(intel)

Smart support for vulnerable adults from Cascade3d

Intel® Atom™ Processor, Intel® IoT Gateway
Internet of Things (IoT)

Investment in Internet of Things (IoT) deployments for healthcare is predicted to reach $117 billion by 2020[1]. Together with Intel, Cascade3d is helping to make the IoT a revolutionary reality in healthcare right now. It builds and deploys smart home solutions that help care professionals to work smarter with data-driven, targeted support, thanks to the Intel® IoT Gateway. As the IoT expands, Cascade3d's Connected Care* platform is going beyond safe-at-home connectivity, delivering smart devices that help and inform both care work and clinical decisions.

Challenges

- **Smart healthcare.** Cascade3d wanted to integrate its analytics into an IoT platform so that data from sensors could be gathered, filtered, and analyzed to transform and optimize professional healthcare.

- **Education.** IoT solutions are seen to be quite complex and can be daunting for less technical people, so adoption in the healthcare industry requires education as well as low barriers to use.

- **Data privacy.** Especially when dealing with vulnerable individuals, the security of all data collected is paramount, as is sensitively dealing with this data.

Solutions

- **Bespoke IoT solutions.** Cascade3d deploys Intel IoT Gateways to securely connect different configurations of smart sensors, depending on client needs, and ensure a safe, uninterrupted data flow between them.

- **Significant capacity.** Intel® Atom™ processors in the gateway devices provide the computing power and throughput needed to gather all incoming data, normalize it, and send it to the cloud.

- **Top security.** The Intel IoT Gateway has built-in enterprise-grade security to keep sensitive data as safe as possible.

Impact

- **Higher standards.** In collaboration with Intel and Wind River, Cascade3d gives care organizations the opportunity to work more efficiently and support vulnerable people to live at home in a monitored environment.

- **Data-driven care.** With bespoke home monitoring, the IoT can help carers to work smart, going where they are needed most at the right time to ameliorate resource shortages and give the best care they can.

- **Constant connection.** Patient data from the gateway devices is stored in the cloud for easy review and analysis in real-time through a simple Cascade3d* dashboard application available on a PC or mobile device.

With the IoT, Cascade3d revolutionizes long-term care

"Real care can only be provided by people. The IoT and actionable analytics can help care professionals to use their time in the best possible way to give the best possible care."

**Gerry Hodgson,
Chief Executive Officer, Cascade3d**

"We want to be at the forefront of making the IoT a reality in the healthcare industry. My job is to gather as much useful data as possible and we aligned ourselves with Intel to deliver reliable, data-driven solutions."

**Krishna Iyengar,
Senior Embedded Software
Engineer, Cascade3d**

Data analytics for healthcare

Cascade3d has provided big data analytics solutions since 2002, specializing in deriving business insight from diverse datasets, such as behavioral analytics, particularly in the fitness and lifestyle industries. "We have already demonstrated competency in the Big Data environment," said Gerry Hodgson, chief executive officer for Cascade3d. "Being able to work with Intel's industry-leading IoT Ignition Lab puts us in a strong position to help care professionals experience the benefits that the IoT can bring to healthcare."

Healthcare is a traditional industry, but care organizations and consumers are starting to understand that the IoT can help transform delivery mechanisms. With the right technology, it is possible to track a decline in a person's health that might have gone unnoticed and react accordingly; for example, fridge and kitchen appliances being used less frequently or at unexpected times might indicate illness, disorientation, or a decline in wellbeing.

Thanks to the Intel IoT Gateway, Cascade3d has created a smart home management solution powered by Intel Atom processors; Cascade3d Connected Care*. This includes easy-to-install sensor fittings and an easily tailored insight platform that can track patient data and help healthcare professionals to provide proactive care. Cascade3d's analytics platform can integrate existing data with information from other sources, such as wearables or GPS tracking, to create as complete a picture as possible of the individual being cared for. "It's about reassurance," said Hodgson. "This system means that someone is going to be there for you when you need them, whether at home or out and about."

As more sensors become available, Cascade3d's offering is enriched. It has integrated smart home sensors that can monitor appliance use, humidity, smoke, and leaks to help make the environment safer, and is continuing to expand.

Rejuvenating quality of life

One gentleman, who had a motorbike accident in 1989 leaving him with brain damage and limited mobility, has been given back some independence thanks to Cascade3d Connected Care. "He was so relieved when he was put into his own flat that his whole demeanor changed," said Trina Hardiman RGN, brain injury case manager at rehabilitation specialist, HeadFirst. "There's no way we could have supported him going into his own home without this system. It has massively improved his quality of life."

Last summer he was hospitalized as his health had seriously deteriorated. While relatively mobile and able to speak despite dysarthria, his reasoning and memory is so poor that he has little understanding of his needs. Therefore, a team of care professionals from HeadFirst was given the responsibility of making decisions in his best interests. Autonomy is particularly vital to this individual's wellbeing, but his memory is such that living independently was not considered viable.

However, HeadFirst was not happy with his quality of life in residential care. Although he is now wheelchair-dependent, he is only in his 50s and capable of living more independently. He was deemed resourceful enough to manage on his own with regular support, but he wouldn't wear a pendant or tilt alarm and sits still for hours at a time so needed more than straightforward movement sensors to

monitor his well-being. The key was to track his movement and keep him safe in the least restrictive way possible so he's supported with no invasion of privacy.

HeadFirst turned to IoT technology to give him more independence, asking Cascade3d to equip his home with 32 sensors to track his movements and give his care team useful information to support him as he needs. Suddenly working with graphs and charts can be a scary prospect, so HeadFirst needed a system that was easy to understand and use. Not only is Cascasde3d intuitive and clear, the alternative would be live-in care, which would be a big drain on resources and not satisfactory for this patient. The platform also enables support staff to be on call, which is more cost effective and the support staff are happy as they too get more freedom thanks to remote monitoring.

Carers are available every day from 9.30am, but also monitor him remotely overnight and can visit if he needs it, checking the system updates hourly to review his movements and well-being. For example, if they suspect he has had a fall, due to no pressure sensor activation and lack of movement, they can go and check. Furthermore, the sensors in his furniture and wheelchair have driven a clinical decision that the team wouldn't otherwise be sure of: Data showed that he was spending more time in his wheelchair, so needed a more appropriate wheelchair.

"This is such a complex case and Cascade3d Connected Care has enabled us to offer him support that suits his preferences and needs, opening up a far greater level of freedom than we could have given him otherwise," said Hardiman. "For the people this could make a difference to, it will make a massive difference. I'd love to see this platform more widely available."

Hodgson added; "This technology will drive efficiencies, which is valuable for a healthcare organization as demands on resources are so high. We can gather data to provide an ever more accurate picture of an individual's movements. The value of having this information lies in being able to streamline processes and provide targeted care based on individual needs, which in turn improves cost allocation and optimization. It's not just about well-being, but clinical decisions. With Intel's support, it is easy for us to help non-technology companies benefit from the IoT."

Making care work smart

Cascade3d takes advantage of the latest Intel IoT Gateways as they become available because they provide pre-integrated, pre-validated hardware and software building blocks that connect both new and legacy systems and enable seamless and secure data flow between edge devices and the cloud. "The ease of scalability with Intel® architecture is critical, because if a new IoT device comes out tomorrow, we want to be able to use it quickly and grow," said Hodgson.

Krishna Iyengar, senior embedded software engineer at Cascade3d, commented; "This platform gives great insight into someone's daily routine and flags deviations which help evolve a carer's plan. Care professionals can see what is happening to behavior trend profiles and not rely solely on human observation. Intel was a very flexible, cost-efficient, and powerful option for us, but it was most important to develop a flexible solution that fits all needs. Everyone is different, so being able to offer different sensor configurations is key."

Cascade3d's dashboard application enables care workers to access and react to sensor data appropriately, and in near real-time. "Through the app for both iOS* and Android*, users can view their patient information on a single dashboard," said Iyengar. "Our alerts can also be automatically sent to call centers so, while family can be the first point of call, alerts can be sent to a care team or another 24/7 support if needs be."

Lessons Learned

With analytics from Cascade3d, professional care agencies can scale, improve revenue generation, and streamline operations. For example, Cascade3d technology gives such organizations the opportunity to offer new services such as outbound calls for medication or eating and drinking reminders, reducing isolation or loneliness through targeted companionship services.

Cascade3d has big ambitions for using the IoT to transform quality of life for vulnerable adults of all ages, with significant projects already underway. "We've extended our vision from helping the elderly to supporting the wider community of vulnerable people. This platform can have a huge impact, supporting people for most of their lives, which is a real revelation and rather humbling," said Hodgson.

Cascade3d Connected Care Dashboard: carers can easily access and learn from patient data anywhere

Secure IoT connections

Intel IoT Gateways integrate technologies and protocols for networking, embedded control, and enterprise-grade security, making them invaluable for Cascade3d's solution. When gathering and processing so much data, privacy is paramount. Intel's built-in security helps Cascade3d to offer peace of mind. Data privacy and security are critical components for Cascade3d, currently supporting AES-128 encryption from the sensors through to domain authentication and field level privacy in the cloud.

Intel® technology also enables easy connectivity of legacy devices and other systems to the IoT. "Connectivity, manageability, and security are the three most important elements of our system," said Iyengar. "We aligned our platform with Intel Atom processors as they reliably deliver on these requirements. We have to be sure that the response time of all our sensors is very high so data is as real-time as possible.

"Working with a large and trusted supplier of scalable services and solutions like Intel has helped us to demonstrate to a relatively wary customer base that the IoT offers incredible insights and business opportunities that would not otherwise be possible."

Going global

The global IoT in healthcare market was valued at $24,666.7 million in 2014, and is expected to grow with a compound annual growth rate of 37.6 percent through to 2020[2]. "Working with Intel was an important strategic decision for us as part of our long-term plan to scale up internationally," said Hodgson. "We wanted to offer an incredibly robust and proven platform based on an architecture that could be rolled out globally. Intel delivers that. Being catapulted onto the global stage has been incredible."

Next steps

"We are very excited to bring the IoT to healthcare organizations, as the possibilities are endless and the value of integrating behavior insights into the care pathways will prove profound," said Hodgson. "Our next steps are to continue to expand our analytics capabilities, providing greater understanding of changes in behavior as people with long term conditions grow older living at home. With the ever expanding range of wearables and sensors, we will be able to generate a more complete picture for family, carers, and clinicians to provide higher quality, personalized care."

Find the solution that's right for your organization. View **success stories from your peers** and check out the **IT Center**, Intel's resource for the IT Industry.