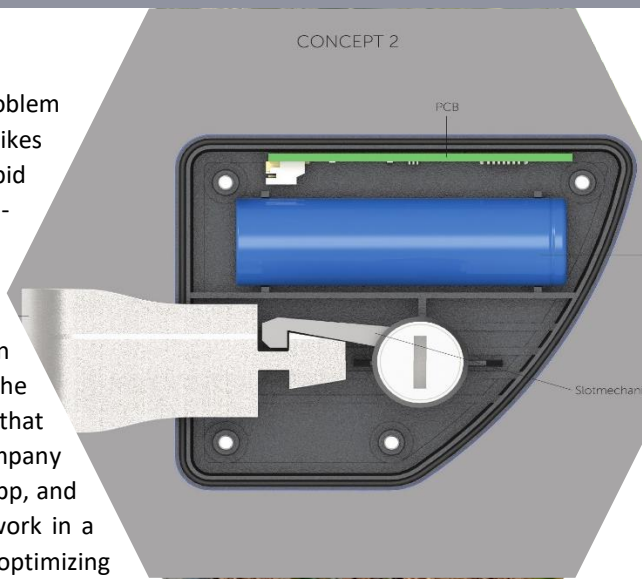
Applying the Brakes to Bicycle Theft with Asset Tracking and the IoT

Challenge & Solutions



Domotica Control, a home automation startup, wanted to do something about the problem of bicycle theft in the Netherlands, where about 120,000 of the nation's 22 million bikes are reported stolen annually. They saw an engineering opportunity created by the rapid advent of wearable devices, a market trend that has driven development of new-generation chipsets with onboard sensors, highly integrated location and communication functions and very low power consumption. The Domotica Control team realized that this technology could be leveraged to produce Internet of Things devices capable of determining position both outdoors and indoors with triangulation of radio signals and inertial sensors rather than power-hungry GPS. In addition to the superior energy efficiency compared to GPS, the project aimed at a lower cost device that took up less space on the printed circuit board and required fewer antennas. The company also developed a proprietary algorithm for location, as well as a dedicated mobile app, and set out to prove experimentally that the position-determination methods could work in a complementary way, or independently, should one fail. Secondary goals included optimizing communication range and reliability, and reducing power consumption to achieve three-year battery life. This major learning experience has set the stage for a new product with invisible mounting, improved algorithms and a smartphone app that will allow users to activate the tracking device, receive an alarm notification if their bike is moved and locate stolen or misplaced bikes. It will also allow mileage tracking. A prototype of the system, called BikeLinQ, incorporated an Intel Curie wearable chipset and a LoRa™ communications chip from Semtech, and included a battery and secure mechanism for attaching to a bike frame.

EuroCPS Support

Multiple disciplines were brought together in a targeted way under the EuroCPS umbrella, with the Dutch technology-sector organization HighTech NL providing coordination and access to industrial and academic partners.

Digital Skills

Domotica Control: overall project vision and integration, algorithm and app development.
Intel: proactive development assistance and feedback on experimental findings.
Semtech: LoRaTM platform and chip-based implementation.
Luleå Technological University : consulting assistance on underlying technologies, including the support on the use of inertial sensors and the analysis of acquired data.

Company

Domotica Control is a home-automation company focused on the development of systems to increase the comfort of its customers in and around the house (NL) https://domoticacontrol.nl

5 employees

Partners:
Intel, Semtech, Lulea TU

Since 2014

Impact / What's next

The company has tested the positioning algorithm, including benchmarking against GPS-based tracking, and has developed new filtering techniques to improve accuracy. The system will be tested on bicycles in Leiden and Amsterdam in 2018. The production version of BikeLinQ, and an associated set of services, are targeted for introduction in the fourth quarter of 2018, after refinement of mechanical design, algorithms and associated software. Domotica Control's goal of selling 5,000 units in 2019 is based on interest from a number of potential customer groups, including bicycle manufacturers and municipalities that want to measure bicycle traffic flows. Revenues are projected to exceed €300,000 in 2019 and the company expects to add one or two employees in sales. With proven success in the Netherlands, the company will gradually introduce applications in other European countries. It also sees opportunities for applying the basic technology to other types of mobile assets and equipment.

EuroCPS Cyber-Physical Systems

EuroCPS is an European funded project gathering several design centers in order to boost and initiate synergies between innovative companies, major CPS-platforms and CPS-competency providers.