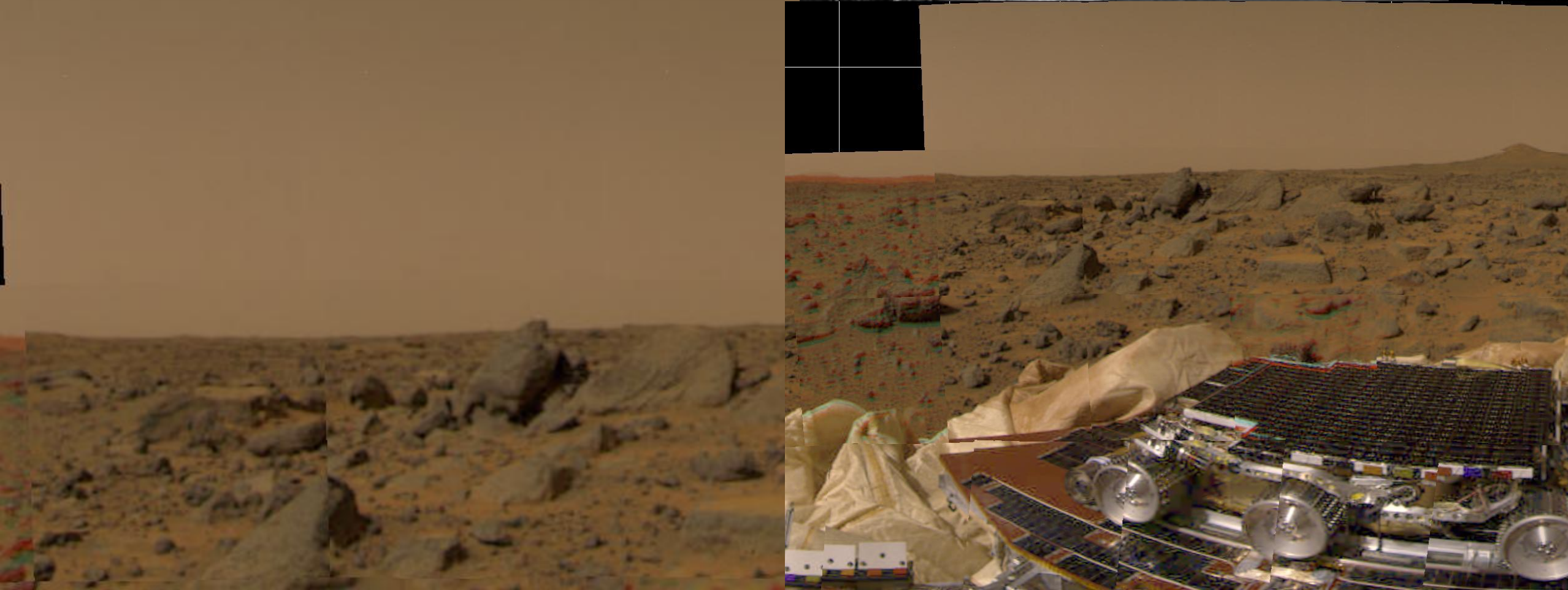


# CSE 550: Systems for all

Au 21

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# Mars pathfinder 1997

Deemed super-successful at first

- Unconventional landing with airbags
- Sent beautiful pictures to Earth

Then frequent system resets 😞

- Accompanied by data loss

# What happened: System design

Tasks on Pathfinder were structured as threads with priorities

Share information using an information bus

Synchronization based on mutexes

# What happened: Component interactions

High-pri: Information bus manager

Medium-pri: Communication task

Low-pri: Meteorological data gatherer

1. MetData thread acquires lock
2. Interrupt  schedule InfoBus thread  wait for MetData
3. Interrupt  schedule Comms and pre-empt MetData
4. A watchdog notices that InfoBus is not working, resets everything

# Fix?

## Priority inheritance

- Priority of MetData becomes high when InfoBus is waiting on it

More detailed story at

<http://www.cs.cornell.edu/courses/cs614/1999sp/papers/pathfinder.html>

Over to Priyal and Tina

# What do applications want from the network?

Reliable delivery

Delivery acknowledgement

Prevent duplication

High throughput

Guarantee min. throughput

Guarantee latency

FIFO

Encryption

Authentication

...

File transfer: High throughput, reliability

YouTube: Min throughput, low jitter

Phone call: Low jitter, low latency

Zoom: Low jitter, min throughput, low latency

Web: Low latency



# Key architectural questions

1. How do design a network that serves diverse applications?
2. What other factors to prioritize beyond application performance?