



# Ethical and technical challenges of GPS transmitters





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***GPS transmitters may provide extra reassurance for people with dementia and their relatives. The transmitters help to provide a greater degree of autonomy and better quality of life for the person with dementia, as they can go for a walk without being afraid of wandering. At the same time, relatives have fewer concerns because they know that the GPs will help if the person with dementia cannot find their way home.***

However, many also experience ethical and technical challenges when using a GPS unit to look after people with dementia. Ethical, because the GPS system often monitors the person with dementia all the time. Technical, because GPS transmitters quickly run out of power. The GPS equipment must be monitored continuously and may be complicated.

Below you can read about:

- Privacy and autonomy
- Challenges with the GPS system
- Alternatives to GPS

## **Privacy and autonomy**

The benefit of using GPS transmitters are so great that they to some extent outweigh the disadvantages. The location system may help ensure that the person with dementia does not wander. The main drawback is that most GPS transmitters monitor and record every step the person takes. The person with dementia is therefore monitored 24/7 and not only when needed.

So it might be difficult to persuade the person with dementia to use a location system. In addition to the concerns over monitoring, people with dementia may often reject things they are not familiar with. Even though you may have gone to a lot of trouble to introduce the location system, some people with dementia will still refuse to have anything to do with it. If this is the case, the best way of showing care for the person is to think about safety rather than having a bad conscience about concealing the location device, for example. Every year, more than 1,500 people with dementia wander in Denmark. Things often end happily and the person is found safe and sound. But unfortunately, there is approximately one death a month because of the person not being found in time.



## Challenges with the GPS system

In addition to the challenges related to the privacy of the person with dementia, there are also some practical challenges associated with GPS monitoring.

### Uses a lot of power

GPS transmitters for people with dementia often send messages with their location. This requires a lot of power and the transmitters therefore need regular charging. Most GPS units need charging once a day. If relatives and staff are not aware that the device needs charging, you may end in the unfortunate situation where the GPS battery is flat on the very day that the person with dementia wanders. Unfortunately, people with dementia wandering is a regular occurrence even though they have their GPS transmitter with them, simply because it is not charged enough.

### Precision

The GPS transmitter cannot show precisely where the person with dementia is located. The GPS signal has a level of inaccuracy of between 20 and 75 meters. If the person is somewhere among many people, or in a forest or dense vegetation, then this inaccuracy could make it difficult to find them. Fortunately, police dog patrols can often help find the person once the area has been narrowed down.

However, if the person with dementia is inside a building, the GPS cannot always help find him or her because GPS transmitters can rarely find a signal indoors.

### Adapting

Many people with dementia are uncomfortable with new things. It is therefore a good idea to think about what they are used to. If they usually wear a watch or take their keys with them then a GPS transmitter in a key ring or built into a watch might work. If not, there is a high risk of the watch or keys remaining at the home on the day that the person wanders.


Instead, you can sew the GPS transmitter into their jacket or place a location device in the sole of a shoe. However, several transmitters may be needed if the person has several pairs of shoes or jackets, so it will not which they wear. If the GPS transmitter is sewn into jackets or coats, you should be aware that it may be difficult to charge the GPS and that the transmitter may break down if it is washed together with the jacket.

### Alternatives to GPS

Other types of location device are available which may work better on a daily basis for people with dementia. For example, there are door alarms at most care homes. However, caregivers must be very attentive, because the alarm only registers the moment when the person with dementia goes out of the door. There is therefore very little time to react and help the person return before he or she gets too far away to be found.

Otiom, which is a completely new type of location system, is one alternative to traditional GPS transmitters. Otiom uses the very latest localisation technology and is the first product to be specifically designed to meet all the requirements for finding people with dementia.





Otiom's location system uses a combination of technologies to solve the challenges commonly found in ordinary GPS transmitters for people with dementia. Otiom uses a combination of GPS, Bluetooth and NB-IoT technologies. The last of these technologies is brand new and is an acronym of Narrowband – Internet of Things. The NB-IoT network sends very small amounts of data that reach their destination even in conditions where other types of signal fail.

A combination of technologies gives Otiom the following advantages:

- **Uses much less battery power**  
Otiom has enough battery power to remain on standby for three months and there is always enough power to be found. When Otiom needs charging, the users get a reminder. This gives greater assurance that the battery is charged on the day when a charged battery can mean the difference between life or death.
- **Provides very precise localisation**  
The combination of technologies provides a more precise localisation compared to systems that only use a GPS signal. Otiom's location device shows its position with very high precision and also works inside buildings.
- **Easy to use**  
Otiom's location system is managed with an app on a smart phone. The app allows you to configure zones and times so that the system can be adapted to daily routines – also when the dementia disorder places new demands on a location system.

The location device is small and it is easy to sew it into clothing or place it in a pocket. And the Otiom Tag has no buttons, so you cannot accidentally turn it off or disable it.

- **Only localises when necessary**  
With Otiom, people with dementia get the freedom to live the life they want to live. They can go for a walk, visit a neighbour or go to dance classes without anyone monitoring what they do. The location device only sends an alarm if the person deviates from his or her normal route or leaves at an unusual time. It gives people with dementia more privacy, greater autonomy and more reassurance.
- **The transmitter is hardy**  
The Otiom Tag is waterproof and can therefore also withstand being washed in a washing machine at up to 60 degrees. Otiom's location device can also withstand being dropped.

## Otiom is developed in collaboration with people with dementia and relatives

Otiom is the result of one of the largest collaborations between public institutions and private individuals in Denmark. The collaboration included the DaneAge Association, Aalborg Municipality and Aalborg University, among others.

All of those involved in the collaboration respected that people with dementia should be able to maintain their privacy. The relatives and the people with dementia who were involved in the development of Otiom said it was important for them that the person with dementia could also live as independently as possible for as long as possible.

Both relatives and people with dementia who were involved in the collaboration emphasised that the person with dementia has the right to decide things for themselves and be able to move freely – without fearing that they will wander or are being monitored. Several of the people with dementia reported that location systems remind them of a prison and are a nuisance. However, some people think that location systems help provide a sense of security – if the people using them are people you can trust.

For this reason, the optimal location system for people with dementia must be able to do two things: meet the wishes of the person with dementia for freedom – and the relatives need for reassurance. Many relatives spend a lot of energy worrying about the safety of their loved ones and whether they can find their way home.

Otiom helps both parties as the system can be configured to match the user's daily life. The location system can be configured according to both time and place, so you can get exactly the level of reassurance and freedom you want. In addition, the person with dementia — or their relatives — decide who should be notified if the location device sends an alarm. For example, this could be family members or lifelines that are nearby such as a neighbour.

**Contact Pentland Medical for more information**

[www.pentlandmedical.co.uk](http://www.pentlandmedical.co.uk)

T: 01314675764

E: [mail@pentlandmedical.co.uk](mailto:mail@pentlandmedical.co.uk)