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**Progress Report – 1 Mar 2018 – 31 Mar 2018**

Contract Number: HSHQDC-06-D-00022

Contract Number 7500097279

Order Number: HSCG23-07-J-TED150

Task Order – Performance Work Statement (PWS) 1.12

Attachments: (1) SAROPS subcontractor financial reports.

1. **Many many meeting.**
2. **Worked on the C++/Java interface for computing a sweep width. Seems to work fine now.**
3. **Responded to “eyebrow-raising” case involving lines of particles showing up that looked like an artificial shoreline. Turned out to be that the deflections (ricochet was the word used by Jim) of particles during slippery shore computations line up since they all deflect off the same edge. If that edge is long, we get a lot of these ricochets lining up.**
4. **Young had a case that finally showed what happens when the post-processing rounding for Planner introduces overlap; it didn’t work. I could never generate such a case and even Young’s case was tricky; I had to use my GUI to stop the optimization at just the right time. When I let my program run for the 68 seconds in Young’s case, the optimizer had jumped to a new position which, after rounding, did not introduce overlap. So I ran the problem in my GUI, and kept stopping it earlier until I found a place where *that* result’s rounding introduced overlap. Once I figured that out, I tracked down where the bug was and I think I have that fixed.**
5. **Worked quite a bit with Melody on comparing old particle files with new ones. We agreed that a directory structure would dictate which pairs of particle files should be compared. Melody had a scheme in mind and, after learning about it, I worked with that. The issue here is that we are comparing a collection of pairs of particle files. The first particle file in the pair is what Melody calls “ORIG” and the 2nd particle file in the pair is the new one. The “ORIG” one is generated by the same case, but from 2.1.1, and the 2nd is generated by 2.2. These should be similar. I *had* suggested that Melody give me a directory and there would be subdirectories underneath, which each subdirectory containing an “A” particle file and a “B” particle file. Now the main directory has many directories underneath. A “case” is any directory that has a file “particles.nc” and a subdirectory called “ORIG” that has a “particles.nc” file. Also, the directory names are unintelligible GUIDs so I invented a shorthand convention for referring to a case.**
6. **I gathered the cases mentioned in the previous item, and, for each case/scenario/objectType/timestep combination, computed the average positions and dispersion statistics of the particles’ Lat/Lngs, for each of “ORIG” and “NEW.” This means that I then had bivariate normal distributions for ORIG and NEW and could compute the containment value of the mean of one in the other’s distribution. If the two distributions were similar, these containment values should all be close to 0. I tested this by using the same code (2.2) but changing the seed. I found that they were not all very close. Even after cleaning up some bugs (including in the accumulators that were necessary for computing the statistics, and my use of the 3rd party library “Poi” for creating the spreadsheet), there were still some surprisingly high values. I think that those are due mostly to small numbers of particles (for a single time step, “original craft” particles in particular, could have few particles). I’ve changed my code to “flag” high values, and then created kml files so I could look at the 50% containment ellipses in Google Earth. So the end result is that there is a single Excel Workbook that has a separate sheet for each case and a sheet for “All Cases.” Each sheet has the containment values for the case/scenario/objectType/timestep combinations (one combination for each line), as well as some supporting data. The highest containment values are flagged with colored cells in each sheet. Then, for each case, a kml file shows up that, when double-clicked (assuming Google Earth is installed), will show all of that case’s pairs of ellipses. I used radio buttons in the kml to keep Google Earth display from being too overwhelming.**
7. **To make it easier for Melody, I built a new installer for the program, called “CompareParticleFiles.”**
8. **Finished up the other sensor work. The way I did this, I have a large jump on multi-sensor as well.**
9. **Have a first cut at sailboat voyage, including using netcdf4 for string variables.** **Showed Judy how to turn netcdf4 on for her installation.**
10. **A few questions about overriding Sim.properties. This might happen more now that there is more testing.**
11. **Discovered a problem with the way we’re doing ”OnMars.” BTW, “OnMars” should have been called “DoNotUse” or “StayAtHome.” The problem is that I given Judy “OnMars,” but I also have been told to give her a box that she can draw so the user doesn’t wonder where the SRU is. I do this, but brought the box back in closer so that the user does not have to “hunt” for it by zooming way out. The problem is that on subsequent optimizes, Judy is giving me that box, and there’s no way for me to know that this is not a box that I should take seriously. One of these boxes came to me and I generated over 5500 legs because I took the box and fit a pattern to it. Evaluating 5500 legs for each of 5000 particles weighed the performance down considerably. This occurred because I have to evaluate the original solution against the optimzer’s best and decide whether or not to take the new solution. So I put a rule in never to evaluate more than 100 legs.  
     As an aside, Judy *had* been putting “OnMars” as an attribute of the SRU, which it is not, and I asked her to remove that. She did, but we never put “OnMars” in as an attribute of the BOX that she gives me. Of course, if she gives me “OnMars,” then I will ignore the rest of the BOX.**

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| **Name** | **Activity Worked** | **Hours Worked** | **Hourly Cost** | **Total Cost** |
| Kratzke | Coding/Doc/Travel | 185.59 | -- | -- |
|  |  |  |  |  |
| **Totals** |  | 185.59 |  |  |
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