

DIM: Developing a Mobile Least Squares Application for Android

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The Problem

- Integration of GPS and conventional observations
- Least Squares Software is expensive
- Does not exist for mobile platforms
- Limited access in field



Total Station with GPS Receiver,
from leica-geosystems.us/

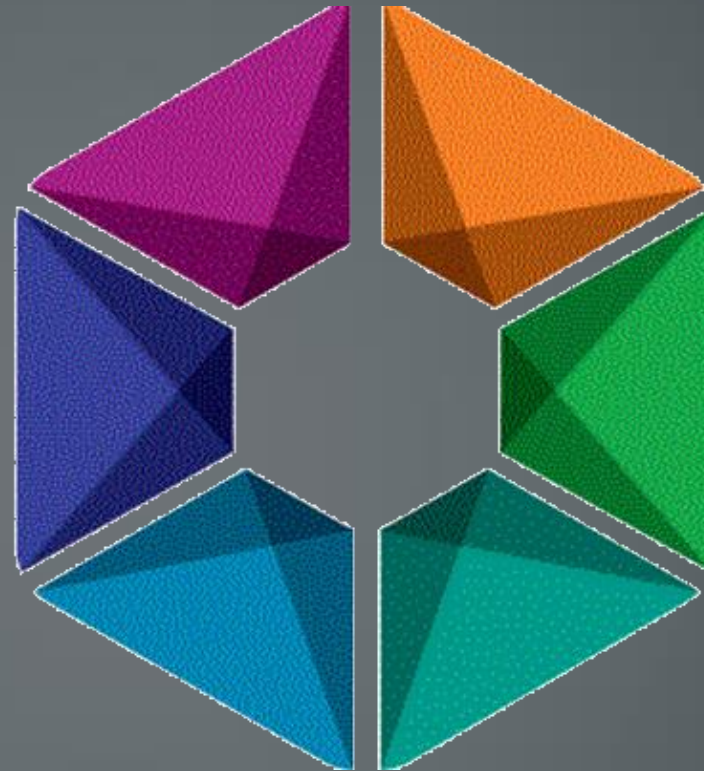
Android Research

- Most used mobile platform
- 1 million activations /day
- Android apps written in Java
- Android Studio IDE
- Online courses at udacity.com



User Research

- User Consultations
- User Profiles
- Use Cases

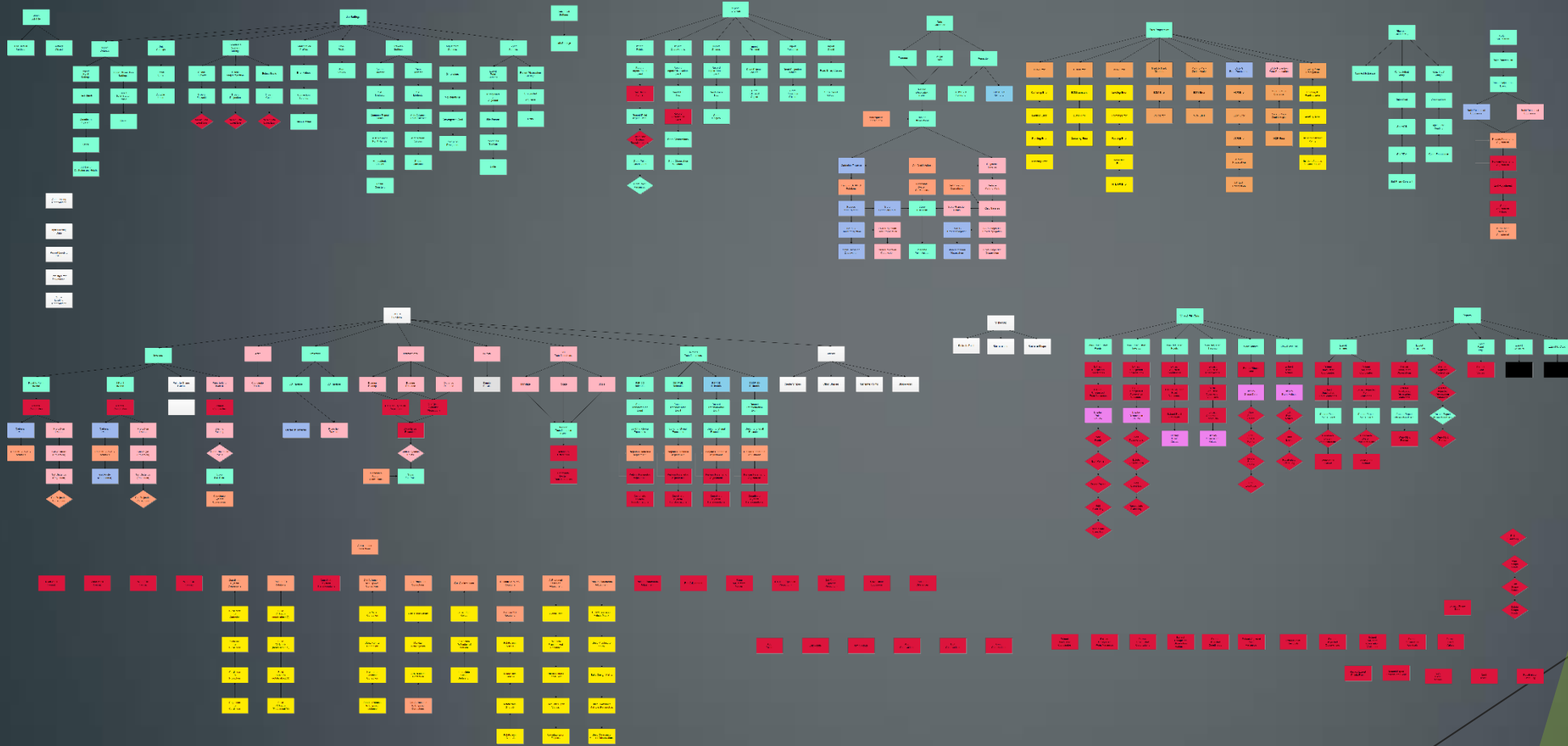


TME Logo, from www.unb.ca

Application Features

Critical Features	High Priority	Low Priority
Job files	Cogo	Map
Coordinate files	Coordinate Systems	Transformation
Observations	Geodetic Reductions	Auto-Fill Input Fields
Observation Files	Connect to Total Station	Input Field Inverses
Least Square Adjustment	Generate Reports	Angle Sets
Immutable Event Log	Recalculation Logs	Utilize Phone GPS

System Design



Methodology

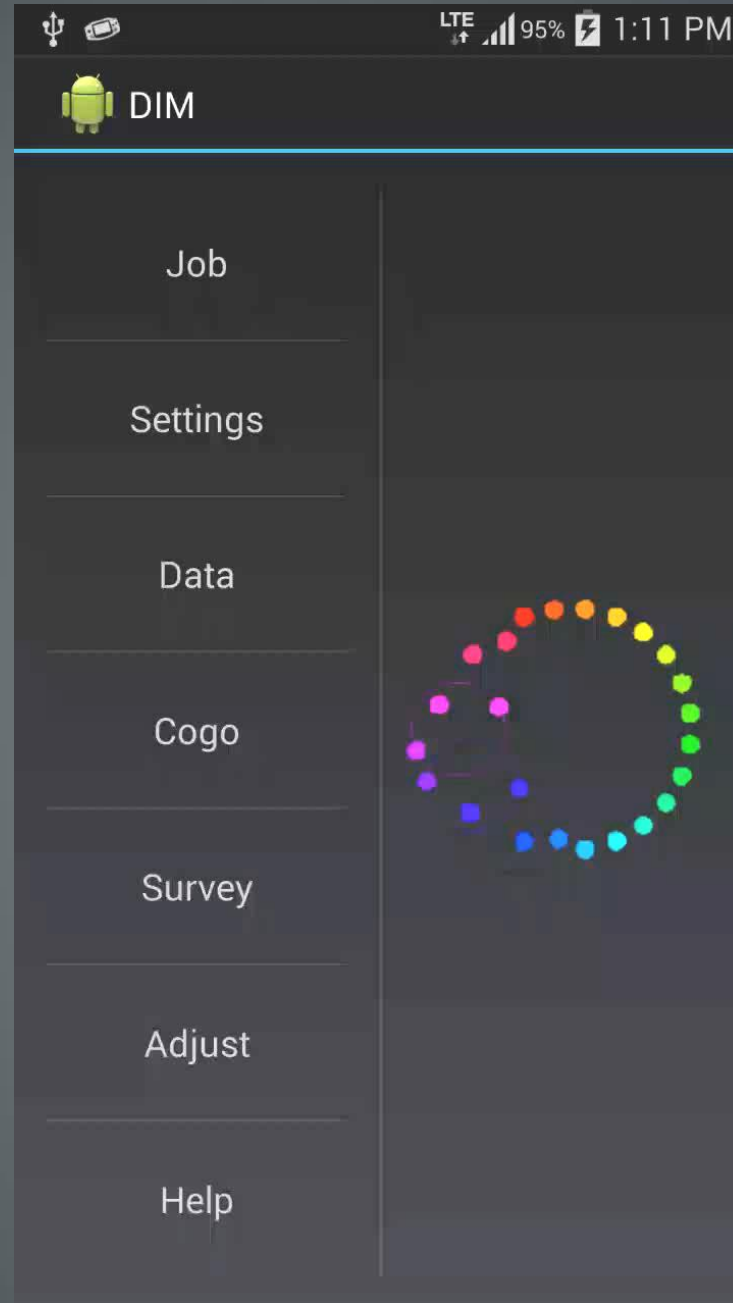
- Interfaces defined in XML
- Calculations performed in Java
- Data stored in SQLite Databases



Meme, From www.librarified.net/

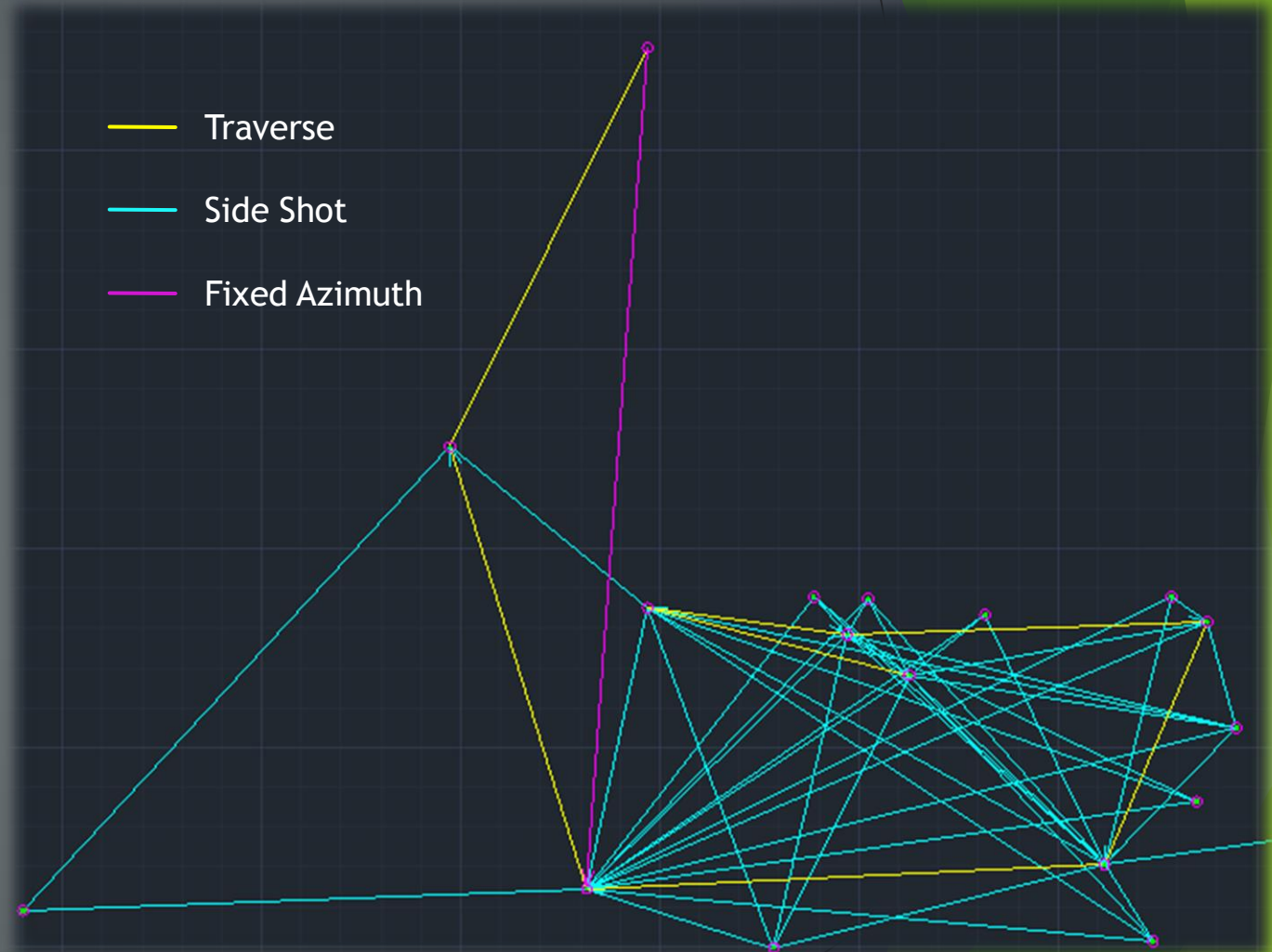
The Prototype

- 40,000 lines of code
- Imports Coordinates
- Imports Observations
- Common COGO functions
- Performs Adjustment



Sample Data

- Control Network
- Surveyed in 2013
- Civil 3D Overly Optimistic
- DIM Overly Pessimistic
- Coordinates Match Civil 3D within 1.2mm



Challenges

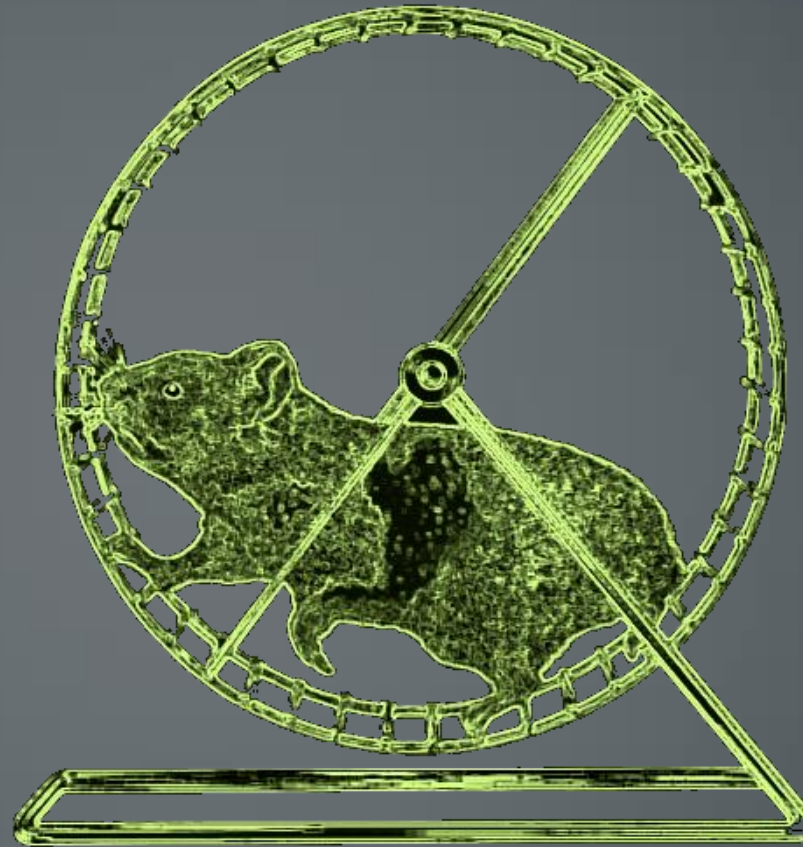
- Time Constraints
- Scope Creep
- Connection to Total Station



Meme, From zazzle.com

Future Work

- Adjustment Constraints
- Adjustment Analysis
- Geodetic Calculations
- Recalculation Logs
- Transformations
- Cartesian Adjustment
- Map



Hamster Wheel, From animal-kid.com

Synopsis

- Successful Prototype
- Needs More work
- Useful in surveying industry



Meme, From knowyourmeme.com

Acknowledgments

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