



**2024 ENGINEERING INSTITUTION OF ZAMBIA
SYMPOSIUM**

Kitwe flood alert and reporting mobile application

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**Avani Victoria Falls Resort, Livingstone,
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INTRODUCTION

- Floods are a major concern for people living in many parts of the world.
- With unpredictable weather patterns and increasing impervious cover due to urbanization, the risk of floods is higher than ever before.
- Flooding can have a devastating impact on people's lives and properties.
- To address the floods issue, a mobile app has been developed that will help users stay informed about floods within Kitwe.
- The development of a mobile app designed to address flood-related challenges is a critical and timely initiative in today's world.



Floods Disaster



FLOODS: LUSAKA WORST HIT URBAN PLACE - [Diamond Media](#)

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STUDY AREA

- Kitwe is a district in Zambia located in the Copperbelt Province, known for its mining industry.
- Land use includes mining operations, residential and commercial areas, and agriculture on the outskirts.
- As of 2022 the population of Kitwe was estimated as **661,901** (ZamStats, 2022).



METHODOLOGY

- The application was developed in Java and XML languages using android studio as the development environment.
- GitHub was used to collaborate and store different parts of the code as the application was being developed.
- The main activities are outlined below.
 - ✓ The Application interface was designed using XML programming language in android studio.
 - ✓ Flood hotspot map was uploaded to the mapbox website.



METHODOLOGY

- The main activities are outlined below.
 - ✓ Functions were created to make area and distance calculations in android studio.
 - ✓ An algorithm that detects if the user is in a flood hotspot was coded.
 - ✓ A dashboard was created for the admin or relevant authorities to manage and update status of the reports.
 - ✓ The App was uploaded to play store.



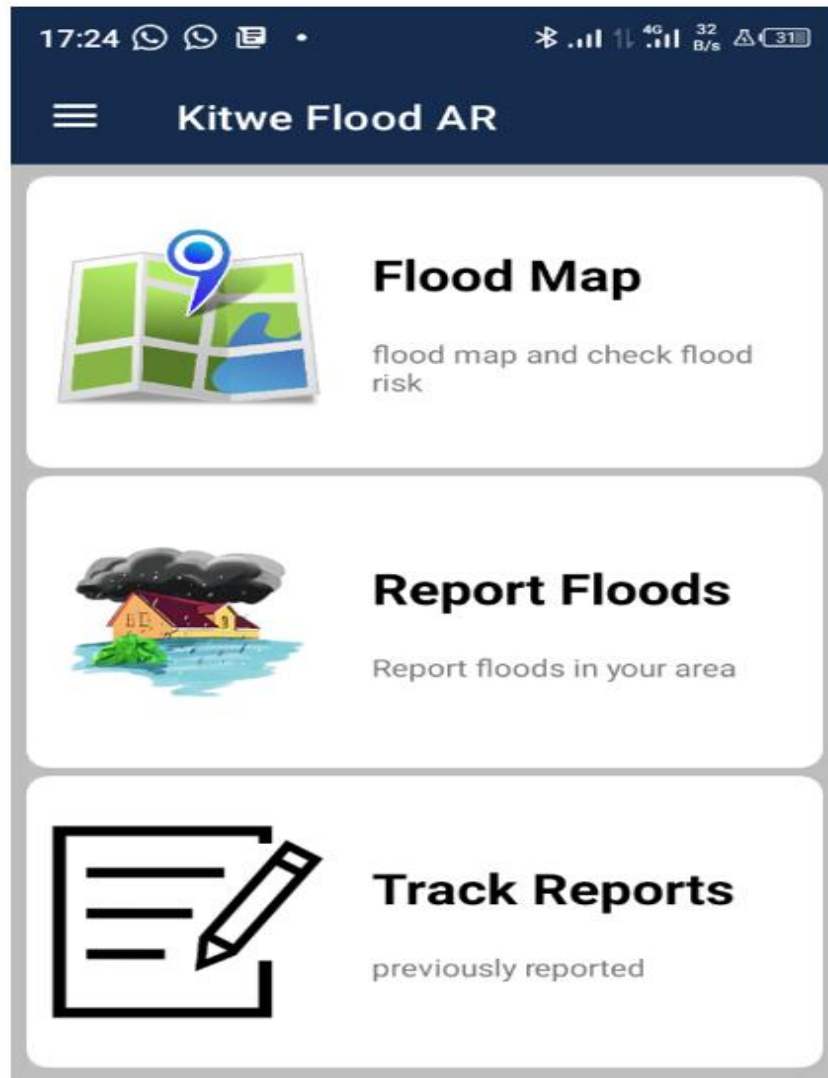
How to use the developed Flood App

- The application is available on google play.



How to use the developed Flood App

- Once the user installs and signs up, they may start using the application.



How to use the developed Flood App

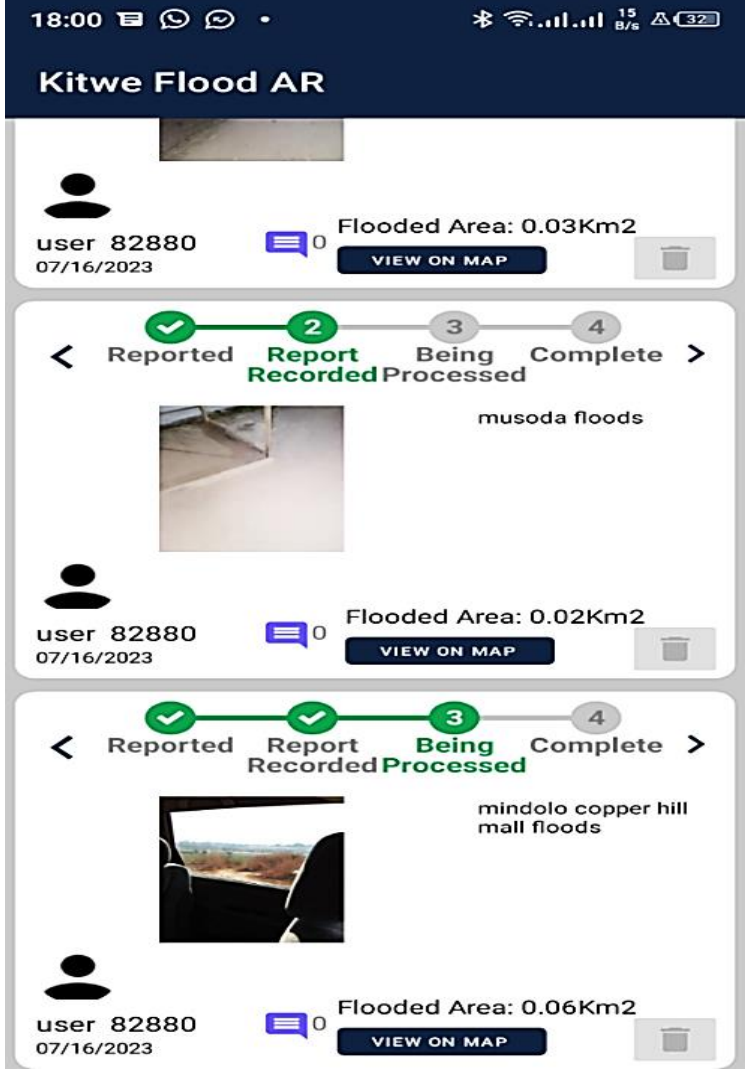


➤ User's interface.

The screenshot displays the user interface of the Flood App, divided into three main sections:

- Flood Map tab:** Shows a map of a residential area with a purple location pin at 'opperbelt University'. The map includes labels for 'Zambezi Road', 'Hile Road', 'Jambo Drive', 'Mini Mart', 'MUSONDE', 'CHIPATA', and 'CEC VILLAGE'. A blue shaded area indicates a flooded region.
- Report floods tab:** Features a map with a blue location pin and labels 'MPF' and 'garage'. Below the map are buttons for 'TAKE PHOTO' and 'VIEW IMAGE'. A text input field is labeled 'Write Description of Flooded area, time occurred' and an optional field is labeled 'Optional: phone number'. A 'SUBMIT REPORT' button is at the bottom.
- Track reports:** Shows a progress bar with four stages: 'Reported' (checked), 'Report Recorded' (2), 'Being Processed' (3), and 'Complete' (4). Two report entries are visible:
 - musoda floods:** Reported by user 82880 on 07/16/2023. Includes a photo of a flooded area and a 'VIEW ON MAP' button. The flooded area is 0.02Km2.
 - mindolo copper hill mall floods:** Reported by user 82880 on 07/16/2023. Includes a photo of a flooded area.


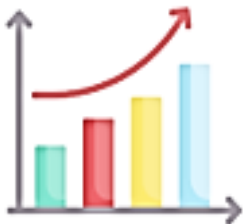
How to use the developed Flood App

- Admins interface.
- Provide feedback.

Summary of reports	Single detailed report
 <p>18:00 Kitwe Flood AR</p> <p>user 82880 07/16/2023 Flooded Area: 0.03Km2 VIEW ON MAP</p> <p>Reported Report Recorded Being Processed Complete</p> <p>musoda floods</p> <p>user 82880 07/16/2023 Flooded Area: 0.02Km2 VIEW ON MAP</p> <p>Reported Report Recorded Being Processed Complete</p> <p>mindolo copper hill mall floods</p> <p>user 82880 07/16/2023 Flooded Area: 0.06Km2 VIEW ON MAP</p>	 <p>18:01 Kitwe Flood AR</p>  <p>VIEW ON MAP</p> <p>Description: musoda floods 2 Flooded Area: 0.03km2 Phone Number: 0 Date Reported: Sun Jul 16 18:49:42 GMT+02:00 2023 Location from where the flood was reported Latitude: -12.7925419 Longitude: 28.2535488</p>

How to use the developed Flood App

- Admins interface.
- Statistics tab.

<u>Statistics</u>	<u>Manage reports main tab</u>								
<p>18:01 [icons] 41% [battery]</p> <p>Kitwe Flood AR</p> <p>Report Statistics</p> <table><tbody><tr><td>Number of Reports</td><td>16</td></tr><tr><td>Total Reported Area (km2)</td><td>1.91488364901 14962</td></tr><tr><td>Intersecting Reported Area (km2)</td><td>0.01405454142 2439304</td></tr><tr><td>Net Reported Area (km2)</td><td>1.90082910758 90569</td></tr></tbody></table>	Number of Reports	16	Total Reported Area (km2)	1.91488364901 14962	Intersecting Reported Area (km2)	0.01405454142 2439304	Net Reported Area (km2)	1.90082910758 90569	<p>18:54 [icons] 79% [battery]</p> <p>Kitwe Flood AR</p> <div><p>Provide Report Feedback</p><p>Click For More Info</p></div> <div><p>statistics</p><p>Click For More Info</p></div>
Number of Reports	16								
Total Reported Area (km2)	1.91488364901 14962								
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Net Reported Area (km2)	1.90082910758 90569								



DISCUSSION

- The application was tested using a group of fifty Kitwe residents and all testers found the flood map useful in assessing whether or not they were in a flood risk zone.
- The ability to report floods also provides an opportunity to collect real-time information about which areas are flooded.

CONCLUSION

- A novel and innovative flood risk assessment and reporting application was successfully developed.
- The application uses advanced geospatial technologies to provide users with real-time information about;
 - ✓ if the user is in a flood risk zone or not.
 - ✓ how far they are from the flood risk zone.
 - ✓ how far they are from the nearest reported flood.
- Another core feature of the application is that it allows users to report floods in their area.



RECOMMENDATIONS

- There is need to expand the app to other parts of Zambia.
- Disaster management and mitigation unit (DMMU) and water resources management authority should come on board to support and adopt the app for flood disaster management.

The End

THANK YOU FOR YOUR ATTENTION.

