



# Wearable Technologies Workshop

## Challenge Request

April 29 & 30, 2019

hosted by NASA at the Johnson Space Center

**Challenge Title:** Wireless Distance Charging Solutions for Wearable Devices

**Organization Name:** NASA Johnson Space Center

**Team Assignments Available:** 2

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## Summary of the Challenge and Team Project

### Background:

Various stakeholders at the NASA Johnson Space Center are acquiring or are interested in acquiring data through astronaut-worn devices on the International Space Station (ISS), such as for radiation, acoustics, or activity assessments.

### Problem Statement:

Power management activities are a large part of the resources required from astronauts when operating wearable devices on ISS. Wireless charging solutions at a distance would decrease the need for power management activities or entirely eliminate them. Autonomous wireless charging at a distance solutions inside the ISS (when combined with wireless data transfer) would also enable area monitoring/stationary sensors with a significantly smaller resource footprint in terms of vehicle interface hardware and/or battery needs.

### Important Design Considerations (These can be discussed, and possibly negotiated, in more detail after the Team has been assigned):

1. Only technologies that obtained FCC approval or where FCC approval is pending should be considered.
2. The most value for our needs is provided by effective charging over 1-6 ft / 0.3-2 m throw distance, and various companies have developed charging at a distance solutions that would meet our needs. Magnetic or electro-magnetic charging should be the main focus.
3. Effective charging power on a prototype device battery should reach 1 mW or more for 1 ft throw distance (trickle charging).
4. The receiver, charging interface and rechargeable battery should fit inside a smart watch form factor with a footprint target of smaller than 2 in x 2 in and a thickness target less than 1/2 in.
5. The transmitter volume target is 20 in x 20 in x 20 in.

### What funding and/or resources can be provided to each Team? (The details of the payment arrangements must be negotiated with the Team.)

Unfortunately, no funding is available. Teams can be pointed to existing technology candidates.

**Deliverables (the final product the Team is to provide – such as a report, garment, user evaluation, ...):**

1. Report containing a market survey, trade study and technology down-select for the proposed technology, and electrical schematics or configuration details of the prototype system.
2. Prototype system consisting of transmitter and receiver, charging interface and rechargeable battery that can be demonstrated to charge over a 1 ft distance.

**How Will the Results Be Used?**

The down-selected technology and implementation prototype will be used as a starting point in considering power management in new astronaut-worn devices currently in development at NASA.

**What deliverables (if any) are to be transferred to the organization at the end of the project?**

No deliverables need to be transferred other than an electronic copy of the final report.