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SafeCAll; Implementing Deepfake Audio Detection in an Open-Source Communication App

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Abstract

The problems faced nowadays are due to the quick advancement of artificial intelligence and machine learning models, giving rise to an alarming trend of deepfake audio scams; posing financial risks, job security threats, and disinformation hazards, as well as political influence. The purpose is to improve voice authenticity and trustworthiness during calls, as this research tackles the critical need for safeguarding communication against deepfake scams, whilst making the public aware of this uprising issue. The methodologies used in this research focus on the integration of a deepfake detection model into the Jitsi open- source web communication application. The detection model has an audio feature extraction engine (using libraries from python like pyaudio and librossa) that will obtain features like mccf from raw audio data and transform it into a dataframe. It will then be fed into a machine learning model. The ML model will be an XGBoost, as it is good for extract intricate patterns from audio data. This makes it reliable for real time audio monitoring as well as helping in eliminating latency. which will aid in spontaneous identification of deepfake voices. An awareness game in the front end will be created to educate users the difference between a genuine and a manipulated voice. The results and the implications expected from this research extend to mitigating the global prevalence of deepfake frauds, thus emphasizing the important role of AI in addressing the evolving deceptive practices and contributing to a safer digital communication environment.

Keywords
Artificial Intelligence, Machine Learning, Deepfake, Integration and Jitsi.

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Biographies
Akshita Sushil Bhatia is a Final Year student of Computer Science (Big Data) at University of Wollongong in Dubai. She is the Team Leader and one of the Project Managers of the Capstone Project and is developing the Project's

Machine Learning Model. On the academic front, she has learnt different programming languages like Python, Java and C++ and has knowledge of Generative AI, Web Designing and Web Development. She has successfully completed a number of IBM courses. She is involved as a UG Research Assistant in the research grant on Food Safety Time Series under her Professor's supervision. As an intern, she has been the WISP (Real World Innovate Solutions to Real World Problems) Program Co-Ordinator. She is a Board member at the ENAI WG (European Network for Academic Integrity) in the UAE. She has been the host on Academic Integrity podcast and has been consistently engaged in rigorous academic research related to Integrity. She has actively participated in the ACARI2023 (Asia - Middle East - Africa Conference on Academic and Research Integrity) on behalf of the Student Board from the Centre for Academic Integrity in the UAE. At COP28 held in Expo City, Dubai, she has spoken about 'The other 50% - Women in STEM & Climate Change'

Aleena Rashid is a Final Year student of Computer Science (Cyber security) at University of Wollongong in Dubai. She is the Web Developer for the Capstone Project. She is working on the Front-end of the Jitsi application. She will be creating awareness games using React for the Jitsi Web page. She likes coding and has made projects related to Web Development, and also likes building systems for example a tiny ATM Application using C++ or a university enrolling system using Java. Her interest and experience of shadowing at PwC, Dubai is related to Software engineering where she analyzed business requirements and built a solution for it.

Joseph Ivan John is a Final Year student of Computer Science (Big Data) at University of Wollongong in Dubai. He is the Audio Feature Extraction Engineer for the Capstone Project. What he enjoys most is finding hidden insights and patterns in data that will be useful to a particular organization and will help them deliver better value to their clients. His recent project in building Data Lake for a fictitious company that helped analyze their data and create a dashboard, showing an insight into how customers purchase products from them; taught him a lot about understanding and working with data and he had a good learning experience.

Mazin Sherif is a Final Year student of Computer Science (Cyber security) at University of Wollongong in Dubai. He is the Web Developer for the Capstone Project. In University, he has done a major project: 'Twitter Offense Detector' using ML/DL. From the Odin Project Curriculum, he has completed three Front-end projects done in Vanilla, HTML, CSS and JS and they are: Library Project, Sketch Board Project and To-do List project. After learning the fundamentals of Reverse Engineering/Game Hacking, he has done a simple CS: GO mod menu. Mod was done on C++ utilizing the Windows API and he has also found several different multi-level pointers using cheat engine (a debugger).

Shriram Sekar Gounder is a Final Year student of Computer Science (General) at University of Wollongong in Dubai. He is one of the Project Managers for the Capstone Project. Academically, he has explored different domains of his interests, like Ethical Hacking. Currently, he is learning Artificial Intelligence. He began coding at the age of fourteen by building games and when he was about eighteen years, he moved onto Web Development. He has experience of building complex mobile and web applications and robust APIs. He has been working as a part-time intern for almost 2 years.

Dr. Patrick Mukala is an Assistant Professor specializing in Artificial Intelligence and Data Science, brings a wealth of expertise to his role. Possessing a dual PhD in Computer Science, he instructs computer science courses and engages in research related to AI and Data Engineering. Driven by a teaching philosophy that places students at the core of the learning experience, he combines practical tasks with theoretically informed knowledge to ensure the relevance and utility of knowledge and skills for students. His research focuses on AI for Data and Process analytics (Applied Analytics) and Software Engineering. Within Applied Analytics, his interests span Learning Analytics, Process- Centric Analytics, Healthcare Analytics, and Governance Analytics. His research objectives revolve around assessing the suitability of analytics techniques for real-world data analysis challenges, developing innovative process-centric paradigms for data analysis, and collaborating closely with industry to deliver timely and pertinent solutions. Additionally, Dr. Mukala is actively involved in semantic web, abstract state machines, model checking, and automata theory. Drawing from years of experience in research and teaching at institutions such as Tshwane University of Technology in South Africa, the Technical University of Eindhoven, and the Fontys University of Applied Sciences in the Netherlands, Dr. Mukala has also contributed significantly to industry. His versatile roles in Dutch companies for over 5 years included responsibilities in data architecting, data engineering, data science, and AI.