Ethics Paper

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CST 472

Mars Climate Orbiter

This paper will analyze the events that caused the Mars Climate Orbiter to fall too close to mars and eventually crash to the surface. On September 23, 1999, the Mars Climate Orbiter, or MCO, lost signal at around 9:04 UTC [2]. The cause of this incident was a culmination of communication errors and failure to follow documentation. The software that was made by Lockheed Martin used imperial measurements and the control software that was made by NASA used metric measurements. “The data in the AMD file was required to be in metric units per existing software interface documentation, and the trajectory modelers assumed the data was provided in metric units per the requirements.” The failure to confirm that the units were in metric violates ACM 3.4 which states “Ensure that users and those who will be affected by a system have their needs clearly articulated during the assessment and design of requirements; later the system must be validated to meet requirements.” [3]. Another point where this mission failed is that the measurements were seen by the navigation team and it wasn’t relayed which is in violation of the IEEE Code of Ethics 7. Which states “to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, to be honest and realistic in stating claims or estimates based on available data, and to credit properly the contributions of others;” [1]. There were many stages where this mishap could have been corrected, but it wasn’t verified by either NASA or Lockheed Martin that the units were different, and it wasn’t reported by the navigation team which could have corrected for the errors in time. In practice, I have started including documentation for all of my projects to clearly indicate what units the software or hardware is using. If I were in their position, I hope and believe that I would have checked to ensure the development was in the correct units from the start, and if I had caught the error, I would have taken the necessary steps to report it.

Bibliography

[1]

IEEE, “IEEE Code of Ethics,” *ieee.org*, Jun. 2020. https://www.ieee.org/about/corporate/governance/p7-8.html

[2]

“Mars Climate Orbiter Mishap Investigation Board Phase I Report,” 1999. Available: https://llis.nasa.gov/llis\_lib/pdf/1009464main1\_0641-mr.pdf

[3]

Association for Computing Machinery, “ACM Code of Ethics and Professional Conduct,” *Association for Computing Machinery*, Jun. 22, 2018. https://www.acm.org/code-of-ethics