



Nobi

Fall Detection and Prevention



"We're focused on helping people grow old in a dignified, safe, and happy manner. We believe that every elderly person deserves good, qualitative care when needed. NVIDIA's Jetson product range has enabled us to move processing to the edge, removing the need to transmit images to the cloud thereby ensuring optimal privacy."

Stijn Verrept, Co-founder and CTO

Business Challenge

Falling is the second leading cause of unintentional deaths worldwide—especially for the elderly. Almost half of elderly people are unable to get back up after a fall and, according to research, mortality rates for those who are helpless for over 72 hours are as high as 67%. This figure drops to 12% when assistance comes within an hour¹.

There are also a smaller number of support workers in care homes, meaning those who do work in the sector are overloaded and have a higher number of patients to care for. The result? An unsustainable situation, and the inability to provide a high level of care for those who need it.

Nobi developed the Nobi Lamp, a smart lamp designed to detect and prevent falls for residents in assisted living facilities, health care centers, service flats, and at home. It uses infrared sensors to continuously detect whether a resident needs assistance, alerting staff when action is required. The smart lamp supports busy caregivers in care homes and hospitals by relieving them from repetitive, time-consuming tasks, which means more time spent on human contact—a crucial part of care for the elderly.

nobi

**Smart lamp for fall detection
reduces hospitalizations and
increases standard of care**

Industry

> Healthcare

Business Challenge

- > Increase support for a challenged long-term care sector with decreasing numbers of staff
- > Create a fall detection and prevention solution using edge technology without sacrificing privacy or sending images to the cloud
- > Ensure that the edge device is powerful enough to expand with new features in future

NVIDIA Products Used

- > NVIDIA® Jetson™ TX2 NX
- > NVIDIA Jetson Nano™



The Nobi Smart Lamp in-situ on a bedroom ceiling.

NVIDIA Solution

The Nobi Lamp consists of multiple infrared sensors with an NVIDIA Jetson™ TX2 NX onboard. Images captured by the sensors are processed by the Jetson module using NVIDIA TensorRT and custom detection models to evaluate the position, posture, and pose of both people and beds in the room. By using Jetson, the Nobi Lamp runs its algorithms and processes all information locally. This means it can continuously evaluate patients for situations where assistance is required, and send an alert to staff in real time for immediate support.



The Nobita Smart Lamp in-situ on a kitchen ceiling.

Key Processing Engines Used

- > Inference pipeline using NVIDIA DeepStream designed in C++
- > NVIDIA Triton Inference Server™ for performing inference using pretrained pytorch models and ONNX files, as well as NVIDIA TensorRT™ engines in Python
- > TensorRT engines used during inference time in the DS pipeline

Software Used

- > TensorRT
- > DeepStream
- > Triton Inference Server
- > C++

Results

- > 100% success rate of detecting falls, resulting in zero hospitalizations for elderly residents
- > Support for care workers to reduce repetitive, time-consuming tasks, meaning more effective care and a more attractive industry for recruitment

Business Results

In its initial pilot, Nobi lamps were installed at WZC Gerstjens, a leading long-term care facility in Belgium, giving the center a new lease on life.

Over a six-month period using lamps installed in 20 rooms, it was able to detect 62 falls—all of which received immediate support—resulting in zero hospitalizations for elderly patients. In addition, 80% more fall incidents were detected in the rooms with lamps, than in the rooms without the lamps.

An unforeseen benefit of the pilot was detecting falls that previously went unnoticed. Residents who are able to stand up independently after a fall don't always report it, often out of embarrassment or not wanting to be a 'bother'. However, these residents don't always realize that minor, seemingly innocent, incidents can sometimes have major consequences.

With this new information, care support staff of WZC Gerstjens can offer help faster after a fall, and they have an overview of 100% of all fall incidents occurring.

The center now has two waiting lists; the first is for prospective inhabitants who want future-oriented care and peace of mind for the patient and their family; the second is for care support staff who want to work there. This is an impressive achievement for a country that's struggling to recruit and retain support staff.

By lowering the pressure on caregivers, the Nobi Lamp is helping the sector by providing better support and making a career in elderly care support attractive again.

NOBI

Belgian-based Nobi was founded in 2018 and believes that everyone deserves to grow old in a dignified, safe, and happy manner. The star of Nobi is its AI-powered smart lamp, which watches over the safety of older adults.

Nobi is a member of the NVIDIA Inception program, an accelerator for AI startups technology startups, including AI and deep learning, data science, HPC, networking, graphics, AR/VR, and gaming.

<https://nobi.life>

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1. Gurley, R.J., Lum, N., Sande, M., Lo, B. and Katz, M.H. (1996). Persons Found in Their Homes Helpless or Dead. New England Journal of Medicine, 334(26), pp.1710-1716. doi:10.1056/nejm199606273342606.

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