IoT solution lights up e-candle mobile app

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It's a traditional sight in Roman Catholic institutions: a table or altar lined with rows of candles. Parishioners or the public will light votive candles as a symbol of a prayer intention – and donations for "votive offerings" are customary.

Yet, while the candle lighting itself remains an established practice, there has been a slow progression these past several decades to replace the wax or paraffin candles with electric or battery-powered candles, complete with a flickering flame. In recent times, many parishes have incorporated a thin, metal wand used to switch the candle "on" to mimic the lighting of the flame.

For some churches, the change has been driven by fire safety reasons or cost-saving measures. Still, others want a "green" alternative – to reduce harmful carbon dioxide emitted from the candles.

For more than 40 years, Niagara-based Vendalite Enterprises has manufactured and distributed electronic candles to Catholic churches, shrines, mausoleums, hospitals and school chapels throughout North America.

"Our market is a very complex entity, steeped in 2,000 years of tradition," says Vendalite president Derek Insley.

Over the years, the company has continued to upgrade their electronic-candle technology, and they've brought their latest innovative idea for redeveloping its system to the research team at Niagara College's Walker Advanced Manufacturing Innovation Centre (WAMIC) to help with the Internet of Things (IoT) development of a smartphone application.

The app, called "Gabriel," will allow an individual to make a donation and light a votive candle remotely anywhere in the world using their smartphone.

"We contend there exists a burning need to light votive candles for an individual's intentions. Gabriel is fantastic for someone who cannot get to a church or mausoleum because of the weather, an illness – or pandemic – to light a weekly votive candle to remember a loved one," explains Insley.

> ***"The team at the College has adapted to our introduction of new ideas to enhance the presentation of our product immeasurably. This shows how a small dedicated team supports the innovation of the product to our marketing program."***
> **~ Derek Insley, Vendalite president**

Research assistants in the Computer Programming & Analysis program and the Electronics Engineering Technology program are working alongside engineers at Research & Innovation's WAMIC labs to design the system architecture, engineer connectivity solutions and develop the defined software packages.

Similar to lighting the candle in person, an individual will be able to choose the number of candles and the location that will interface with Vendalite's existing master system. The candle will remain lit for five days and a reminder will be sent to re-light their candle if one chooses. A further innovation, adds Insley, will see a drop-down page to provide a list of available locations with Vendalite's electronic candle systems.

"We are entrepreneurs who rely on the expertise of others to engineer our ideas into completed products," says Insley. "We do the work of marketing the products in a very complex marketplace during a debilitating time in our history. We finance everything ourselves, so the assistance of the College is greatly appreciated."

He says the new e-candle system will also be used to complement crowdfunded efforts for various fundraising events for things such as natural disasters or an international crisis.

"For crowdfunding, a candle can be symbolic of helping others, as the current pandemic exemplifies. Gabriel could also be applied to fundraising for charities, such as the Heart and Stroke Foundation, local or global catastrophes and special needs."

Insley points out that mobile app-based technology to connect more people worldwide is nothing new for the Catholic church. The Vatican got on board the technology train in 2016 in releasing its smartphone app "The Catholic App," an interactive GPS-powered application

allowing the user to find the nearest church offering confessions. And in 2019, the Pope's Worldwide Prayer Network launched "Click To Pray eRosary."

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"The Niagara College team has displayed a varied knowledge related to the myriad of regulations pertaining to privacy laws," adds Insley. "There are substantive requirements for the Google and Apple stores that the team is constantly trying to satisfy."

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For WAMIC research assistant Elzo Honorato – a student in the Computer Programming and Analysis (Co-op) program – a certain challenge presented itself at the beginning of the project. While he had already learned about web development, database designing and mobile application development, either in class or on his own, the essential IoT was completely new to him.

IoT is a description for connecting any device or gadget to the internet, such as smartphones, self-driving cars, smart speakers, or smart house devices used to control lights and heating systems, for example.

"I had to learn how IoT works and how to program a device like that. Learning a totally new subject, new programming languages and concepts – which are different from developing a web application – were the challenges for me," explains Honorato.

But he did learn the new technology and is appreciative for the opportunity: "As a research assistant, this project is the best experience I could have gotten during my co-op. I have expanded my programming skills and interests, which indeed will assist me in my career."

This project received funding through the Southern Ontario Network for Advanced Manufacturing Innovation (SONAMI), a Niagara College-led consortium of seven academic institutions and backed by the Federal Economic Development Agency for Southern Ontario (FedDev).

For more information about the applied research and technical services offered at R&I's Walker Advanced Manufacturing Innovation Centre, visit the website.

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