Rehabilitation and Assistive Technology

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Increasing the Conformance of Academia towards Rehabilitation Engineering (i-CARE)

Project ref. 586403-EPP-1-2017-1-PS-EPPKA2-CBHE-JP

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Date: 10/12/2018

This publication has been produced with the financial support of the Erasmus+ Program of the European Union. The contents of this publication are the sole responsibility of the partners and can in no way be taken to reflect the views of the European Commission.

Introduction

- According to WHO, about 15% of the world's population lives with some form of disability, of whom 2-4% experience significant difficulties in functioning.
- People who have a non-severe disability are those who have difficulty performing functional activities of daily living such as seeing, hearing, lifting, carrying, climbing stairs, walking or having their speech understood.
- People who have severe disabilities are those who are unable to perform one or more activities of daily living;
- The **rehabilitation technologies** help people with disabilities become more self-reliant and able to participate\integrate into work, school or social environments more easily through the use of **assistive technology**.
- A lot of people who have physical and mental disabilities haven’t been able to live a normal life until new **Assistive Technology** has come out.

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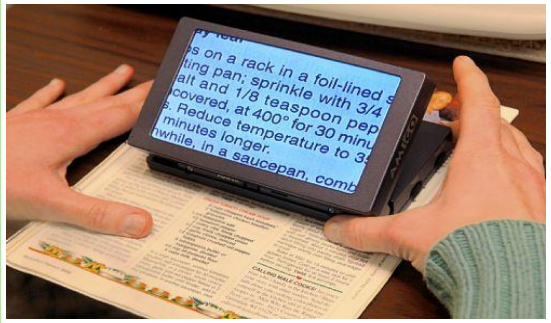
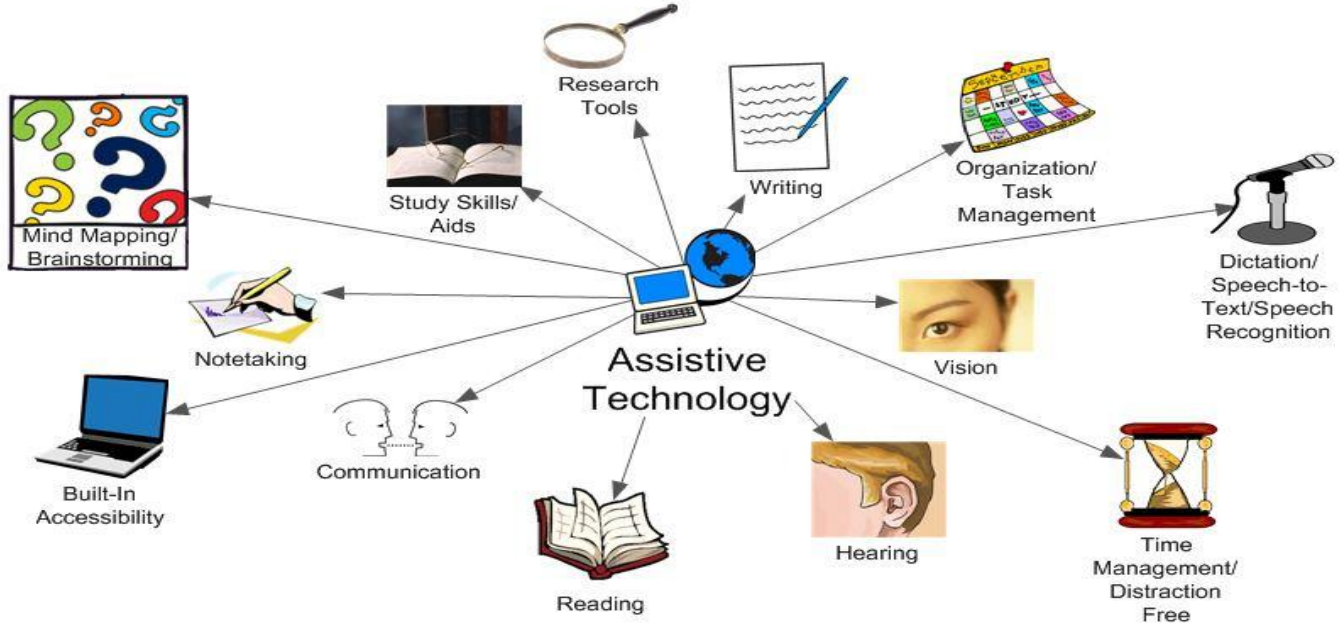
What is Assistive Technology?

- **Assistive technology (AT)** is assistive products, related systems, and services developed to maintain or improve an individual's functioning and independence, thereby promoting their well-being. [World Health Organization(WHO)]
- Assistive technology (AT) is anything (tool, device, system, software, or service) that assists individuals with disabilities or individuals experiencing difficulty with a task (visual, hearing, physical, or mental) to improve their functional capabilities.
- Examples of ATs such as wheelchairs, prostheses, hearings aids, visual aids, and specialized computer software and hardware that increase mobility, hearing, vision, or communication capacities.



Electronic magnifier



Why Assistive Technology?

- Assistive Technology assists elderly, disabled people, or those with a medical condition or injury by:
  1. makes their life easier and safer.
  2. provides them an independent living without the need of assistance from others.
  3. enables them to participate in education, the labour market and civic life.
  4. enables them to live productive and dignified lives and to be active in the society.
  5. Enables them to interact more easily with non-disabled people

- Without assistive technology, people are often excluded, isolated, and locked into poverty, thereby increasing the impact of disease and disability on a person, their family, and society.

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Adaptive Technology Vs. Assistive Technology

- The term adaptive technology is often used as the synonym for assistive technology; however, they are different terms.

Edge protector

- Assistive technology: refers to "any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities",

Jar opener

- Adaptive technology covers items that are specifically designed for persons with disabilities and would seldom be used by non-disabled persons. (for example: prostheses)

- Adaptive technology is a subset of assistive technology.

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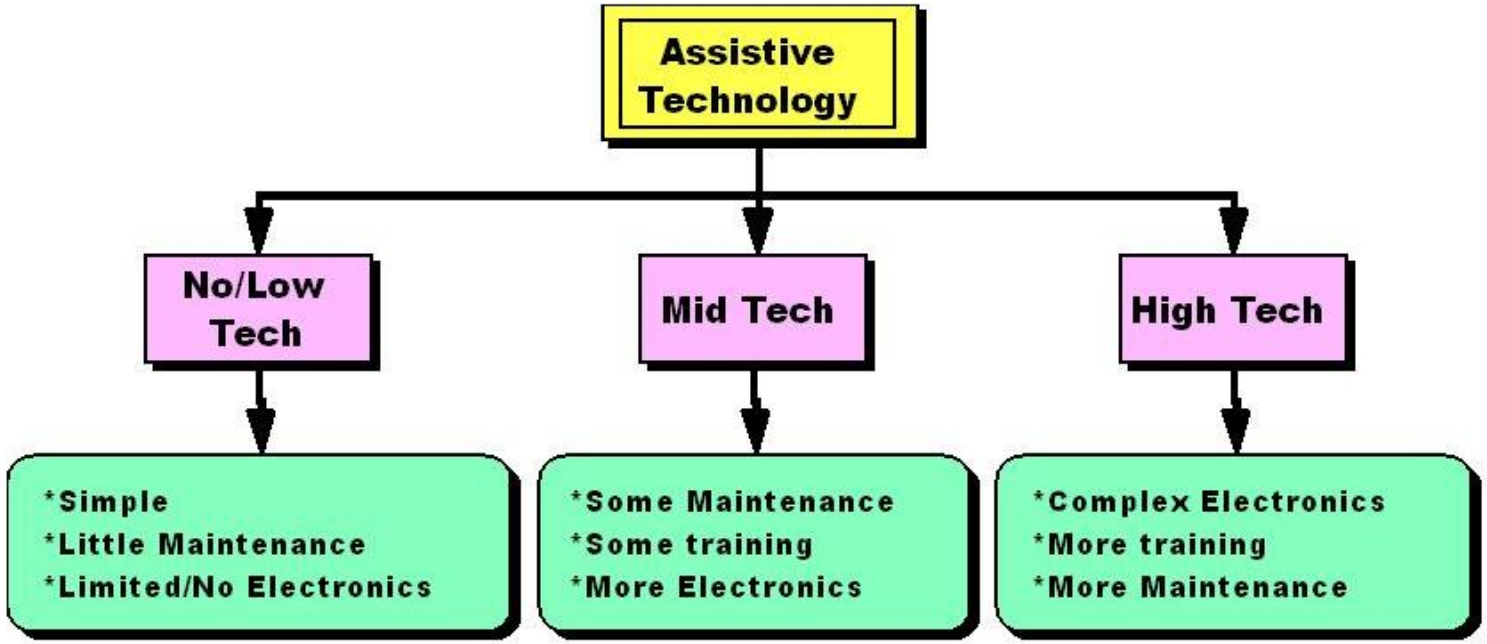
Classifications of Assistive Technology

- Assistive Technology ranges from low tech to high tech devices or equipment.

- It is classified based on its technological sophistication and complexity, as well as the level of technical training needed to use the device (Roy, 2003; Weiland, 2003).



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Low tech AT

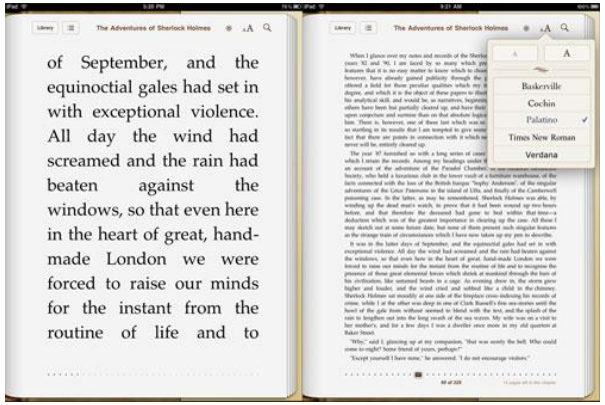
- Devices or equipment that don't require much training, may be less expensive and do not have complex electronics or mechanical features.

canes and walkers

pen or pencil grips

grabbers

handheld magnifiers



large print text

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Mid-Tech ATs

- Devices or equipment that may have some complex features, may be electronic or battery operated, may require some training to learn how to use and are more expensive than the low-tech devices.

Personal hearing amplifier

Adaptive keyboard or mouse

Reminder Alarm Clocks

Talking Calculators

manual wheelchairs

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High Tech ATs

- the most complex and expensive devices,
- computerized and have complex electronic components,
- likely require training and effort to learn how to use

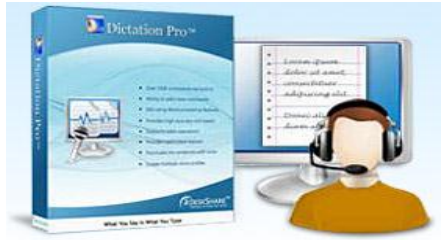
Voice activated
Environmental control and Home Automation

power wheelchairs and scooters

Robotic Exoskeleton

Dedicated Speech Generating Devices

digital hearing aids



Speech to Text Dictation Software

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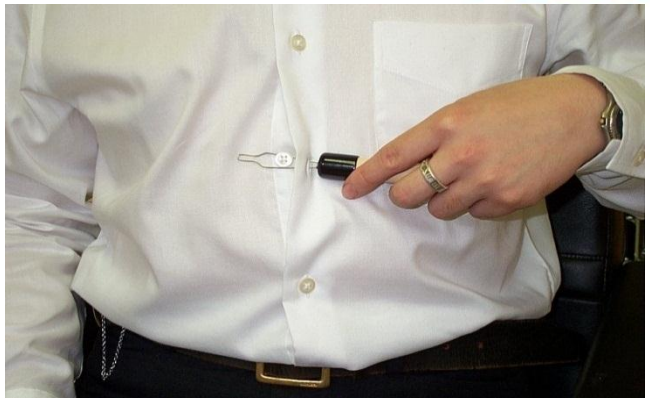
Other examples of Assistive Technology

Dressing :(Put on/off clothing, socks and shoes)

Suitable for elderly with impaired limb function

stocking aid

Long-handle shoehorn



button hook

Suitable for elders with impaired hand functions

Jar opener

Can opener

Key holder

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Other examples of Assistive Technology

Personal Hygiene
Suitable for elders with impaired mobility, so as to avoid home accident

Toileting and bathing

Shower chair

Bathroom grabber

Bath board

prostheses

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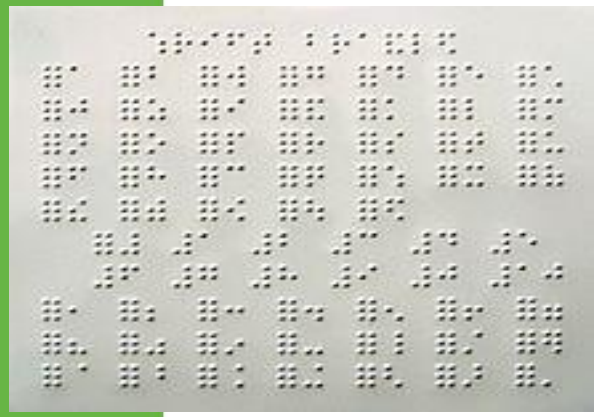
Other examples of Assistive Technology



Braille printer

Braille Display and Keyboard

Co-Robotic Cane (CRC)

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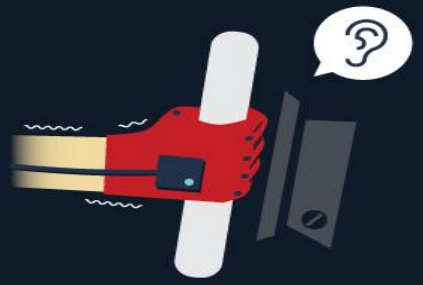
Some Latest Advances in Assistive Technology

THE CAR FOR BLIND DRIVERS

Engineer Dennis Hong is currently developing a car that can actually be driven by people who are blind.

Cameras will be used to observe the environment around the vehicle while providing sound and vibration for the driver using sensory input.



The sounds and vibrations may include auditory alerts, pulsing vibration signals in gloves worn by the driver, seat vibrations of various strengths and locations and a screen that displays a virtual picture of the vehicle's surroundings using compressed air.

THE DYNAVOX EYEMAX SYSTEM

People who have disabilities such as paralysis, cerebral palsy and strokes can use the DynaVox EyeMax System to participate in communication using only their eyes.

The device uses a sophisticated eye tracking system in which users can interact with an on-screen keyboard.

The on-screen keyboard allows users to enter words and phrases.

After the user enters words and phrases, they'll be translated into spoken text through the device's text-to-speech mechanism.

SMART GLOVES

Created by researchers at the University of California in San Diego.

They automatically translate American Sign Language to digital text that appears on a computer or smartphone.

The iBot Stair-Climbing Wheelchair

is a self-balancing, stair-climbing wheelchair for physically disabled.

Video

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Undergraduate Projects (Ongoing)

- Eye-activated Environmental control and Home Automation for paralyzed people
- Prayer chair for elderly people
- Braille display and Keyboard for blind people

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Conclusion

- Building assistive technology supports people with disability to overcome the barriers they face and provide them the independency in their life.

- The society should be aware with the specific needs of the disabilities and how technologies can support them.

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Thank You

Keep connected with i-CARE project:

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References

- https://www.disabled-world.com/assistivedevices/
- https://prezi.com/k19y-vcjhajj/prezipowerpoint-project-assistive-technology/
- https://www.who.int/news-room/fact-sheets/detail/assistive-technology
- https://www.elderly.gov.hk/english/healthy_ageing/selfcare/assistivedevices.html
- https://guardianhelmets.com/advances-assistive-technology-infographic/

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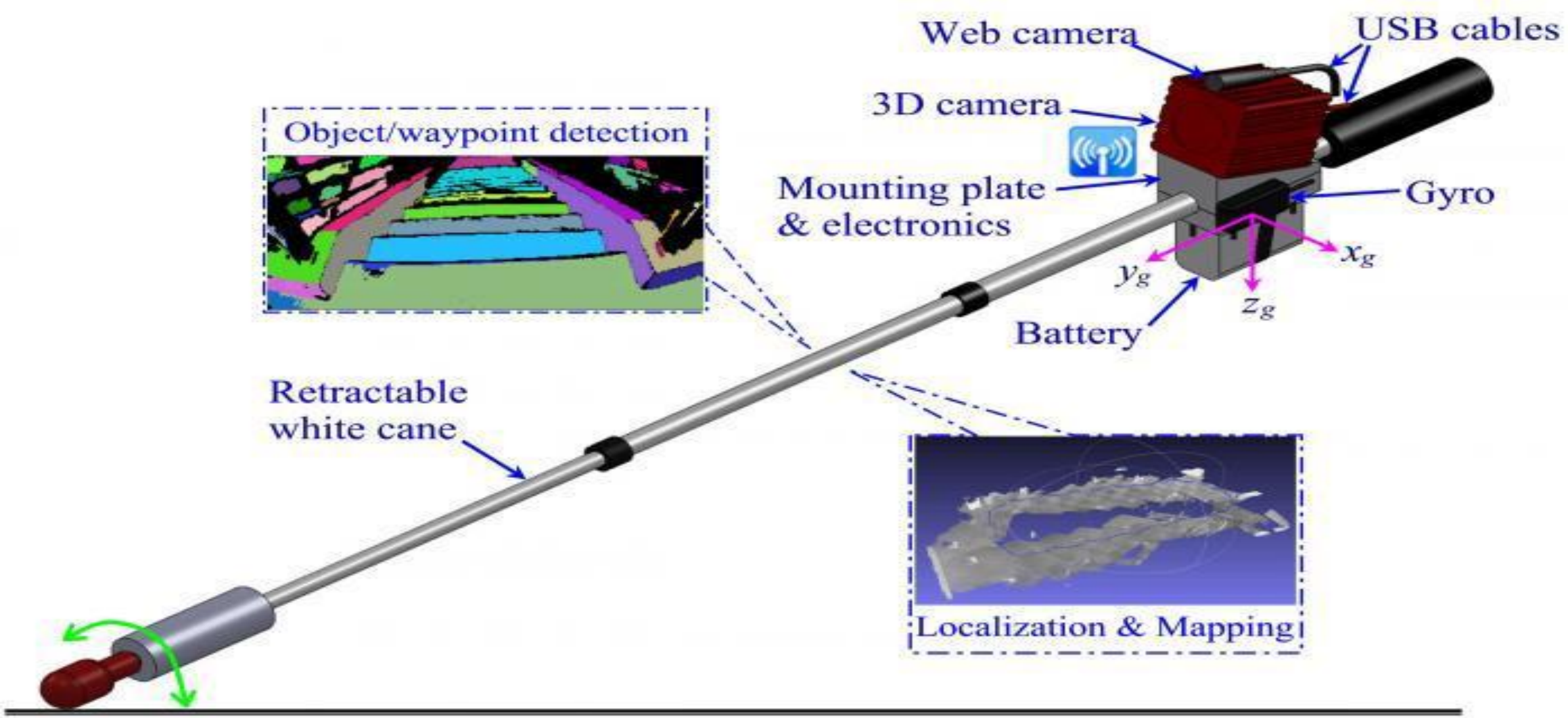

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