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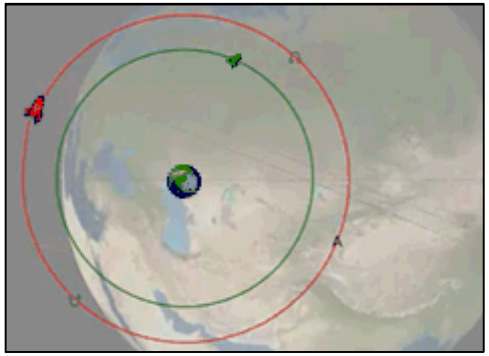

AstroTouch: A Multi-Touch Digital Desktop for Astrodynamics

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U.S. DEPARTMENT OF ENERGY | NNSA

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AstroTouch

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…a prototype multi-touch application to support *space mission analysis*

Research questions:

- Is multi-touch **feasible** for this domain?
- What **surface type** and **configuration** is appropriate?
- How to **represent** and **manipulate data**?

Design Guidelines

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1. Provide **ample screen space** to analyze complex situations

2. Provide **intuitive interaction** in 2D and 3D space

3. Support long-term **single-user** analysis as well as **collaboration**

4. Support **precise data manipulation**

Related Work – Digital Desktops

BendDesk: Seamless integration of horizontal and vertical multi-touch surfaces in desk environments

Weiss, M., Voelker, S., and Borchers, J.

In Extended Abstracts of Tabletop '09. ACM, 2009

Curve: Revisiting the digital desk

Wimmer, R., Hennecke, F., Schulz, F., Boring, S., Butz, A., and Hußmann, H.

In *NordiCHI '10*, 561-570. ACM, 2010

Magic desk: Bringing multi-touch surfaces into desktop work

Xiaojun, B., Grossman, T., Matejka, J., and Fitzmaurice, G.

In *CHI '11*, 2511-2520. ACM, 2011

AstroTouch : A digital desktop solution…

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Persisted 3D view on vertical touch surface

Data manipulation in 2D space via horizontal touch surface

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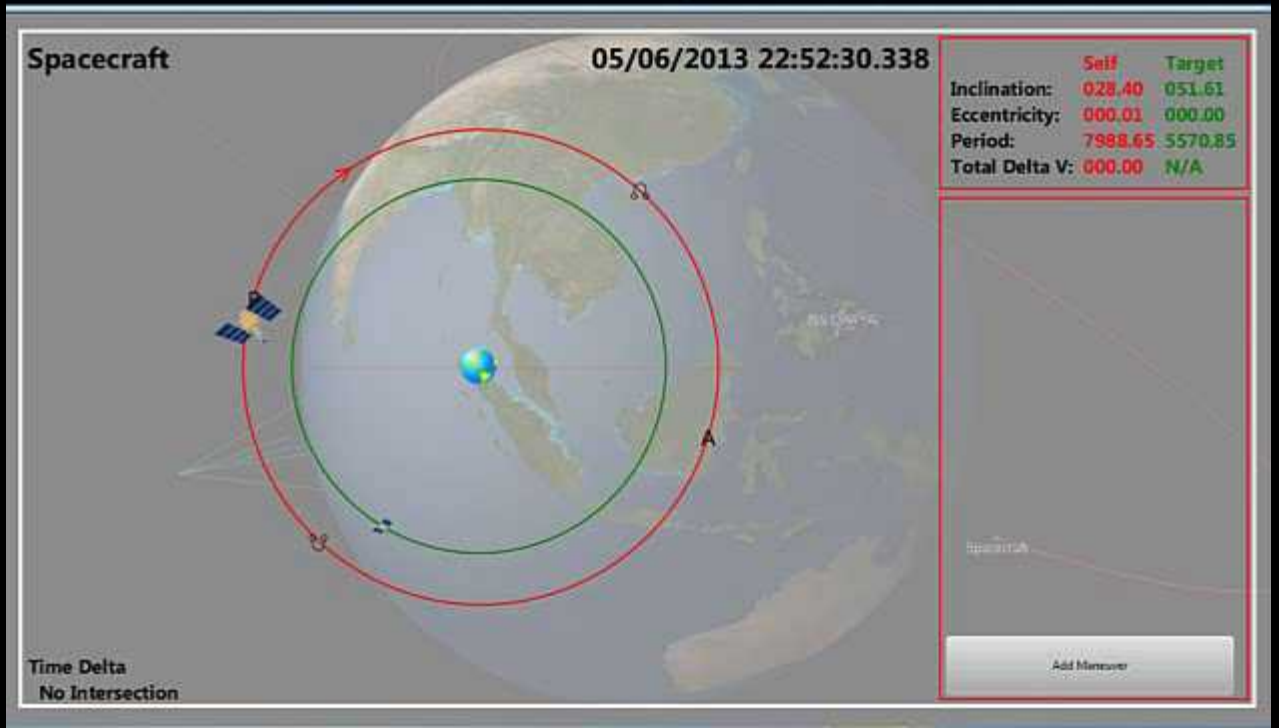

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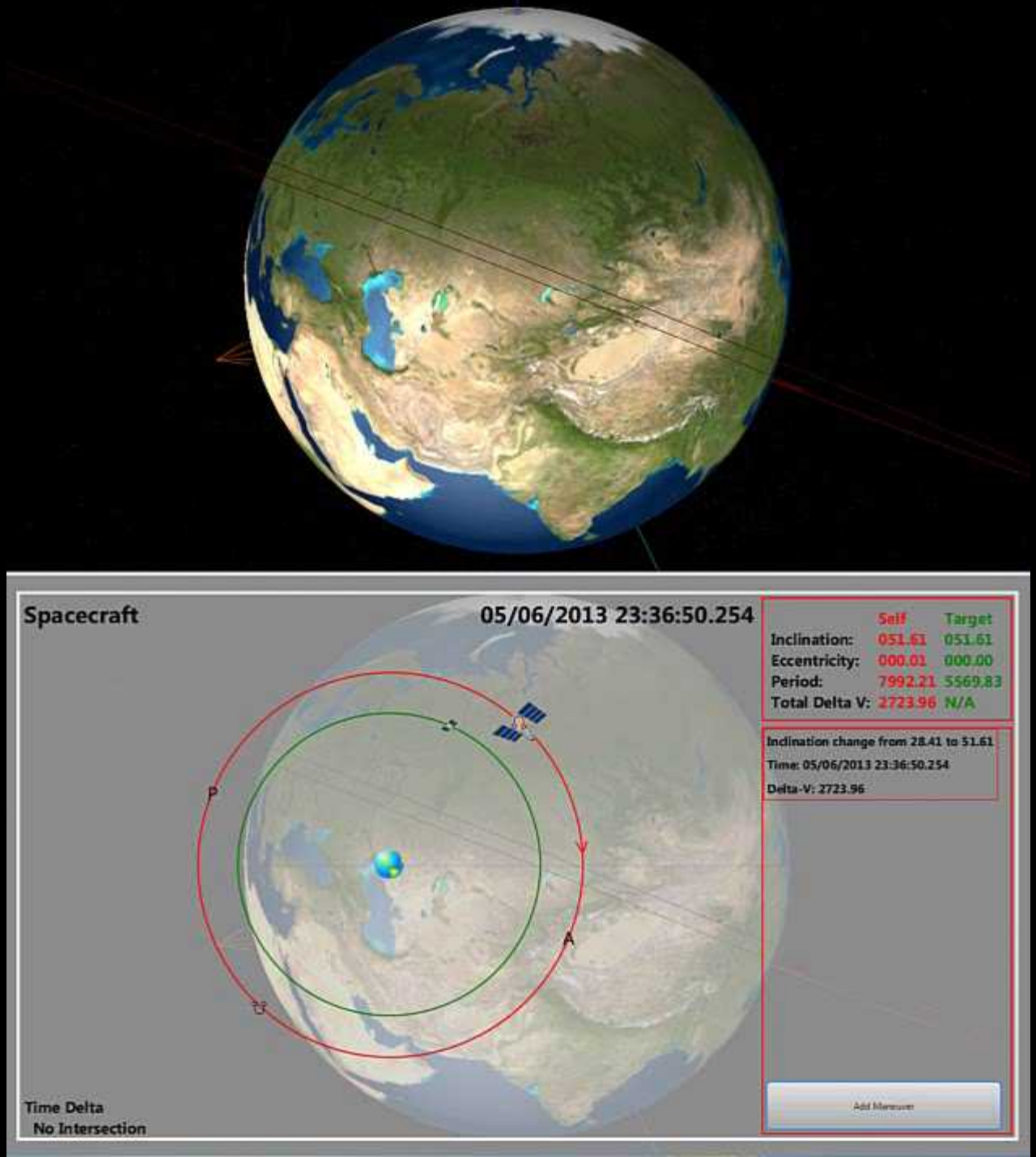

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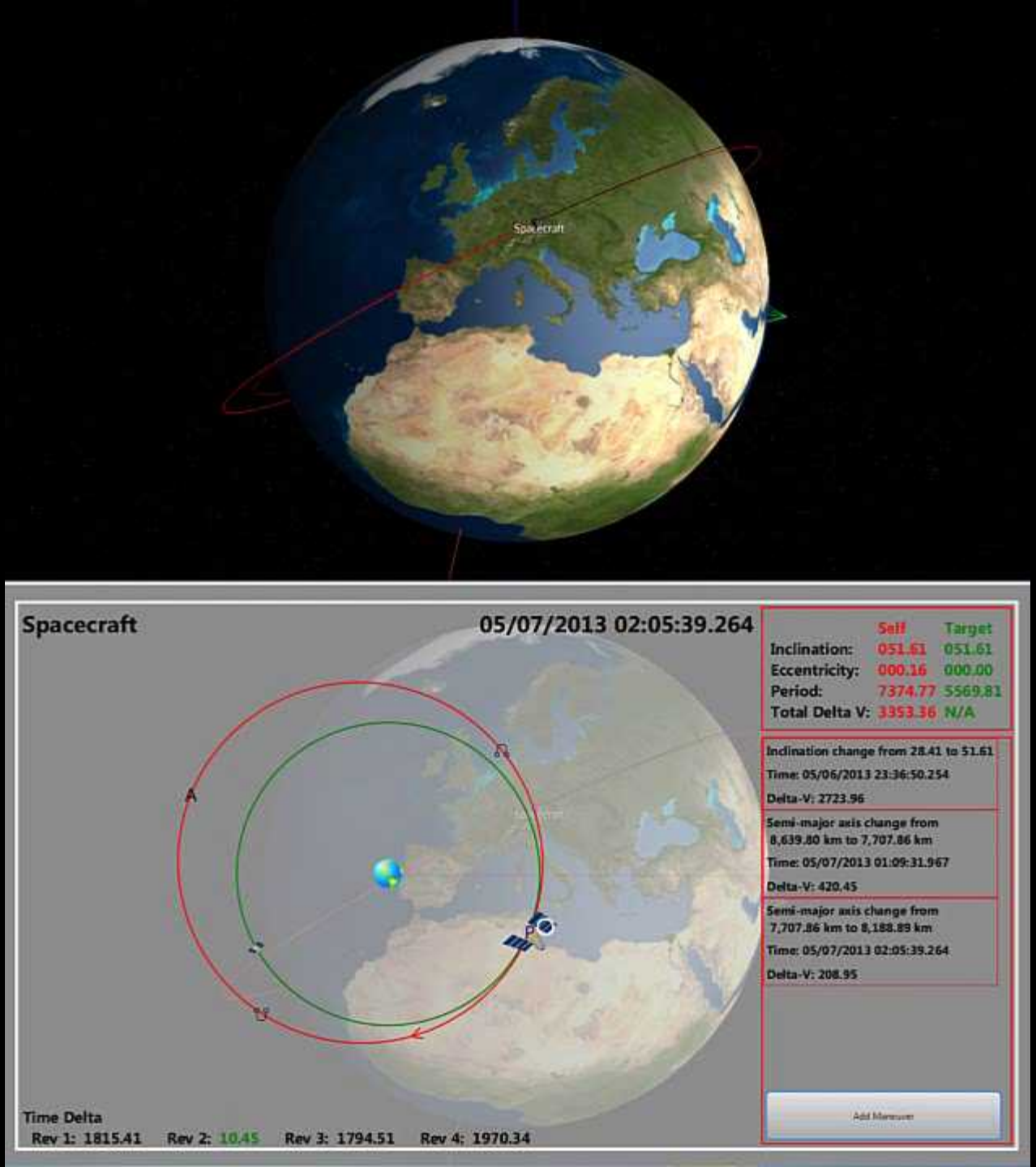

Qualitative design feedback

Dual surface configuration	Intuitive touch interaction	Long-term single-user tasks vs. collaboration	Precise data manipulation
Provides sufficient screen space for the task	Gestures are intuitive and usable	Multi-touch while seated at desk is useful	Precision is appropriate for exploratory tasks
Reduces context switching	2D representation makes data manipulation easier	Configuration shows potential for collaboration	Text input is more efficient for known values
Reduces occlusion		Keyboard inhibits use of horizontal surface	
Minimizes fatigue			

Conclusions and Future Work

- Initial results show that **multi-touch technology** with a **modified digital desktop** configuration is a **feasible solution for space mission analysis**

- Additional work is needed to improve **precise data manipulation** and further explore support for **collaboration**

- A formal study is needed to compare the efficiency of **touch interfaces vs. traditional mouse and keyboard input** in real-time mission situations

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