

33rd United Nations (UN)/IAF Workshop on Space Technology
for Socio-Economic Benefits

*Space Derived Innovation for Inclusive Societies:
Advancing EDIA and Socio-Economic Participation
for Persons with Disabilities*

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Persons with Disabilities: Prevalence, Challenges & Barriers

- ~ 1.3 billion people globally (15% of the world's population) live with some form of disability. They face ableism, and persistent barriers to healthcare access, education, employment, mobility and full socio-economic participation.
- The International Labour Organization found levels of unemployment among persons with disabilities being up to 80% in many countries. UNESCO indicates majority of children with disabilities in emerging/developing countries did not attend school.
- Addressing these challenges is essential for health, human rights, inclusive economies, and resilient societies.
- Disability does not define potential; with equitable access, opportunity, and inclusive environments, persons with disabilities can realize their full potential and thrive on Earth and beyond.

Beyond Boundaries: Space Innovation for Disability Inclusion

- **Inspiration & representation:** Breaking barriers- world's first Parastronaut ESA's Dr. John McFall.
- **Space as a testbed for disability:** Space is an extreme, physically demanding environment; developing ways to enable astronauts to move, work and perform safely can generate insights relevant to persons with disabilities on Earth.
- **Assistive technology & rehabilitation*:** Space innovations into wearables, exoskeletons, AI, robotics, VR/AR, and telemedicine to support mobility, function and independence.
- **Space medicine & human performance:** Research on muscle, bone, cardiovascular function, balance, etc. can inform rehabilitation and recovery for persons with disabilities.
- **Sports Medicine and Space Medicine:** Astronaut training and human performance research in extreme environments can inform conditioning, injury prevention, rehabilitation and performance optimization for athletes and Para athletes.
- **Education & Opportunity:** Inspire and create STEM, research and career pathways for persons with disabilities through role models, accessible learning and space engagement.
- **Partnerships & Impact:** Connecting space, healthcare, academia and disability sectors to drive innovation on Earth.

From Space to Stroke Rehabilitation

* Adapting robot assisted EVA/Space walk glove technology to support post stroke hand function and rehabilitation.

Hand Function After Stroke

- Impaired **strength, dexterity and coordination** (impacting daily activities, independence and **quality of life**)
- Persistent hand dysfunction can limit ADLs/IADLs and functional recovery.

Potential from Space Technology

- EVA glove technology enable astronauts to grip, manipulate objects and perform precise hand tasks despite resistance & pressurized glove constraints.
- Adapted powered/robotic glove technology could potentially support hand movement and rehabilitation after stroke.

Questions • Collaborations • Speaking & Teaching Engagements

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Dr. Farhan M. Asrar, is a Canadian physician, Associate Dean at the Toronto Metropolitan University (TMU) School of Medicine, Senior faculty at University of Toronto & an internationally known space medicine educator and researcher.

His research in space medicine has involved leading international projects, and working with experts and astronauts from space agencies around the world. He is looking at human health in space, and also looking at how space can advance health, societal benefits, wellbeing, Equity, Diversity, Inclusion & Accessibility (EDIA) and the environment on Earth.

A global educator, physician leader and noted speaker, he has been invited to teach professionals and learners from 30 countries and six continents.

Dr. Asrar's research has been published in world renowned journals, and he has frequently interviewed by the media including CNN, New York Times, ABC News, NBC News, CBC news, Euronews, CTV news, The Independent, Dawn, Hindustan Times, Arab News, The National, Houston Chronicle, and USA Today.