- This paper presents the first comprehensive analysis of SLAM (Simultaneous Localization and Mapping) advancements through the lens of recent breakthroughs in radiance fields and Gaussian Splatting. It delves into the evolutionary trajectory, inherent strengths, and limitations of SLAM, providing a fundamental reference for understanding the dynamic progress and specific challenges in this field.

**Visual Odometry Pipeline Development Using KITTI Dataset for 3D Vehicle Motion**

Jan 2024

**Tracking , - Research Assistant , NWPU (Scholarship Student)**

- In this project, I developed a visual odometry pipeline using the KITTI dataset, focusing on accurately tracking vehicle motion from sequential camera images. My approach involved feature extraction, matching, and pose estimation techniques to achieve precise motion tracking in a simulated environment. Key elements of the pipeline included ORB feature detection, KLT optical flow tracking, and the implementation of a PnP (Perspective-n-Point) algorithm for estimating the vehicle's trajectory in 3D space. This project demonstrates my capability to process complex datasets, implement computer vision algorithms, and effectively use libraries like OpenCV to build real-world perception applications.

**Cityscape Modeling Project: From Drone Capture to 3D Visualization - Research Assistant**

Dec 2023

*, NWPU (Scholarship Student)*

- In this project, I utilized Unreal Engine 4 (UE4) and photogrammetry to create detailed 3D models of urban areas. I captured down-looking image sequences using a drone flying at 100 meters to scan a city section, and employed mvg and mvs software to convert the images into a 3D model. The final model was imported into Cesium for visualization. I replicated this process using real-world drone imagery of the NWPU school campus, demonstrating my ability to adapt to different environments and datasets. This project showcases my skills in drone operation, photogrammetry processing, and 3D visualization tools.

**3D Human Reconstruction using Handheld Stereo Camera and vSLAM - Research**

Nov 2023

**Assistant , NWPU (Scholarship Student)**

- In this project, I utilized a handheld stereo camera to capture a 3D representation of a static human body. First, I employed the Unimatch software to generate depth images from the stereo camera feed, providing information about the distance of each point in the scene from the camera. Next, I leveraged vSLAM (visual simultaneous localization and mapping) to estimate the camera's pose throughout the scanning process, crucial for aligning captured depth data and building a cohesive 3D model. Subsequently, I stitched together the individual point clouds obtained from each scan to create a complete 3D representation of the human body. Finally, I utilized the generated point cloud and depth information to create a textured human model, offering a visually realistic representation of the scanned subject.

**Wearable Technologies for Healthcare in Sports - Participant , Tsingua University**

Mar 2023

- I participated in the "Innovation & Entrepreneurship for Digital Economy" program at Tsinghua University, where I worked with Professor Kris Singh on a project titled "Wearable Technologies for Healthcare in Sports". I used a smartphone to collect activity data, trained a deep learning model for activity prediction, and built a web demo for visualization using Streamlit. The project explored the potential of wearable sensors and AI-powered activity recognition to prevent injuries, enhance performance, and optimize healthcare services for athletes.

## **Fault Diagnosis Based on Vibration Analysis for Rolling Bearing - Student , UESTC**

April 2021

(Scholarship Student)

- My bachelor's final year project, titled "Fault Diagnosis Based on Vibration Analysis for Rolling Bearing," investigated the effectiveness of transfer learning techniques for rolling bearing fault detection. I conducted experiments to evaluate its performance and compared its accuracy with five established vibration analysis techniques. This project allowed me to develop expertise in fault diagnosis, vibration analysis, transfer learning, and experimental research methodologies.

## **Contactless Automatic Door with Activity Monitoring - Student , UESTC (Scholarship Student)**

Jun 2020

- Developed during the COVID-19 pandemic, this project utilizes an Arduino-controlled automatic door opener to minimize direct surface contact and reduce the spread of the virus. The system incorporates a camera for real-time activity monitoring around the entrance. Data on individuals exiting the area is stored in the cloud, potentially aiding in contact tracing efforts.

## **Automatic Seeding and Plowing Robot - Student , UESTC (Scholarship Student)**

Dec 2020

- During my undergraduate studies, I participated in the development of an Arduino-controlled robot for automated seed planting and plowing. This project involved leveraging an ultrasonic sensor to navigate the controlled environment and mimicked the functionality of a fence by utilizing the boundaries of the testing area.

## **ACHIEVEMENTS**

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| • Excellent Student : Adama Science and Technology University Excellent Student award                    | 2016 |
| • Scholarship Award: Betre-Science Scholarship provided by Ethiopia Government                           | 2017 |
| • Academic Achievement: UESTC ward for Academic Achievement 3 <sup>rd</sup> prize                        | 2018 |
| • Academic Achievement: UESTC ward for Academic Achievement 3 <sup>rd</sup> prize                        | 2020 |
| • Scholarship Award: Fully Funded SUSTech School Scholarship 1 <sup>st</sup> prize by SUSTech University | 2021 |
| • Scholarship Award: Fully Funded CSC Scholarship 1 <sup>st</sup> prize by Chinese Government            | 2023 |

## **SKILLS**

Languages C++, Python, Overleaf - LaTeX, CMake

Software Linux, Colmap, Meshlab, Unreal Engine(UE4)(beginner), Pytorch, Adobe Photoshop, Adobe Premiere Pro

## **CERTIFICATES**

Advanced Learning Algorithms	Coursera
Supervised Machine Learning: Regression and Classification	Coursera
Deep Learning Workshop Completion Certificate	UESTC

## **LANGUAGES**

English	Fluent in written and spoken English
Chinese	Basic proficiency
Amharic	Native proficiency
Kambatissa	Professional proficiency

## **SOCIAL ACTIVITIES**

UESTC Summer Sports-Men Volleyball (UESTC)	2018
Participated in a group performance of Tai Chi, showcasing cultural event	2018
The 2 <sup>nd</sup> UESTC International Cup of Soccer Invitational Tournament THIRD PLACE (UESTC)	2019
Bian Lian (Face Changing) - Sichuan Opera (Chengdu)	2020
UESTC Winter Sport Competition Men's Volleyball FIRST PRIZE (UESTC)	2021

## **HOBBIES AND INTERESTS**

Guitar, Cooking, Football(Soccer), Movie, Technology

## **MANAGEMENT AND LEADERSHIP SKILLS**

Member of the Leadership Committee of Joseph Charity Organization as President	2023-Now
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