



# Bridge Inspection Android App

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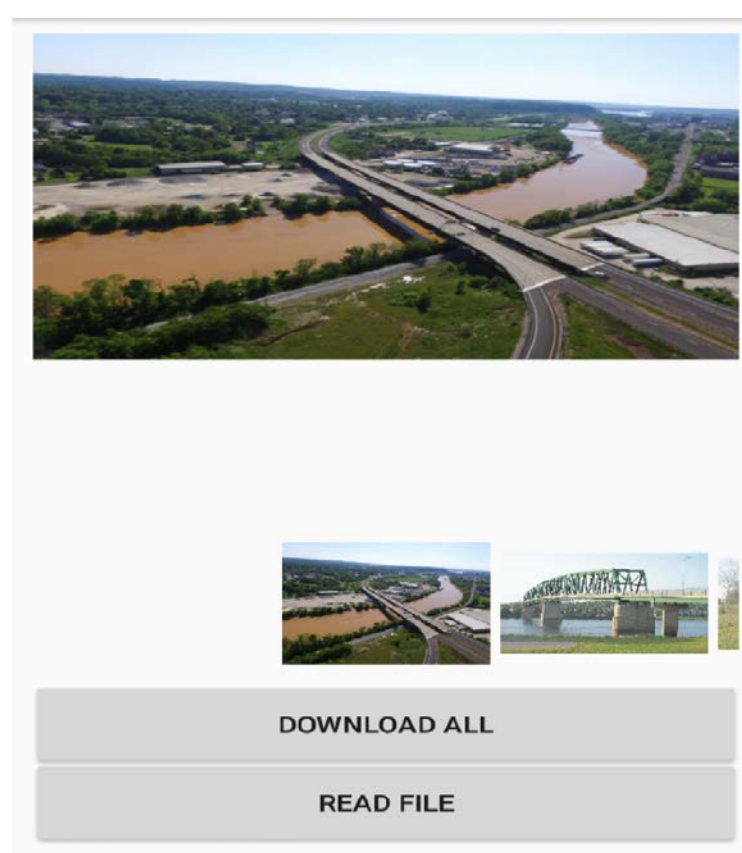
## Abstract

Everyday thousands of people use a bridge on their daily travels and that is only in West Virginia. With the enormous wear and tear these bridges go through a day, it is important to the safety of the people for accurate and thorough inspections take place. In light of this, we have developed an android app to help streamline the process of using a drone to inspect the bridges.

## Introduction

There are over 6,000 bridges alone in West Virginia; each of those bridges are used daily by a myriad of individuals and transportation. With all this usage, it is imperative that bridges are inspected every year for safety reasons. With the old method inspectors have to hang off bridges and climb around them to inspect. But with drones becoming easily available and the many features they include, bridge inspectors can now use a drone to fly around and take pictures for bridge inspection which is much safer way.

For this reason building a prototype app to pair with a drone to make the inspectors job easier and more time effective was the goal. This will allow the inspectors to immediately put their thoughts down about each part of the bridge they inspect while using the DJI controller app, which can then be downloaded and put into the inspection report along with the exact picture.



## System Architecture

The android app that we developed includes:

- A library to pull metadata about each picture the drone takes.
- A pop-up to take notes immediately after the picture is taken.
- A way to transfer pictures with the notes and GPS coordinates to a computer to put into an inspection report.

### Android Application

Within the android application, field inspectors can take photos of bridges using a drone, include the proper information with the photo, and then upload the photo to a web application to use later on in the inspection report. This application will simplify the process of taking a picture, commenting on that picture, and then uploading it to the database. All of this is designed to be carried out in conjunction with the DJI controller app.

### Metadata Library

To assist in attaching and retrieving inspection information from photos in this and associated projects, we developed a library to store this information in the XMP metadata of photos stored in JPEG format. This library uses the open-source library, Apache Commons Sanselan, to store and retrieve this metadata. The developed library also uses Sanselan to retrieve the location at which a photo was taken from the GPS metadata stored by the phone.

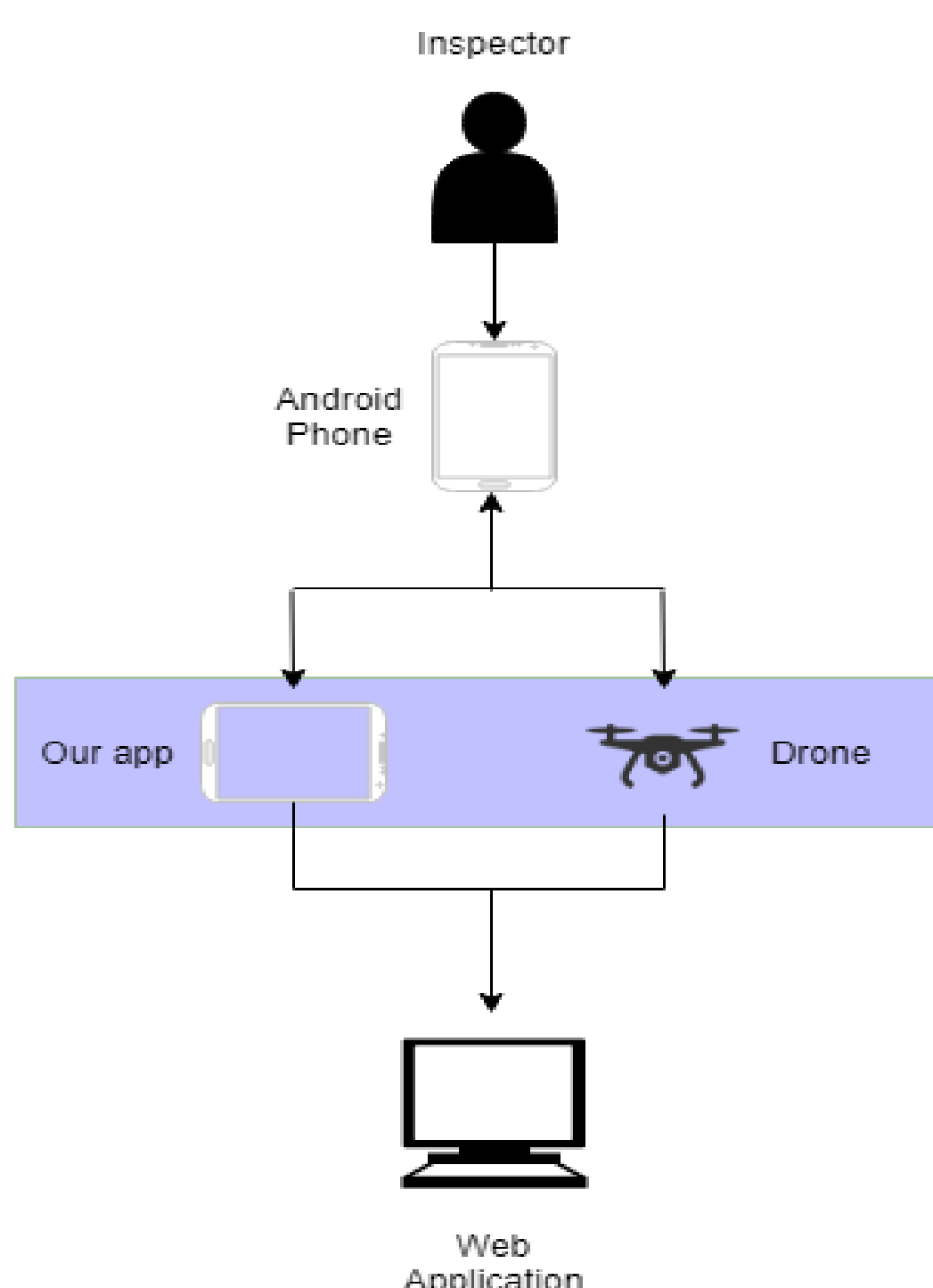


Figure 1: Android app when used in conjunction with the drone

## Benefits

Our prototype could be beneficial in many ways:

- Inspectors will have the ability to create more accurate reports later on with real time note taking
- Easy to view the pictures just taken for quality control
- Inspections will be more time effective

## Android Application

### Description

Our app allows the inspector to streamline their process and create more accurate reports later on.

### Tools



## Challenges

During development several challenges were faced:

- Accessing the metadata of each picture to acquire the GPS coordinates  
Solution: Created a library to handle reading and writing to each photo
- Pulling the actual pictures from the drone itself instead of the thumbnails it stores on the phone  
Solution: Built a basic web application to handle pulling the pictures from the drone, adding the new metadata, and replacing the thumbnails that were being used as a placeholder

## Conclusion

Our app is a small but integral part of a much larger project. This app will be deployed and integrated in the future with the entire Bridge Inspection project. The other parts of this project include a 3-D model of each bridge which will have GPS coordinates of each part of the bridge to help each inspector know what needs to be inspected before they go out in the field. The web application will host the 3-D model and the pictures along with their coordinates, as well as title and comments that go with the picture.

## Acknowledgements

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## References

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