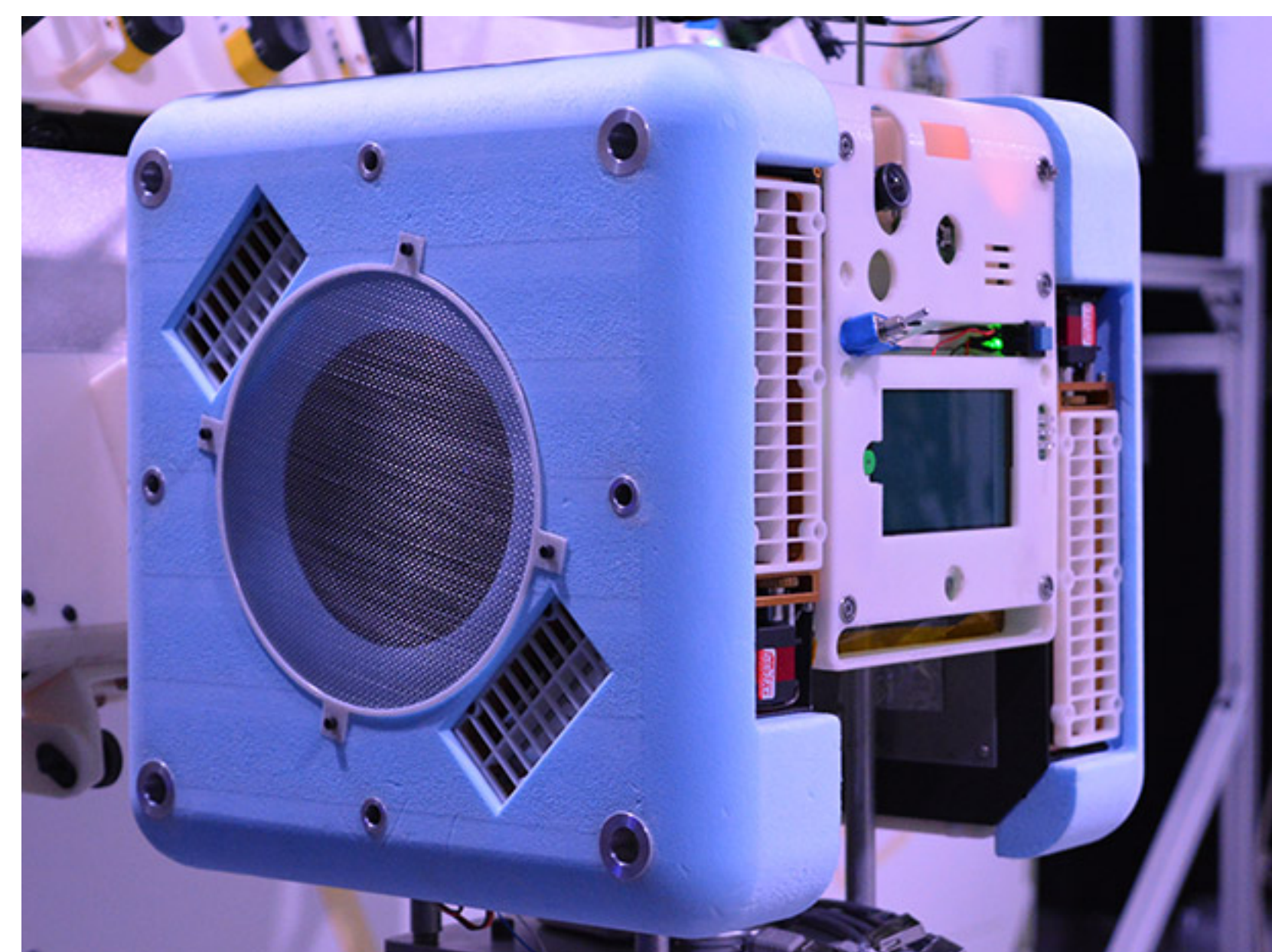


Deployment of a Regression Testing System for Analysis and Visualization of Astrobees Localization

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ABSTRACT

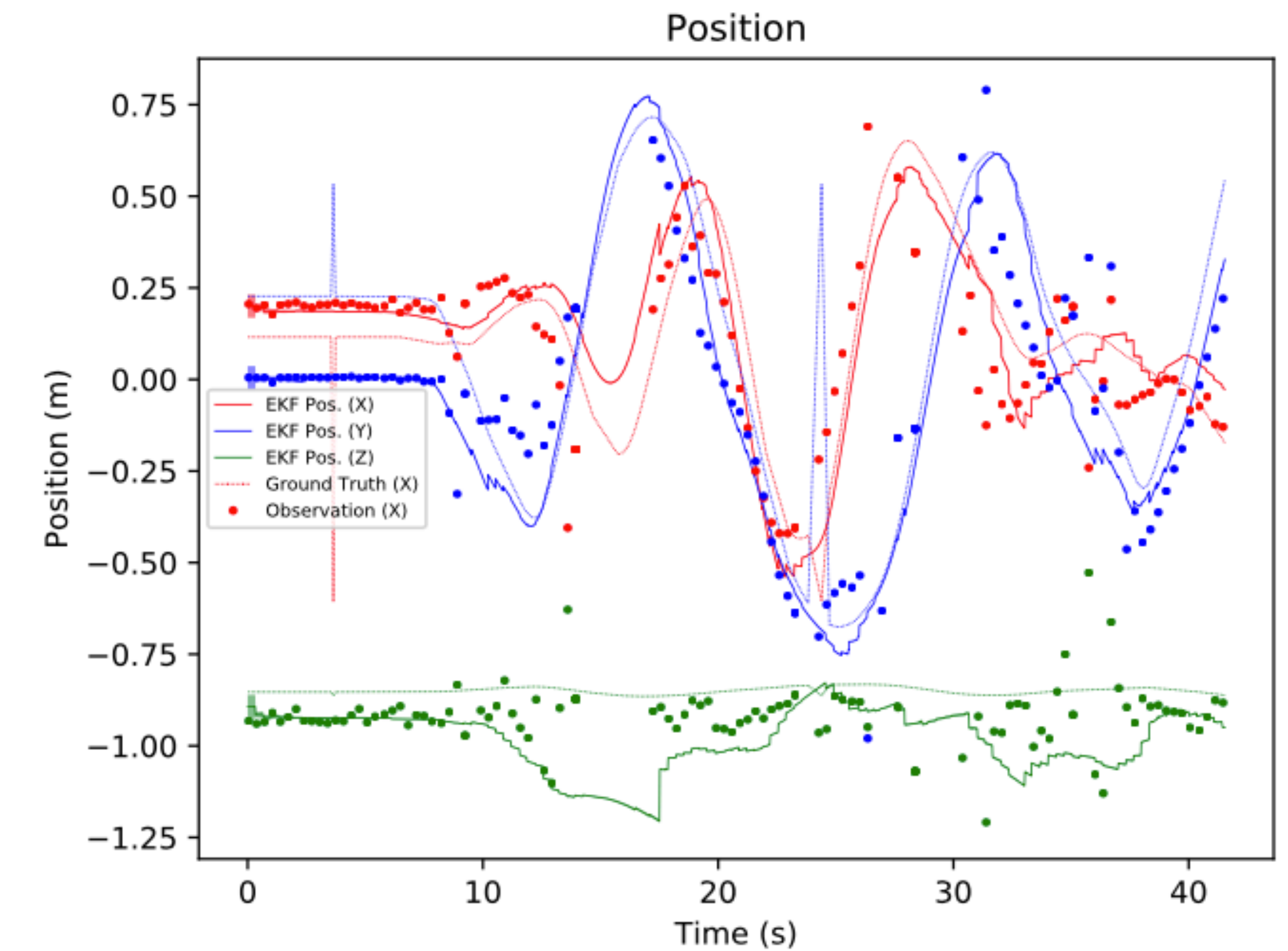
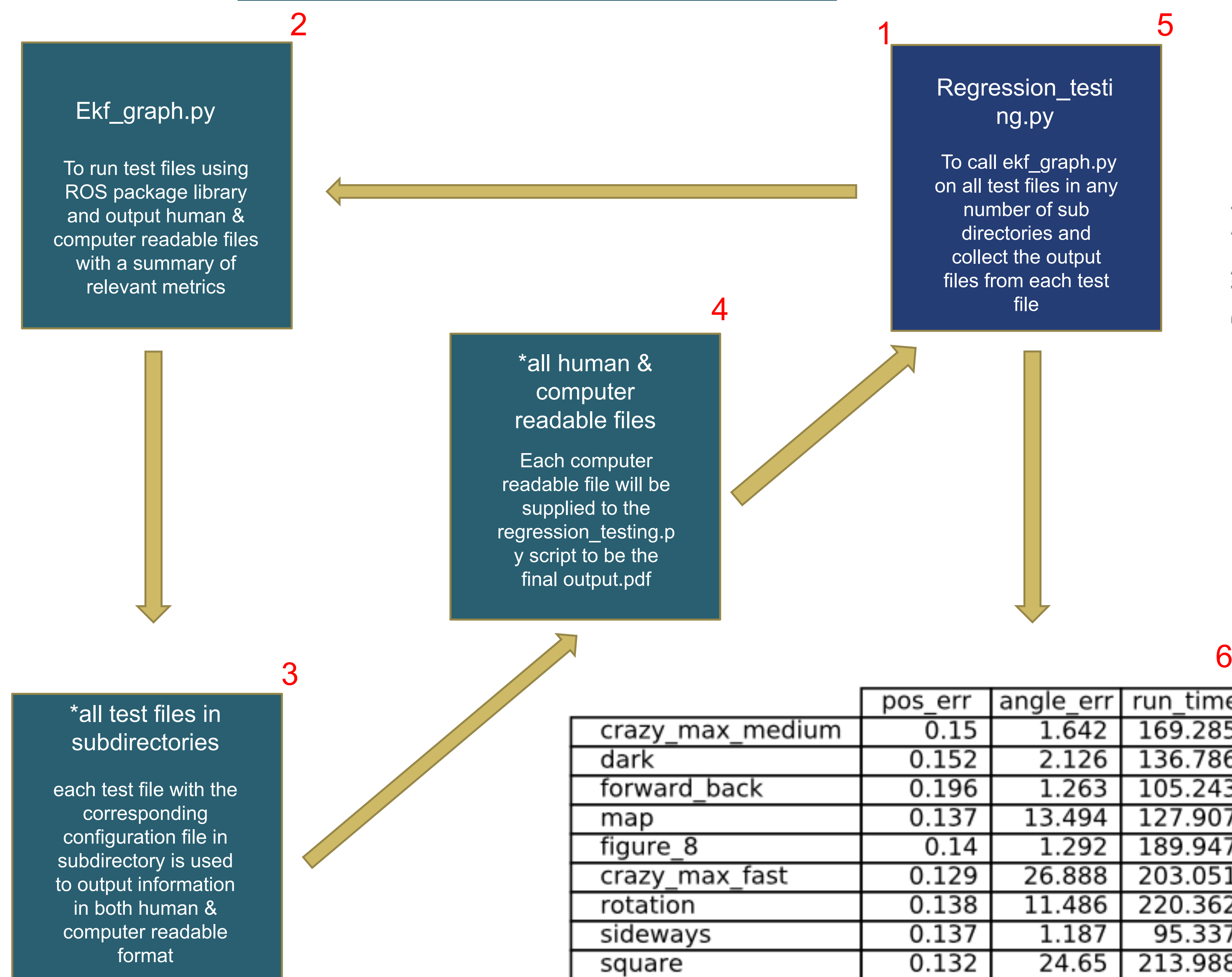
The autonomous free-flying robot Astrobees, designed for the ISS, localizes on a sparse visual map in six degrees of freedom using an Extended Kalman Filter. Currently, the Astrobees team conducts numerous tests to ensure Astrobees localization will succeed on the International Space Station (ISS). However, in testing different mapping and localization algorithms for Astrobees, the method of manual trial and error has been used against individual test cases to determine whether the change was a success. Hence, we are creating a regression testing system to utilize in lieu of trial and error on specific tests, which has proven to be ineffective. The regression testing system will automate the testing process and show the Astrobees engineers how their changes affect the localization system, as the EKF is highly dependent on small changes and provides a complex output challenging for humans to understand. Furthermore, this research seeks to analyze the results of the testing system and then visualize the results in easily understandable ways. The regression testing system is extensible and prepared to be used on new tests created on the ISS when Astrobees launches next spring.



DELIVERABLES

The deliverable of this project include regression testing python script that will aid NASA engineers in knowing how changes to the code affects the current localization system. Furthermore, an analysis and visualization of the results of the regression testing script is also a deliverable.

METHODOLOGY



FUTURE WORK

In conjunction with using the new regression testing script, further additional metrics to output in human readable format will need to be completed in order to have a more robust testing system. Furthermore, the next component that needs to be completed is the optimization of the localization algorithm for Astrobees. This is important because while previous work has been done to construct the robot localization algorithm, further work needs to be done to equip Astrobees with plans to be deployed next spring to the International Space Station (ISS).

ACKNOWLEDGEMENTS

I would like to acknowledge the Astrobees Robotics Software (ARS) team of the Intelligent Robotics Group (IRG) for allowing me to help develop an important tool to be used by NASA Engineers. I would also like to thank NASA Minority University Research and Education Project (MUREP) for providing funding for this research work.

