



Modern data collection record management for the Holloman High Speed Test Track

Ryan Gahagan • Dripping Springs High School • Dripping Springs, Texas
Supervisor: Sarah Magliocca • Space and Geophysics Laboratory • Applied Research Laboratories

Background

The Holloman High Speed Test Track is a **16 kilometer rail** developed to test items such as aircraft and missiles moving at **speeds upwards of Mach 8**. To prevent catastrophic failure, the track must be kept in alignment. The process of measuring deviance in the track is arduous because it involves placing, tracking, and recording the data from GPS receivers at specified **benchmark points at over 1000 places** on the track. Collecting and managing this data is difficult and can take months of work.

Objective

To create a mobile software application that facilitates the collection and management of data sets associated with each receiver, and informs the user of the collection's progress.

Survey Breakdown

Each receiver can occupy one of four states:

- **Active:** Placed, but not gathering for a baseline
- **Collecting:** Gathering data for a baseline
- **Finished:** Ready for retrieval
- **Retrieved:** Picked up and no longer collecting data



Select	Details	Notes	Network
	Serial #	Benchmark #	
	1 Rx 1	BM 1 A	
	2 Rx 2	BM 1 B	
	3 Rx 3	BM 2 A	
	4 Rx 5	BM 3 A	
	5 Rx 6	BM 3 B	
	6 Rx 7	BM 4 A	

Add Scan Remove

Jump to 6 OK

Clear save Close

Select	Details	Notes	Network
	Serial Num Rx 7		
	Benchmark BM 4	A	
	End Point ☐		
	Lat: (N) 30 23 1.39477		
	Long: (E) -97 -43 1.39477		
	Start Time 8/3/18 12:31 PM		
	Elapsed: 0 Days, 02:05:04		

Cancel Retrieve Confirm

Select	Details	Notes	Network
	The receiver was found to be misaligned so the time was reset in order to get more accurate collection.		

User: Phone

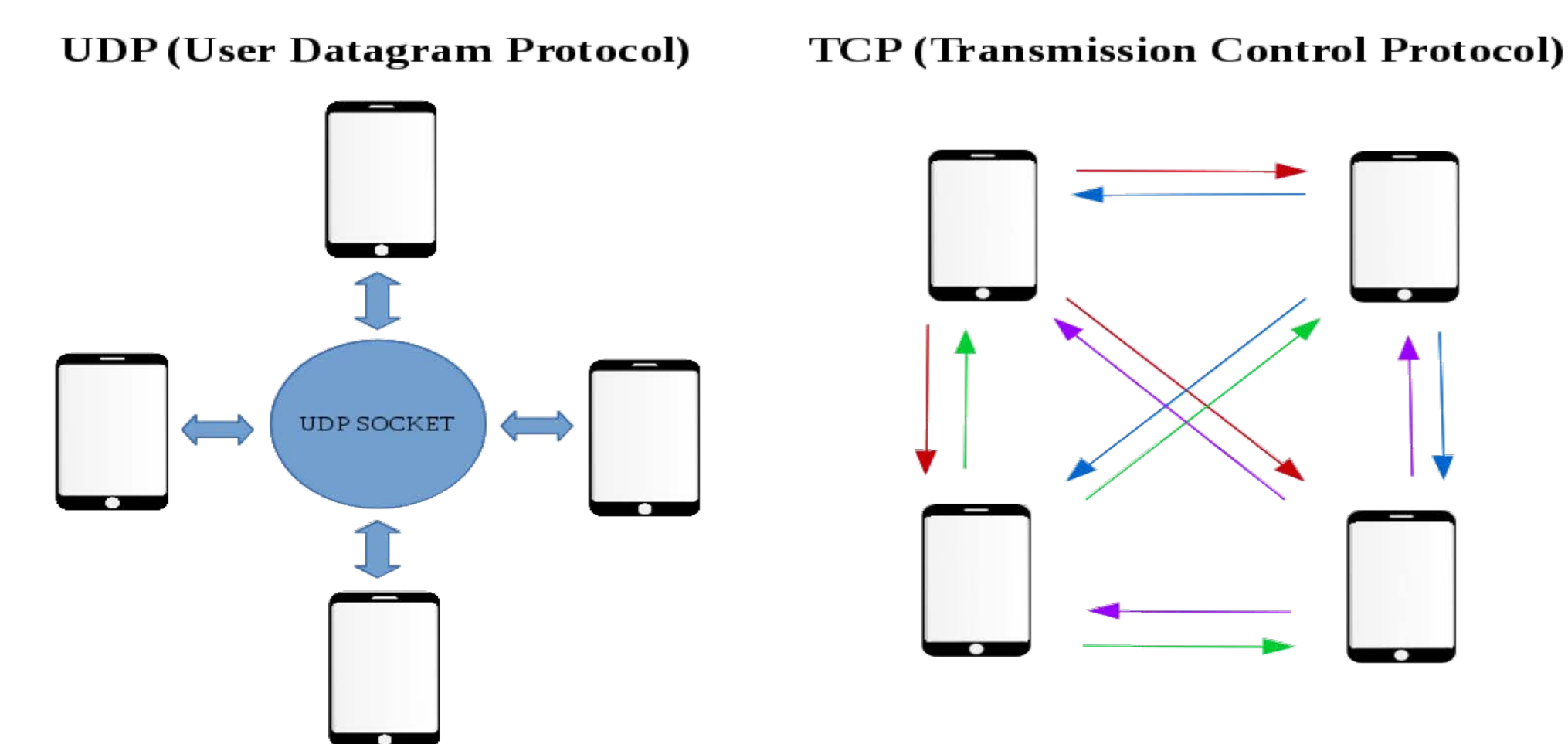
Cancel Confirm

Select	Details	Notes	Network
	1 My IP: 192.168.50.216		
	2 IP: 192.168.50.109 - Tablet		

Update

Approach

In order to create the most flexible data storage solution, a Peer-to-Peer (P2P) database network was implemented. This system has no central storage location, instead relying on the transfer of data between peers to maintain consistent data models over time. The system also tracks connections and disconnections, utilizing a merging algorithm to sync data models whenever connections become available.



Conclusion

By auto-populating data using accurate measurements such as the system clock and location services, user error is mitigated. Distributing data among a network of peers improves the reliability and accessibility of data. These improvements streamline the process of collecting massive amounts of data on the Holloman Track, and can extend to other difficult scenarios requiring offline collaborative data collection.

App Details

Tab 1: Shows model information and statuses, allows addition and removal.
Tab 3: Allows addition of field notes and auto-populated user tag.

Tab 2: Allows user to view and change details of a specific receiver.
Tab 4: Shows list of every device connected to the network.