BACKGROUND
The NASA is pursing space missions beyond low earth orbit that would send astronauts away for months and even years. Missions of this type present concerns for psychological effects of an astronaut being far away from planet earth and missing loved ones and other familiar places. Consequently, the NASA is investigating technologies that would help keep an astronaut psychologically healthy. A technology application currently under investigation is Telepresence that could potentially allow an astronaut to communicate with a loved one or experience the comfort of home or hometown place in an immersive environment using auditory, visual, and haptic senses. NASA would like to explore stimulation of olfactory senses to enhance the Telepresence experience. Several research papers suggest that smell would provide a key factor in remembering past experiences. Moreover, olfactory stimulation may be suitable for other applications besides Telepresence. Consequently, NASA would like to understand the advantages/disadvantages of incorporating olfactory stimulation as part of a human computer interface (HCI).

PROBLEM DESCRIPTION
Develop a prototype ODS that dispenses aromatic sensations (odors/scents) upon computer commands. The dispenser would have a HCI that allows changing the ODS parameters. It is highly desired that the ODS be demonstrated in a simulated application to show the utility of the system, particularly where the application controls when to dispense aromatic sensations. Some olfactory-based simulation applications of interest are:

- Conversing with a person located at home
- Exercising
- Entertainment such as an immersive game
- Walking through a nature trail
- Other immersive application

The utility of the system should be evaluated in a structured study with collaboration from the psychology field.

CONSTRAINTS
- The user should not have to wear anything around the nose for the system to operate.
- The aromatic sensations should not linger for more than a few seconds (<5 sec.) so that another aromatic sensations can be dispensed.
- The aromatic sensation should be detected via smell at a minimum distance of 3 feet within 3 sec. of dispensing.
- The aromatic sensations should be completely gaseous/vapor state when dispensed.
- It is highly desired that the Olfactory system dispensing should be programmable to allow user flexibility in the aromatic sensations intensity, threshold value (minimal concentration that a human can detect), and blending of aromatic sensations. However, a pre-mixed aromatic sensation system is acceptable as well to reduce development time but still meet the intent of the design challenge.
- Dispensing a minimum of 6 aromatic sensations.

DELIVERABLES
Hardware, software, easy to use operations manual including theory of operation

DESIGN TEAM PROFILE

<table>
<thead>
<tr>
<th>NASA MENTOR:</th>
<th>George Salazar</th>
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<tbody>
<tr>
<td>LEVEL:</td>
<td>Upper Division Students [JR/SR]</td>
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<tr>
<td>MAJOR / DISCIPLINES:</td>
<td>EE, IE, Mfg Eng., Chem Eng.,Computer Science</td>
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<tr>
<td>AREA OF RESEARCH:</td>
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<td>DURATION:</td>
<td>Two-Semester Project</td>
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Design Project Topic Offered By:
NASA JSC, EV3