Longitude Explorer Prize

Theme 1: Living Longer

Because of breakthroughs in medicine and better healthcare, we are living longer than ever! But as we get older our needs change.

What can AI do to meet the needs of an ageing society?

In this pack you will find:

- An overview of the theme and how it links to the Industrial Strategy's Grand Challenges
- Examples of the opportunities and challenges within this theme
- Probing questions and sub-themes to help you think about how AI can be used within this theme
- Case studies of real examples of how AI is helping issues within this theme.

The Grand Challenges

The Grand Challenges form part of the Industrial Strategy.

The Grand Challenges aim to improve people's lives, and transform the UK's industries for the better. The four Grand Challenges are linked to the themes of the Longitude Explorer Prize:

Theme 1 Living Longer

Ageing Society Grand Challenge: helping older citizens lead independent, fulfilled lives. The aim is to add **5 extra healthy independent years** to our lives.

Theme 2 Living Better (Artificial Intelligence & Data Grand Challenge)

Theme 3 Living Together (Future of Mobility Grand Challenge)

Theme 4 Living Greener (Clean Growth Grand Challenge)

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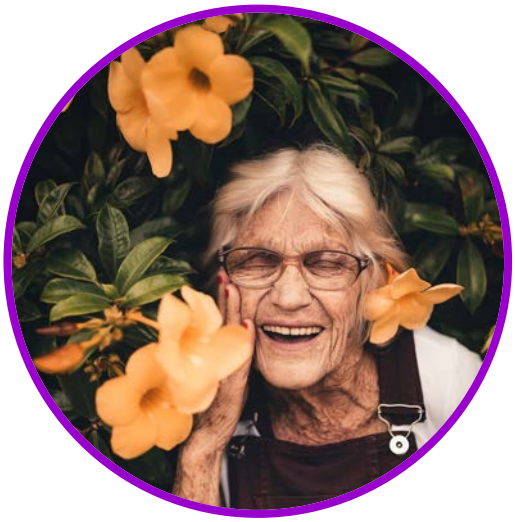
We're getting older!



The elderly population is set to more than double by 2050 world wide.

By 2040, nearly one in seven people in the UK is projected to be aged over 75. [1]

The life expectancies for women and men in the UK as of 2017

	Life Expectancy	Healthy Life Expectancy
Women	82.9	63.6
Men	79.2	63.1

Life expectancy is the number of years a person in a particular society can expect to live
Healthy Life Expectancy is the number of years a person can expect to live in a healthy and independant way, e.g living in their own home, going out on their own, not needing a lot of medical supervision, etc. [2]

It's great that we are living longer, but we would also like to live better as we age.
Here are some of the challenges and opportunities we face in trying to create better lives for older people

Staying Active

How can AI help?

- How could AI be used to help people encourage older people to move more?
- What data or information would be helpful to older people to keep them active? Could AI be used to help get this information to them?

Challenges

As we get older our bodies experience lots of wear and tear. How can we make sure that older people are getting all the health care they need to stay healthy?

Better Connection

How can AI help?

- How can AI help older people feel less lonely and more connected?
- Is there any data or information that older people could use to help them stay connected? Could AI be used to get them this information?

Challenges

Older people are at a higher risk of being lonely than most people. In England alone over 2 million people over the age of 75 ilive alone. How can we keep older people connected with their families and communities? [3]

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Staying Independent

How can AI help?

- How could AI be used to help people find help & information about mental health ?
- Can AI be used to help detect potential mental health issues early?

Challenges

As we get older we may need more help getting around.To help older people stay independent we need to develop tools to help them keep doing what they love.

More Opportunities

How can AI help?

- How can we use AI to help older people stay involved and contribute to society?

Challenges

Getting older doesn't mean there still aren't many ways to continue to society and do things that bring us joy. What are the ways we can keep older generations involved in society?

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Use Case 1

Staying Independent

Smart Homes

Smart homes are helping older people stay in their homes, and live more independent lives.

Anyone's home can be set up with a series of devices, which, using AI, can be customized to the needs of older people.

Watch this 1:25 min video on smart homes used by elderly people in Singapore

Examples of how a smart home can be set up:
AI powered **Virtual Assistants -** like Alexa or Google Home, which are linked to and can control:

- Smart Speakers - allow older people to give vocal commands
- Smart home devices - e.g. thermostats, fridges, TVs, door and window locks, indoor and outdoor lighting etc.
- Other: sensors on medicine bottles to ensure the right doses are taken at the right times

Using these interlinked devices users can set up:

- Daily Routines - which allow multiple tasks to be done when a single word or phrase is said, for example:
- If you say "good night"
- The virtual assistant will
- Turn off all indoor lights,
- Turn on outdoor security lights
- Lock all doors and widows
- Adjust Thermostat
- Enure important household appliances are turned off etc.

Alerts and reminders: if the person deviates from their normal routine pre-selected individuals can be alerted

Reminders: The system can be programmed to send medication reminders and alerts, and ensure they are followed through using sensors on medicine dispensers.

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What are the problems Smart Homes is trying to solve?	How is AI being used to help?	What data is the AI using?
Getting in touch with people when needed - calling relatives of care workers or contacting emergency services **Basic household tasks -** turning devices on and off, closing windows and doors, simple cleaning tasks **Shopping -** creating shopping lists, ordering food and other household items. **Reminders** - reminders to take medication, do the shopping, call a relative, go for walks etc. **Security -** ensuring that the doors are locked, that the gas isn't left on, etc.	**Learning:** Using machine learning algorithms, AI can learn what is or is not normal behaviour and when a care worker or relative needs to be contacted. For example if someone falls, or they are not moving around as much. **Understanding human speech** - With the use of smart speakers, an elderly person can order online shopping, make calls, and operate smart devices e.g. close the blinds, turn off lights etc.	The AI systems will need to collect data from the physical environment. **Wearables** like smart watches can be used, and are fitted with sensors that can tell if you've fallen, monitor heart activity, and respond to voice commands. **Home cameras:** videos of the home and people, which can be used to learn what normal movement and behaviour looks like for a single person. **Home smart speakers** listening out for key words or calls for help. which they are programmed to respond to.

What are the risks?

Access to data

Who has access to camera feeds, and other smart home monitors?

This is an important question, especially when dealing with vulnerable people.

Responsibility

If virtual assistants and smart devices take on caring activities for someone, how can we ensure that the responsibility to care for this person is not lost from others e.g. family, carers, medical professionals?

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Use Case 2

Staying Connected

Aibo - and AI powered pets

Some older people are no longer able to care for pets, having an AI powered pet, like an Aibo can provide some emotional support!

Watch this 1:13 min video on Aibo and other robotic pets

What are the problems AI powered pets is trying to solve?	How is AI being used to help?	What data is the AI using?
Companionship: this is especially helpful for older people who are no longer able to care for real pets. The Aibo is able to provide a similar level of emotional support with little to no care needed. **Keeping active:** AI powered pets can be used to encourage older people to move around more	**Learning body language and expression:** by being able to detect a person's mood, AI devices ro robots are able to respond, e.g. wagging it's tail when its praised. This means they can act as simple alternative companions to people who can't have pets. **Learning about an individual:** AI is currently used on many different platforms to learn a person's preferences, and make suggestions to them. AI pets can also learn a person's normal daily habits and preferences and alert the person or a relative or caregiver if something is out of the ordinary. **Voice commands and communication:** Being able to understand a voice command allows the AI to be more responsive.	The AI systems will need to collect data from the physical environment. **Cameras -** videos of the home and people, which can be used to learn what normal movement and behaviour looks like for a single person. **Microphones -** listening out for key words or tone of voice which the AI can learn from and respond to. **Other sensors** - e.g. touch

What are the risks?

Responsibility

If a robot takes on some of caring activities for someone, how can we ensure that the responsibility to care for this person is not lost from others e.g. family, carers, medical professionals?

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Some other examples you can check out:

- **Silverfit 3D:** using AI and gaming to keep older people fit
  - **video**
  - **website**

References

1. https://www.openaccessgovernment.org/technology-ageing-population/57294/
2. https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectancies/bulletins/healthstatelifeexpectanciesuk/2015to2017
3. https://www.nhs.uk/conditions/stress-anxiety-depression/loneliness-in-older-people/