Jackson Keyser

Professor Banerjee

April 15, 2023

CMSC 491

Realtime Location Tracking

For this assignment, we were tasked with developing a low power consuming algorithm for tracking user location. My algorithm would start out by using a GPS signal to get the initial location. Following this, I would use an accelerometer to detect movement. I would collect the X, Y, and Z acceleration measurements from the accelerometer at a rate of sixteen times per second. To account for gravity, I subtracted it out for the Y-axis. To obtain the velocity for all three directions, I multiplied the obtained acceleration by the amount of time it took to receive the instances, one-sixteenth. I would store these velocities into three arrays for the three directions. Next, I would use these values to obtain the mean velocity for X, Y, and Z. To obtain the time since we calculated the last location, I would subtract the time of last known location from the current time. Following this, we could now calculate the estimated latitude and longitude. The circumference of Earth is 40,075 kilometers, which divided by 360 degrees, is 111.111 km. We are using meters, so this will be 111,111 meters. This value is important because it is how we convert from meters to degrees. First, to get estimated latitude, we can take the latitude of our last known location and add (meanVelocityY \* timeSinceLastKnownLocation) / 111,111. Next, to get estimated longitude, we can get the longitude of our last known location and add (meanVelocityX \* timeSinceLastKnownLocation) / (111,111 \* cos(estimatedLatitude). We can use the coordinates of our last location combined with the coordinates of our newly obtained location to see how many meters we moved. If we are five meters or less away, we assume the user is in the same location and will not update. However, if we are more than five meters away, the new location will be updated. If we have gone over thirty seconds without an update, we will once again pull from the GPS signal.