How AI is helping people with disabilities/special-needs?

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How AI is helping people with disabilities/special-needs

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International Day of Persons with Disabilities 3 DECEMBER

NATIONAL DISABILITY DAY

SRGE

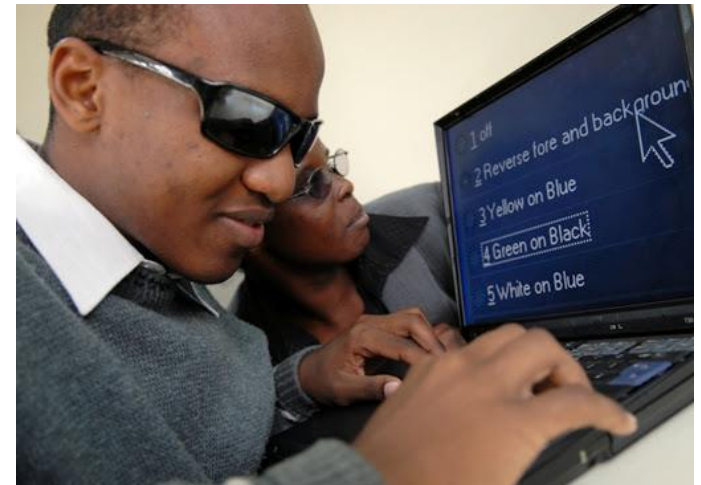ZOOM 6:10-6:30 Oslo time (7:10-7:20 Cairo time)

About myself

- BSc and MSc from Menoufia University in 98, 06
- PhD from Korea University in AI, South Korea in 2010
- PhD from Aarhus University in Field robotics, Denmark in 2012
- Assistant professor Menoufia University from 2011-2012
- Postdoc, Aalborg University, Denmark from 2013-2015
- Associate Professor and Professor at NTNU from 2015-2018, 2018-present.
- Head of international master program in simulation and visualization from 2018-2020.
- Department deputy head for research and innovation from 2018-present.
- IEEE senior member from 2016-present.
- Elected chair of IEEE CIS Norway chapter.
- Founder and Chair of AI & Robotics Interest Group, Norwegian Computer Association DND (Den Norske Dataforening)
- Founder and head of NTNU social robot's lab.

Disability

- Is a physical or mental problem that makes it difficult or impossible for a person to walk, see, hear, speak, learn, or do other things, or interact with the world around them.

- Some disabilities are permanent or temporary.

- Present from birth or occur during a persons' lifetime.

WHO definition

- Disabilities is an umbrella term, covering three dimensions: impairments, activity limitations, and participation restrictions.

1. An impairment is a problem in body function or structure (loss of a limb, loss of vision or memory),

2. An activity limitation is a difficulty encountered by an individual in executing a task or action (difficulty in seeing, hearing, waking or problem solving), and

3. A participation restriction is a problem experienced by an individual in involvement in life situations (cognitive disability, memory and learning disability that make it hard to work and engage in social and recreational activities).
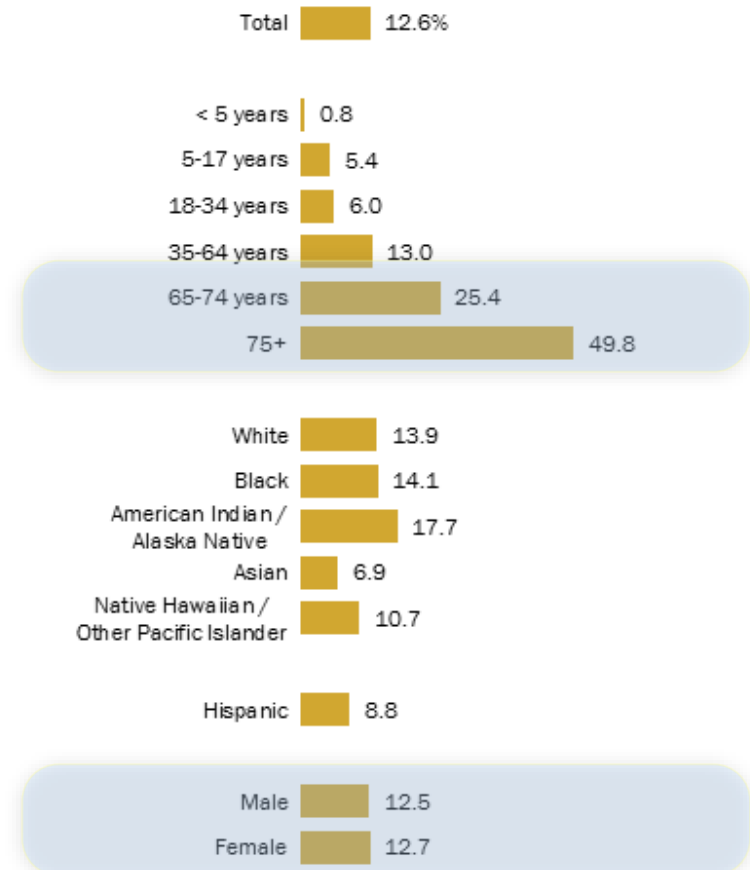
Causes of disability

- From birth
- Gene or chromosome disorder
- Exposure during pregnancy to infections
- Associated with developmental conditions from childhood (autism, attention/hyperactivity disorder)
- Related to injury (brain or spinal cord injury)
- Associated with long standing conditions such as diabetes causing a disability such as vision loss, nerve damage, or limb loss.
- Aging/ageing

Ageing and disability

- The global population of older persons is expected to reach 1.4 billion by 2050.

- 46% of older persons experience moderate to severe disability.

- The most common types of disability in this age involve difficulties with walking/climbing stairs or independent living.

- Disability limits autonomy of older people, introduces dependence, reduces the quality of life and increases the risk of nursing home admission and death.
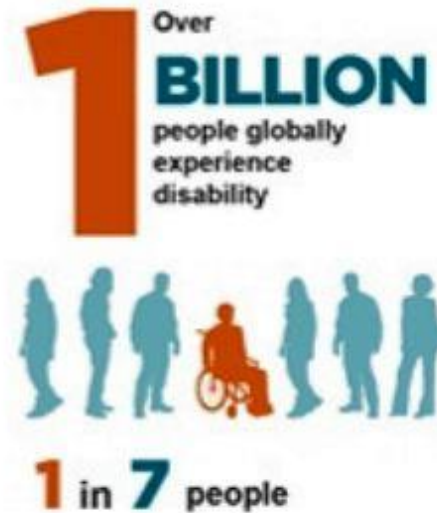
Older Americans are more likely to have a disability

% of U.S. population reporting a disability

Total	12.6%
< 5 years	0.8
5-17 years	5.4
18-34 years	6.0
35-64 years	13.0
65-74 years	25.4
75+	49.8
White	13.9
Black	14.1
American Indian / Alaska Native	17.7
Asian	6.9
Native Hawaiian / Other Pacific Islander	10.7
Hispanic	8.8
Male	12.5
Female	12.7

Global facts

- 15% of world's population or 1 in 7 people.
- The number of people with disability are dramatically increasing due to ageing and increase in chronic health conditions, wars, etc.
- Almost everyone is likely to experience some form of disability at some point in life.
- People with disability(ies) are the largest minority in any society (US statistics).
- If health services for people with disability exist, they are of poor quality and under resourced.

Over **1 BILLION** people globally experience disability

1 in 7 people

Rehabilitation and assistive devices can enable people with disabilities to be independent

970 MIL people need glasses and low vision aids

75 MIL people need a wheelchair; Only **5-15%** have access to one

466 MIL people have disabling hearing loss

Production of hearing aids only meets:
10% of global need **3%** of developing countries' needs

Making all health care services accessible to people with disabilities is achievable and will reduce unacceptable health disparities

2030 agenda: leaving no one behind

- UN Disability Inclusion Strategy (UNDIS) was launched in 2019 by the UN Secretary-General to promote 'sustainable and transformative progress on disability inclusion through all pillars of the work of the United Nations'.

- SDGs of the 2030 agenda make explicit references to older persons and persons with disability to address ageing and disability at global level.
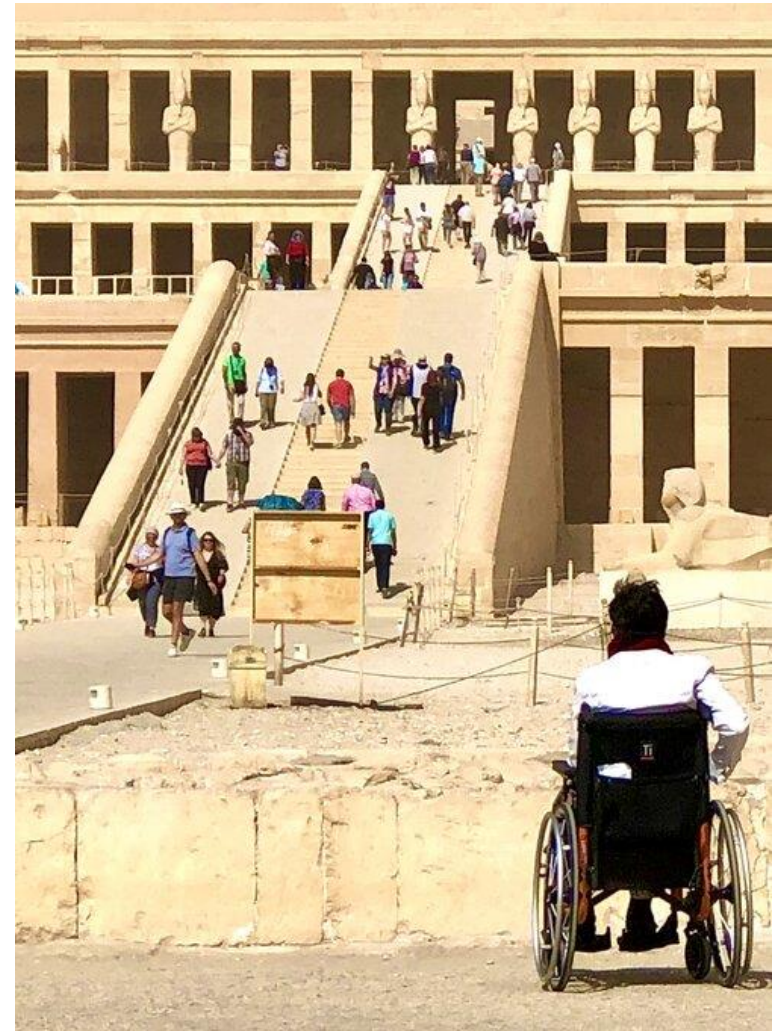
Disability rights

- Access to health services and care facilities
- Overcome physical barriers to hospitals and schools such as narrow doorways, internal steps, inadequate toilets, and inaccessible parking areas.
- Transport accessibility
- Careers and rights of persons associate with a person with disability
- Rights for sports and recreation
- Captioning, audio description and media access
- Violence harassment and bullying
- Educate and develop skills of people around people with disability (healthcare workers, teachers, families, employers, etc).

Sohag, Egypt 09.2020

Dilemma

- The United States has spent its entire history designing a country for nondisabled people, thus excluding people with disabilities from buildings, transportation, educational and recreational programs, and communication methods (Bowe, 1978).

- The need for inclusive design

Low-floor bus

Dependency, Resources, Dignity, …

Egypt: 04 January 2010

Thursday December 24, 2020

scattered clouds 21°

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Meet the Egyptian hidden soldier behind the world's first wheelchair scuba diving experience

The dive, which took place in Egypt's Sharm El-Sheikh back in 2012, is still annually celebrated as it marks the world's first modified wheelchair that is used in scuba diving.

Nada Deyaa'   December 26, 2019   Comments Off

Recommended

New study finds Ocean acidification does not affect behaviour of coral reef fish

Ministers of Environment, Tourism postpone fees on diving activities for 3 months

The Egyptian female world rowing champion seeks to raise awareness about the sport

Researchers monitor CO_2 leakage sites on ocean floor

Accessible tours for wheelchair users (private company)
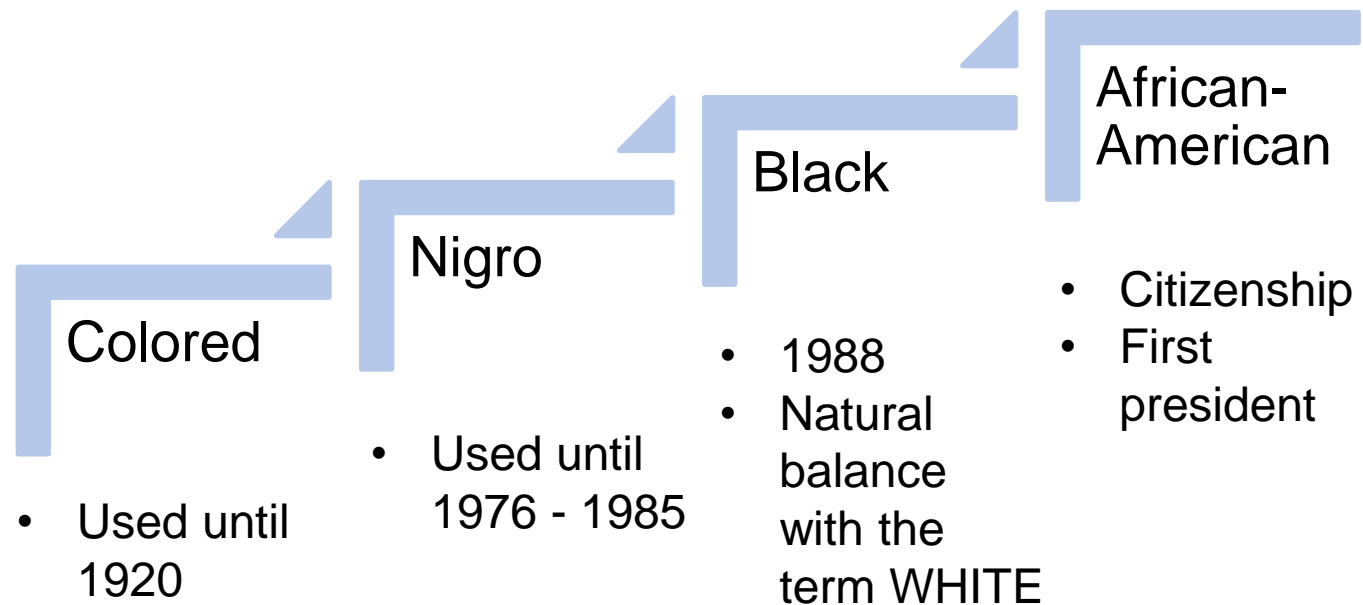
Wheelchair left

Toilets

Parking

Education for disabled

- Digital teaching & assessment
- Updated ILOs and skills
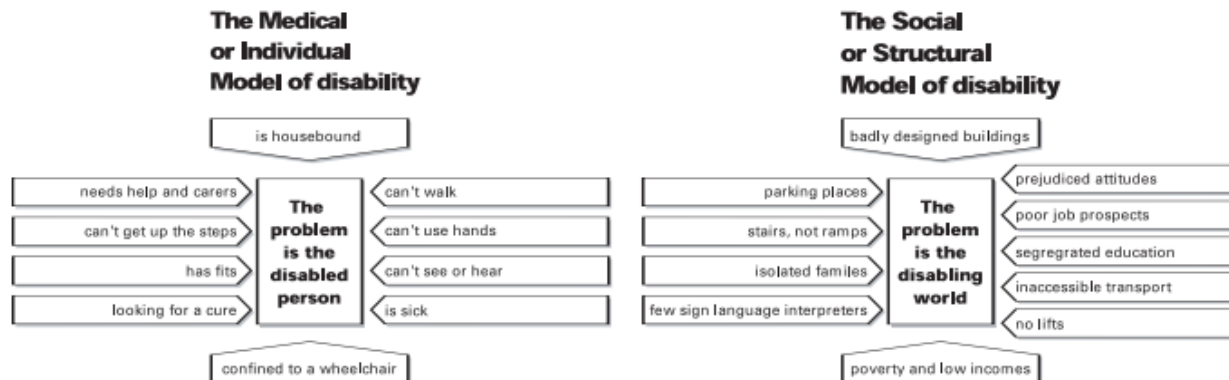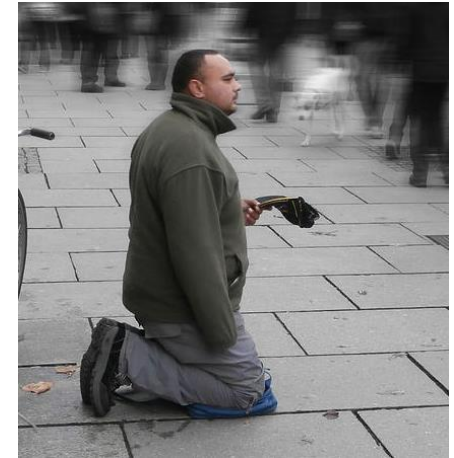- Educate and train teachers/family/society

Power of naming/labelling

- Our language is our culture.
- Through history, culture has dismissed, discount, and discarded those seen as different or disabled.

Colored
- Used until 1920

Nigro
- Used until 1976 - 1985

Black
- 1988
- Natural balance with the term WHITE

African-American
- Citizenship
- First president

Handicap

- Hand-in-cap/cap-in-hand: begging with cap in hand.

- Labels that link/emphasize disabled people to negative stereotypes, fear and dependency.

- Medical model in which the disabled person is seen as the problem: *we are to be adapted to fit into the world as it is*.

- Social or structural model where the society itself creates the dis disability or disabling factors such as discrimination, prejudice and inaccessible environment.
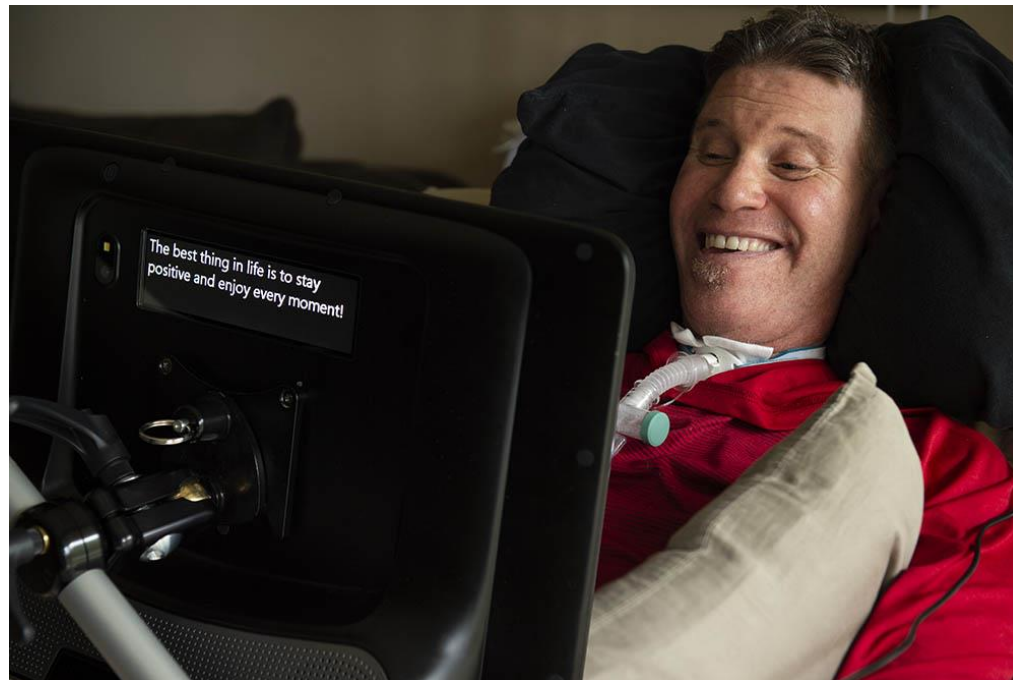

The Medical or Individual Model of disability

- is housebound
- needs help and carers
- can't get up the steps
- has fits
- looking for a cure

The problem is the disabled person

- can't walk
- can't use hands
- can't see or hear
- is sick

- confined to a wheelchair

The Social or Structural Model of disability

- badly designed buildings
- parking places
- stairs, not ramps
- isolated familes
- few sign language interpreters

The problem is the disabling world

- prejudiced attitudes
- poor job prospects
- segregated education
- inaccessible transport
- no lifts

- poverty and low incomes

"The only disability in life is a bad Attitude.

:Scott hamilton

How AI is helping people with disabilities

- Communication and interaction
- Eye and gaze trackers enable disabled users to type, talk (Speech synthesis) and control devices to be more independent in their daily life
- Speech-to-text & text-to-speech for visually impaired people

AI make the world more inclusive

Robotics wheelchair

- Uses gyroscope technology, IoT, navigational mapping, smart motion sensors that helps maintain a stable balance while improving flexibility and capabilities.

Stair Climbing Robot Wheelchair

Mobilization system

Even simple initiatives will make a difference

Robot caregivers

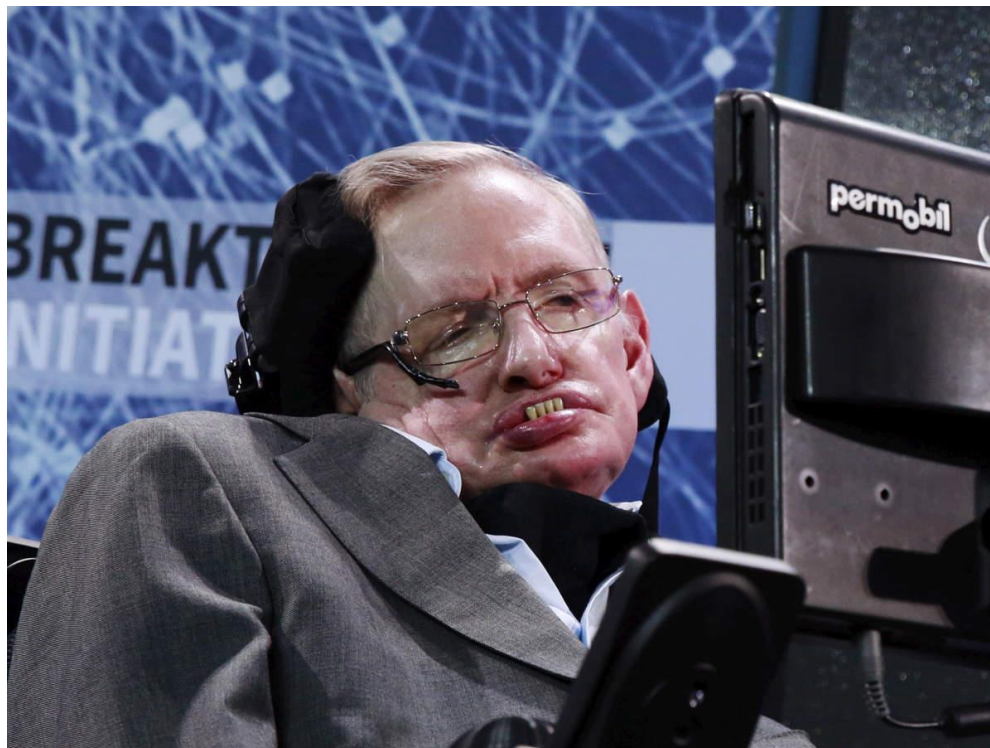# Able to grasp with a robot hand

Stephen Hawking

- AI gave him a voice and he used it to warn us against AI

Stephen Hawking

- He made no secret of his fears that thinking machines could one day take charge.

- He predicted that future developments of AI could spell the end of the human race.

Take-Home message

- Use of BSc, MSc and PhD thesis to develop low-cost AI-based solutions for disabled (1 out of 7 globally is disabled) – start ups.

- Accessibility (transportation, buildings, etc)

- Transfer from medical model (disabled people) into social/structural model of disability (disabling world)

- Use low-high tech to develop assistive technology to facilitate daily life.

- We need to see more disabled people in talk shows, movies, sports, parliament, minsters, governors, as professors, etc.

- Inclusive design – accessibility – toilets – wider corridors

- Economic impact and feasibility --- disabled are the largest minority (around 10 million in Egypt and 50 million in middle east).

Thanks for your attention and time!