



**The Biomedical Engineering Society of The University of Texas at Austin**

# **2019 Case Competition**

# Background

On December 7<sup>th</sup>, 1903, the first airplane was successfully built and flown by the Wright brothers for a grand total of 59 seconds. On April 12<sup>th</sup>, 1961, Lt. Yuri Gagarin became the first human to orbit the earth. On July 20<sup>th</sup>, 1969, Neil Armstrong became the first man to land on the moon. Our methods of travel have exploded in speed and comfort over the last century; however, with all the advancements in these technologies, there comes a change in the conditions a passenger experiences. Airplanes require pressurized cabins to prevent passengers from passing out due to decreasing oxygen levels—a situation only increasingly probable when one considers space travel. Furthermore, with more and more research occurring within the International Space Station (ISS), the health issues associated with living in space for extended periods of time are only becoming a greater concern. One of the main problems regarding space travel involves how the difference in gravity between Earth and other planets or celestial bodies can affect a person's natural biological processes. The transition from one gravitational field to another can negatively affect many systems within our body and generate subsequent health concerns after returning to Earth. Another problem area is focused on the state of one's mental health after being put into such a drastically different environment for extended periods of time. Even with the creation of a habitable environment through space stations/nodes outside of Earth, the profound change in scenarios has been shown to result in great changes to one's health. With this in mind, and seeing as the advent of extra-terrestrial colonization is just over the horizon, a multi-pronged approach that addresses (but is not necessarily limited to) policy and treatment is essential to the advancement of space travel.

# Objective

Design and present a solution to improve or maintain the health of future astronauts and prevent other related problems from occurring, while keeping in mind administrative policies at local, state and national levels. Construct your solution with regards to specific health-related problems an astronaut might face while in orbit, as well as relevant policy that would affect an astronaut's experience. Keep in mind the economic, social, and ethical issues that may arise as a result of your solution. Consider a feasible solution that can be efficient, effective, and financially sustainable during its effective time period. Also, discuss why your idea is novel, as compared to previous solutions regarding this issue. Be prepared to refute potential arguments against your solution.

*Your solution can include but is not limited to: creating a biomedical device, software application, biopharmaceutical solution, medical solution (e.g. a surgical application), or policy change, etc. to diagnose, monitor, treat, maintain, and/or support an astronaut's health.*

# Things to consider

- Your solution may be a physical object or something intangible (e.g. a policy change).
- Research previous solutions or attempts to solve the problem.
- Identify a niche area for your solution.
- Make a novel and creative solution.
- Who else benefits from the impact of your solution?
- Is your solution feasible?
- Think of ethical dilemmas that could arise and how to circumvent them.
- Keep in mind the financial aspect of your solution.

## Summary

A successful presentation will include an innovative solution to the problem at hand, thorough research of the solution, a plan to implement the solution that includes a thorough understanding of the risks and rewards, potential pitfalls, opportunities for further development, relevant financial information such as business development, marketing, funding and expenses, etc., and the long-term impact of the proposed solution in an organized and aesthetically-pleasing presentation.

## Competition Day

The competition will be held on November 23, 2019 at 9 am. Teams will be notified of their presentation times beforehand. Each team will have 15 minutes for their presentation: 10 minutes to present their solution and 5 minutes to answer questions from the judges. Dress code for presenters is Business Professional.

The 1st place team will be awarded \$600. The 2nd place team will be awarded \$400. The 3rd place team will be awarded \$200.

## Judging Criteria

### Idea:

- Novel
- Creative
- Practical

### Implementation:

- Net Positive Impact
- Minimal Ethical and Cultural Effects
- Economic and Technical Feasibility

### Proposal:

- Business Plan for Implementation
- Relevant Financial Information
- Long-term Effects

### Quality of Presentation:

- Neat and Organized
- Smooth Transitions
- Contains all necessary information

If you have any questions, please contact:  
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