Mission H.O.M.E. – A Journey to Mars

Oliver Badaoui, Zachary Casas, Luisa Hernandez, Sarah Tang, Andy Zhu

RUTGERS
THE STATE UNIVERSITY OF NEW JERSEY

Space Travel – An Introduction

June 2003 – Spirit
July 2003 – Opportunity

1957 – the space race

1962 – Sputnik, Mars Lander

May 25, Phoenix

May 2030 – Mission H.O.M.E.

Our Proposal

- 2030: Mission H.O.M.E. – Human On Mars Experiment
- Calculated mathematically paths of spacecrafts
- Researched and identified design constraints in outer space
- Made original 3-D designs of base, spacecraft, lander, return craft on SolidWorks from scratch

Our Mission

- **To determine the feasibility of humans living on Mars through a manned mission and experimentation**

Background on Orbital Paths

- Two types of orbits: closed (elliptical) or open (hyperbolic).
- A satellite in parking orbit at same altitude over Earth's surface
- Simplified assumptions of solar systems (circular and coplanar planetary orbits)

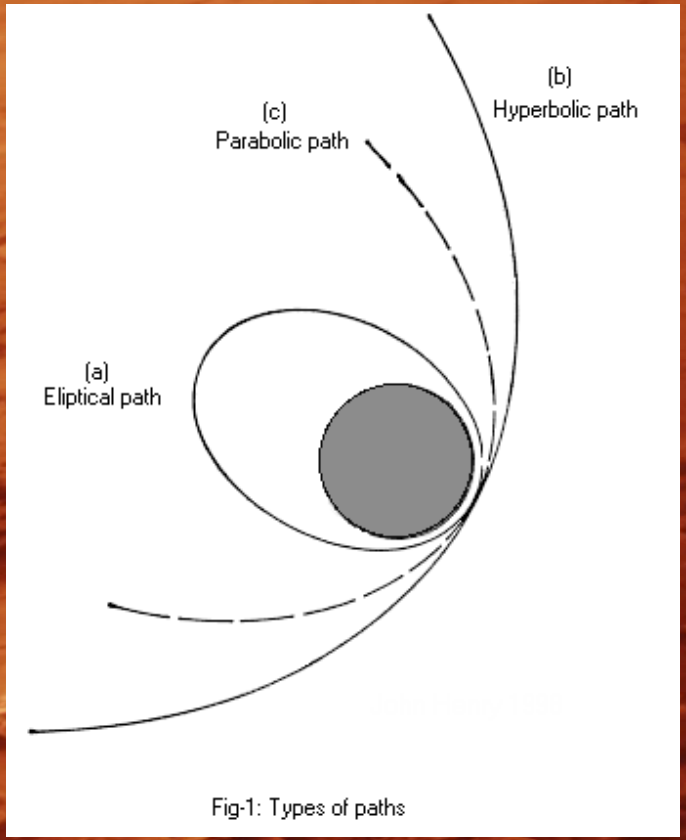
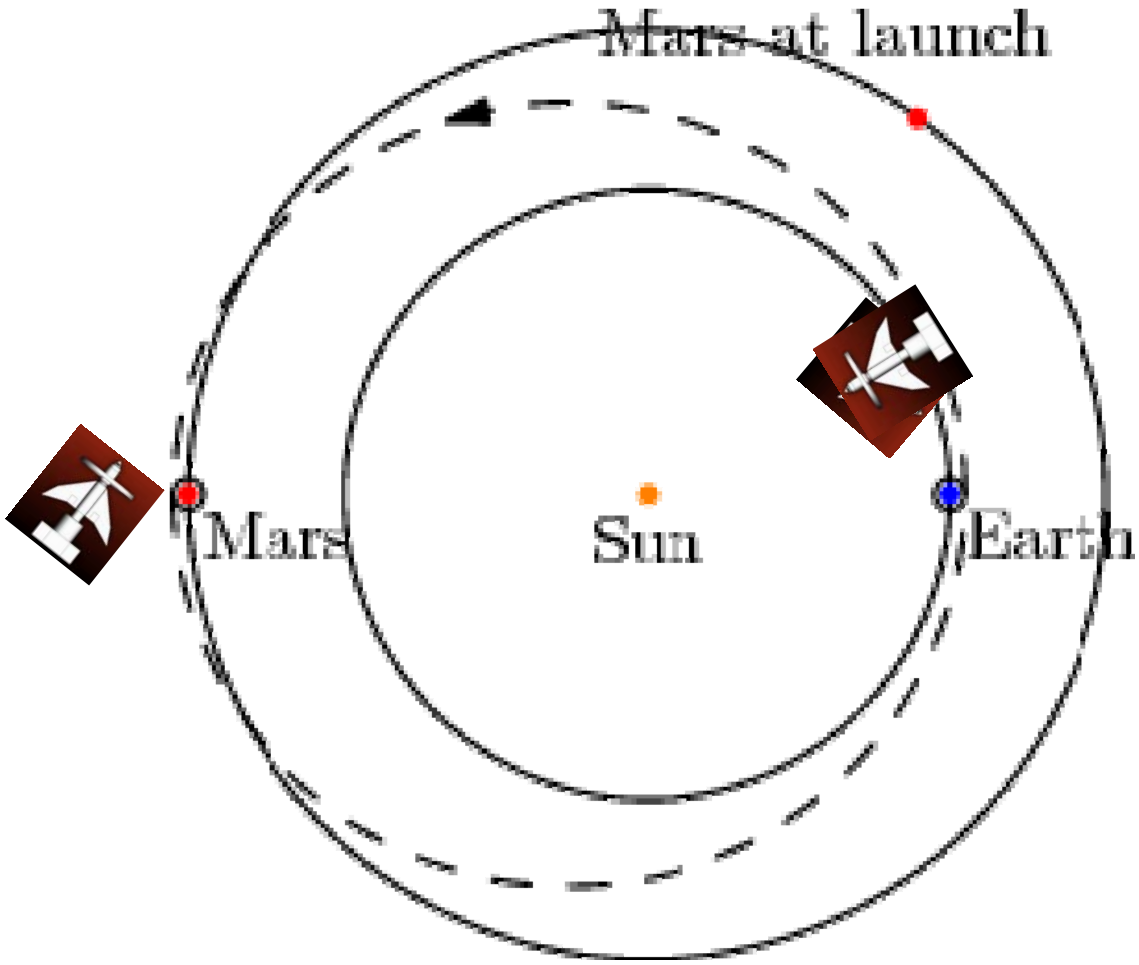


Fig-1: Types of paths

Launch Summary



Launch Calculations

1. Parts shuttled to satellite in parking orbit of altitude 300 km (requires velocity of 2370 m/s)
2. *Oberth Hyperbola* out of Earth' gravitational field (3560 m/s)
3. Elliptical *Hohmann transfer* to Martian orbit

$$P = \pi\sqrt{\frac{a^3}{\mu_S}} = 2.237 \times 10^7 \ s = 8.5 \text{ months}$$

4. Hyperbola into Martianosynchronous orbit (1913 m/s)
5. Lander

$$\frac{1}{2}mV_{M\ orbit}^2 - \frac{1}{2}mV^2 = \frac{m\mu}{r} - \frac{m\mu}{r_M} \Longrightarrow V = 6745\ \frac{m}{s}$$

Total: Thrusting of

$$\Delta V_T = (\mathrm{I}) + (\mathrm{II}) + (\mathrm{III}) = 2370 + 3560 + 1913 = \boxed{7,843\ \frac{m}{s}}$$

or ~18,000 mph

Mission Timeline

- **Dates: May 2030 (base), July 2032 (spacecraft)**
  - **Journey to Mars – 8.5 months**
  - **Stay at Mars – 8 months**
  - **Return to Earth – 8.5 months**

Obstacles to Overcome (Design Constraints)

- Food/Water
- Oxygen
- Energy
- Fuel
- Exercise/Physical Health
- Medical Concerns
- Gravity
- Waste Management
- Spacesuits

Conclusion

Our mission provided for:

- **Several research experiments**
- **A new perspective of the solar system**
- **Future base or waypoint for future exploration or colonization**

A manned mission to Mars is feasible and actually probable

- **Given current trends in developing technologies.**
- **Public support and government spending needed.**

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