SMART PARKING AND ACCESS CONTROL SYSTEM
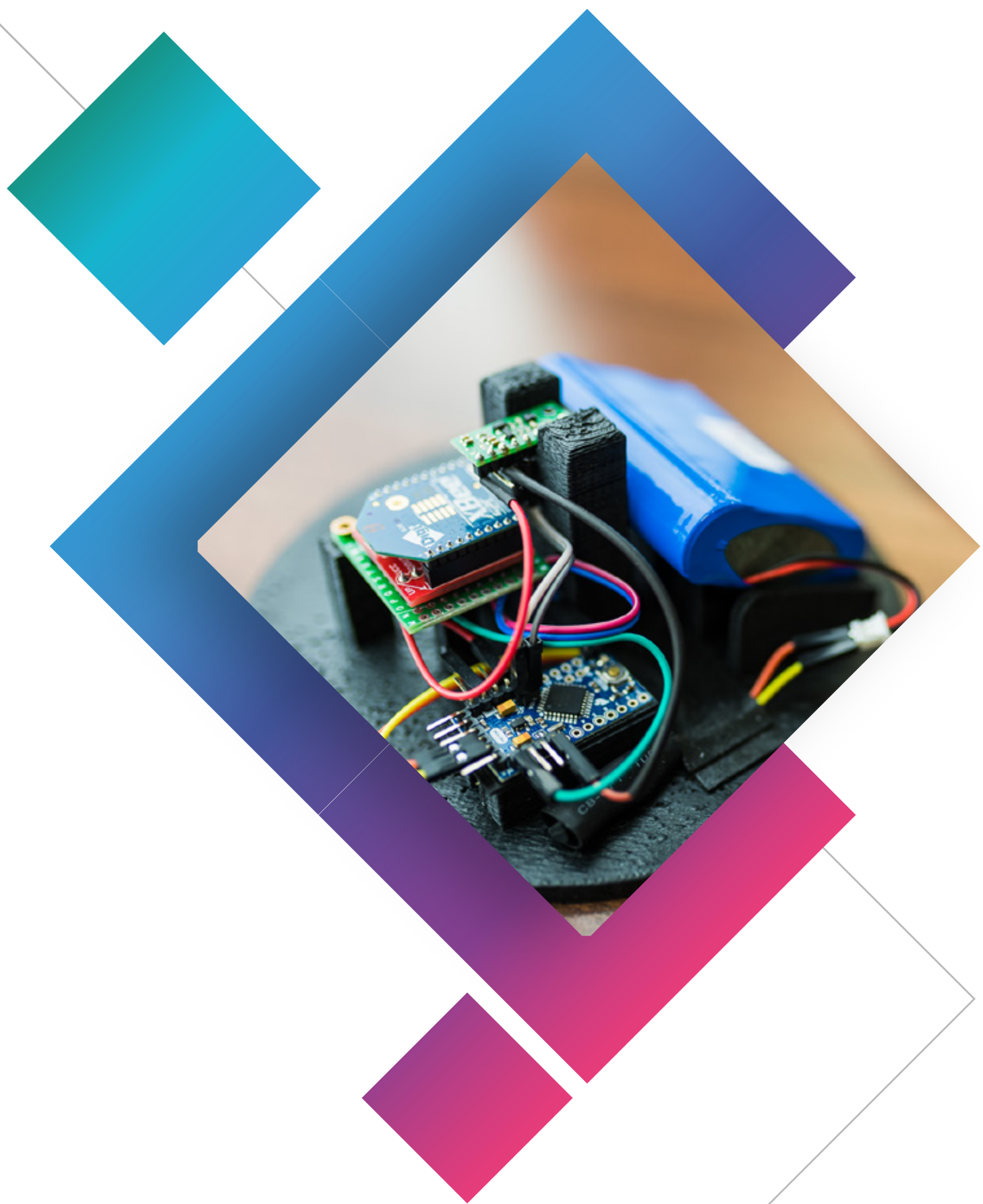
Creating a Real-Time Parking Space Availability Detection and Control Access

Mastery in Software Engineering

FORTECH.
a GlobalLogic company

Key Facts

🏭 Industry: Internet of Things

👥 Team Size: 6 People

📅 Duration: 1 Year

</> Technologies:

- Embedded C++, for entire embedded platforms line (Arduino Pro Mini and BBB Industrial 4G)
- Java REST Webservices,
- Web Application (AngularJS)
- Mobile application (Android)

📊 Trends: Smart Parking

Highlights

- Intelligent parking system for real-time detection of available parking slots.

- The terminals rely on an Arduino Pro Mini board, a geomagnetic sensor, a ZigBee wireless module and a 3.7 Volt accumulator.

- The solution was created from scratch by an R&D team at Fortech.

PROTOTYPE

This is a prototype for an intelligent parking system for detecting free parking spaces based on a sensor network, developed internally at Fortech.

Our goal was to make each parking space "aware" of its state - occupied or not - and relay that information to a central server. We put together an enthusiastic Agile development team and started working.

The system was built using an Arduino Uno board, a geomagnetic sensor for detecting the presence of a vehicle, a ZigBee radio module for communications and a 9 Volt battery to power it all.

Basically, each parking space receives a wireless battery operator sensor, which captures data and provides car drivers with real-time information about parking availability. The parking spaces create a wireless sensor network and publish their status through a web server by using a controller. The information is displayed on a web or mobile application. The connectivity relies on low-power, auto-configurable wireless mesh networks.

IMPLEMENTATION

The biggest challenge was to tune the car-detection algorithm running on the end device. We needed to make sure that the geomagnetic sensor detects all vehicle shapes, sizes and compositions (whether metal or plastic, big or small and so on), and is immune regarding other vehicles' presence in its vicinity.

Version two is in work. It addresses low-energy and long-lifetime criteria. We will move from the Arduino Uno board to another one, having just the microcontroller and switching everything to low-voltage. We are also considering a higher capacity battery and deep-sleep modes for all the components.

We want to take this one step further and build use cases on top of this platform, such as: reserving a parking space in advance or putting a beacon inside of the car to identify the user and handle automatic payments.

For iteration three, in work now, we are working on the following features:

- Admin platform for parking lot setup

- Stats – graphs on parking occupancy, history of usage

- Reserved parking spots assigned to users

- The spots become available during the owner's vacation (integrate with the planning in Jira)

- Barrier access control integration for the reserved spots using one of the solutions:
  - BLE Beacons and gateways (positioned as to triangulate the car's position – in front or behind the barrier)
  - RFID tags and readers in front and behind the barrier
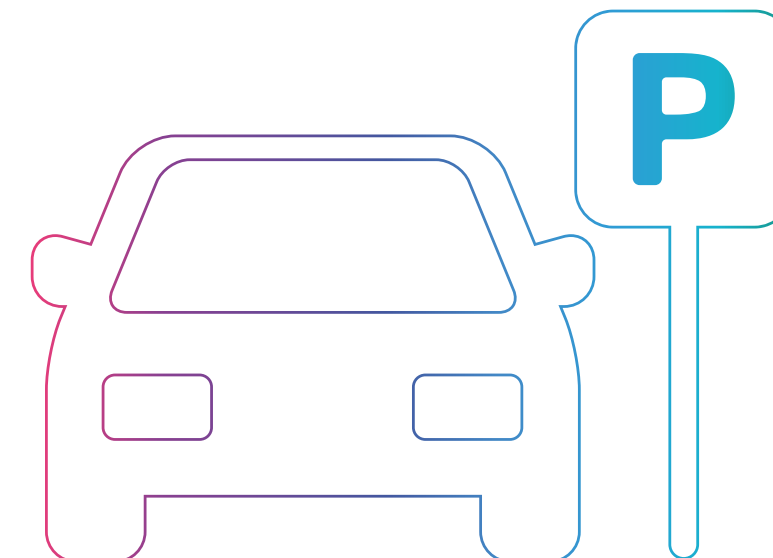
ABOUT FORTECH

Fortech is a top Romanian software development company headquartered in Cluj-Napoca. With a workforce of 1150+ people, Fortech has been repeatedly recognized by Deloitte, IAOP®, EY, and Forbes for its fast-growing, entrepreneurial journey.

With expertise and a strategic focus across healthcare, financial services, automotive sectors, and more, we cover the end-to-end software life-cycle development to deliver the innovation, scalability, quality and speed our clients need.

Our approach to software engineering combines strong technology and process know-how, Agile delivery methods, and a blend of code quality practices and metrics refined in almost two decades. Since 2003, over two hundred fifty clients chose Fortech as their tech partner.

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