sdmay19-37: Are Cross Country Courses Avoiding Hills?
Week 4 Report
September 30 - October 10

Team Members
Connor Smith — *Ground Truth Engineer*
Thomas Chambers — *Ground Truth Engineer*
Ryan Hilby — *Data Handling Engineer*
Jacob Feldman — *Data Handling Engineer*
David Kirshenbaum — *Data Analysis Engineer*
Andrew Mumm — *Data Analysis Engineer*

Summary of Progress this Report
The past 10 days saw the team focus mainly on further research of which software development approach will be best for the needs and desires of our target users following the design-thinking workshop. This involved reaching out to additional faculty experts in the fields of geography and mapping, researching new tools to manipulate point cloud data, and further work on validating the precision of LIDAR data against USGS geodetic points. We had a highly productive meeting with Dr. Zhou and Dr. Miller of the agronomy/geography departments at ISU and received assistance in converting our bare earth LIDAR data model to a more usable file format for our purposes.

Pending Issues
The ground truth team still needs to figure out how to extract data from the differential GPS units and complete a comparison study between known geodetic elevation points in the state of Iowa and the Iowa DNR's LIDAR measurements of those points. The software teams need to become more familiarized with R and R Shiny development as we move forward in that direction.

Past Week Accomplishments
- Connor
    - Conducted additional troubleshooting with the differential GPS unit
    - Collected GPS equipment from Dr. Bradley Miller
    - Reached out to Professor Sean Hartnett of UW-Eau Claire seeking his expertise on marathon course mapping
- Thomas
    - Created table of geodetic points to be checked against LiDAR.
    - Researched CORs.
- Ryan
    - Tried a new set of tools called GDAL to manipulate img files. Some coordinates along with their elevation can be extracted.
- Jacob
    - Did more research into the differences between our data formats and found out why the tools I was previously using wouldn't work. We've been recommended other tools (namely an R library) that I will work with next week.
- David
    - Some research on ARCGIS rest api
    - Worked on Google Maps drawing tool

- Andrew
    - Looking into how we can use R programming to analyze our data and convert formats.
- Team
    - Met with Dr. Yuyu Zhou and Dr. Bradley Miller to discuss data handling issues and what software development approach is most appropriate for our needs
    - Made contact with former ISU XC head coach Bill Bergan to set up a meeting to further discuss end-user needs for the application from a coach's perspective

Plans for Upcoming Reporting Period
- Connor
    - Complete LIDAR vs USGS geodetic point comparison study
    - Complete R Shiny development tutorials
    - Troubleshoot differential GPS
- Thomas
    - Troubleshooting differential GPS, making decision about its use in project. Will look in to new tools like R Shiny.
- Ryan
    - Put more research/experiment with GDAL
- Jacob
    - I will be ramping up this week with R, and will also research the tools and libraries recommended to us in our meeting with Dr. Zhou and Dr. Miller.
- David
    - Unavailable the next week.
- Andrew
    - Looking into options for storing and manipulating our data on a large scale.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Connor Smith	GPS troubleshooting, equipment collection, and correspondence with UWEC professor	8	28.5
Thomas Chambers	Did a study of geodetic points in Iowa that can be reliably used for LIDAR precision verification. Also conducted background research in to geodetic points.	5	21
Ryan Hilby	Experimented with GDAL	5	18
Jacob Feldman	Researched more about the differences between rasters, point clouds, and found out why the library I was using didn't work.	5	18.5
David Kirshenbaum	Researched ArcGIS Rest API and worked on Google Maps drawer to adjust lines	4	17
Andrew Mumm	Worked to learn more about point cloud data handling and programming in R. Also spent	2	12

	time planning the development process.		

Gitlab Activity Summary
Nothing to report.