

Definition:

In this project, it is the goal of the team to develop an accurate and reliable means to estimate the walking velocity and slope of incline wholly from a single IMU mounted on the subjects' leg.

Initial test was conducted on 05-03, however all means so far were unable to determine a means to estimate accurate velocity and slope from the recorded accelerations and slopes. The current hypothesis is that since the data was recorded with the IMU positioned on the subject's thigh, the recorded accelerations were too weak to be properly recorded. This test will position the IMU in several locations and use the resulting data to determine the best position of the IMU to get the most accurate velocity estimates.

Test Objectives:

There are several objectives is this test:

1. To determine the optimal position on the subject which yields the most reliable IMU data.  
There is an open question about the effect of IMU position on the recoded data. Most papers seem to prefer to place the IMU on the shank. For our previous test, we collected mid-thigh. For this test, it would be desirable to get data collections from several locations. This could include (in order of desirability) shank, thigh, foot, trunk. For future reference, it may be useful to take pictures of the IMU on each subject before each test (perhaps with some sort of measurement reference as well). This variable depends on what mounting mechanisms are available for the test.
2. To collect 6 axis IMU data at several levels of incline and speed which will be used to better develop the estimation algorithms.  
This will be to replicate the previous collection. At a minimum, we would like the same levels of incline [-3%, 0%, 3%, 15%] as well as the same speeds [1.8 mph, 2.2 mph, 2.7 mph]. Additional speeds/inclines would be very useful, however only applicable if time permits.
3. To test the WISE algorithm at several speeds/slopes using the existing algorithms to determine the ability of the existing algorithms to estimate speed/slope.  
This will only be a short collection of tests. We would like to run the WISE algorithm (no raw collection of IMU data, only estimation outputs) to get a rough but real-time idea of the performance of the algorithms. If time permits, we may test several combinations of speed/slope and log the results.

For this test, it is very desirable to have at least a few different subjects to get a decent variance in the data. In the previous collection 4 subjects were available. This, again, depends on the availability of time and the access to different subjects.

For each run, data will be collection for at least 2 min (120 seconds).

Subject Name:

No.	IMU Position	Speed	Incline	Time of Collection
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				

Subject Name:

No.	IMU Position	Speed	Incline	Ave. speed est.	Ave. Incline Est.
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					