

**AVAILABLE
THESIS
2020/21
CONCEPT REPLY**



THESIS DESCRIPTION

“TITLE OF THE THESIS”

Description of the operational scenery of the Thesis

What is the Thesis?

Business scenery of the Thesis

What is the Thesis for?

Technologies: list of the technologies the candidate will work with

[Start Availability Date - End AvailabilityDate]: [kk-kk-kkkk - kk-kk-kkkk]

Temporal window of availability of the Thesis for potential candidates



THESIS DESCRIPTION

“Assisted Driving with Alexa in a Smart City”

Digital technologies are introducing profound changes to the vehicle experience. One of the central forces driving this transformation is connectivity, as vehicles becomes increasingly integrated with the connected environment in which we live.

Business scenery of the Thesis

In a R&D project, use of a Cluster control unit interfacing with Alexa as a "driving assistant". The Cluster control unit can:

- Send information to the driver about road conditions / information, through a collection of data from external road sensors, communicating with the vehicle;
- Allow interaction between Alexa and the driver in order to
 - receive driving tips (slow down, change route)
 - send commands useful for changing the graphic settings of the cluster or the graphics themselves, such as the navigation map or graphics on the useful information of the data received from the outside;

Technologies: QT for MCU, Alexa framework and services, CAN-bus

[Start Availability Date - End AvailabilityDate]: [20-10-2020 - 30-06-2021]

Temporal window of availability of the Thesis for potential candidates



THESIS DESCRIPTION

“Smart Rally with Alexa”

Digital technologies are introducing profound changes to the vehicle experience. One of the central forces driving this transformation is connectivity, as vehicles becomes increasingly integrated with the connected environment in which we live.

Business scenery of the Thesis

Use of a Cluster control unit interfacing with Alexa, exploiting telemetry services. The purpose is to:

- reconstruct the track followed by the vehicle, creating Video Graphics and highlighting information on speed, best trip, worst trip and more elaborate graphics based on the driver's needs;
- take advantage of telemetry data such as speed, steering, acceleration and brake to ask Alexa for a training summary, such as:
 - information on how the driving style of the last test session has changed compared to the average
 - or if significant progress has been made
 - if the driving style has improved and if the wear rates of certain parts of the vehicle have been reduced

Technologies: QT for MCU, Alexa framework and services, CAN-bus

[Start Availability Date - End AvailabilityDate]: [20-10-2020 - 30-06-2021]

Temporal window of availability of the Thesis for potential candidates



THESIS DESCRIPTION

“Digital Twins for the Cultural Heritage”

The Digital Twin (DT) paradigm, together with IoT-enabled devices, can help site managers in both the preservation and the valorisation of the cultural heritage, providing analysis and simulations of data captured by onsite sensors, risk models of threats to the site integrity and corresponding preventive solution predicted in the DT environment.

Business scenery of the Thesis

In a R&D project, configuration of a proper Digital Twin framework to acquire data from IoT devices (e.g., sensors used for monitor air quality or other environmental parameters linked to the risks faced by the cultural heritage sites. Proof-of-concept of a possible data flow and application

Technologies: open source (EdgeX, Node-Red, Ditto) frameworks for Digital Twin programming, microservices, MQTT

[Start Availability Date - End AvailabilityDate]: [20-10-2020 - 31-12-2021]

Temporal window of availability of the Thesis for potential candidates



THESIS DESCRIPTION

“Ai-powered software testing for electronic devices”

To build reliable products embedding high-quality, resilient software, test strategies can be improved by test automation tools helping to reduce developers and testers efforts. Based on a case study, focusing on embedded SW development, the thesis will develop and validate an approach for ensuring proper test coverage and allow quicker error identification.

Business scenery of the Thesis

A European R&D project, aiming to improve software testing of equipments/infrastructures (e.g. Telco, automotive, infrastructures), leveraging on formal APIs specifications, deep analysis of logs, performance data, bug tickets and patched code with advanced correlation algorithms.

Technologies: SW development/testing toolchains, AI

[Start Availability Date - End AvailabilityDate]: [20-11-2020 - 31-12-2021]

Temporal window of availability of the Thesis for potential candidates



THESIS DESCRIPTION:

“DLTs TO TRACK PROVENANCE IN CIRCULAR ECONOMY”

Contribution to design and development of an application using Distributed Ledger Technologies (blockchain-like technologies) applied to a Use Case scenario of circular economy, where such technology can improve trust and track provenance and supply/transformation chain steps. PoC development in a remarkable consortium of italian partners.

The thesis requires to explore and evaluate the application of DLTs to a case study scenario related to circular economy, where such technology can improve trust. Data to be certified can be produced by IoT devices (potentially a large number, demanding high capacity requirements). The thesis is about the evaluation, in such scenario, of IOTA technology, a “blockless” architecture (using the directed acyclic graph instead of the blockchain), feeless and more scalable than conventional blockchains.

Technologies: SW development, IOTA, IoT

[Start Availability Date - End AvailabilityDate]: [5-02-2021 - 30-09-2021]



THESIS DESCRIPTION:

“APPLICATIONS OF FOG COMPUTING TECHNIQUES TO SMART CITIES CONTEXTS”

Contribution to design and development of a constellation of sensors and Edge Devices capable of collecting, processing and transmitting data from the field of operation to the SOA framework in a Smart City context.

PoC development in a remarkable consortium of international partners.

Smart cities are becoming a reality thanks to recent advances in technology. In the future, our cities will depend remarkably on 5G connectivity and artificial intelligence, but we have to solve the issue of High deployment costs due to “silos” from legacy systems and/or proprietary deployments with reduced or no interoperability.

The thesis requires to contribute to the architecture definition and to the development of microservices associated to the provisioning of a system with advanced interoperability features.

Technologies: microservices, K3S, EdgeX, MQTT

[Start Availability Date - End AvailabilityDate]: [01-08-2020 - 31-12-2021]



THESIS DESCRIPTION

“SECURITY, TRUST AND PRIVACY IN AN EDGE COMPUTING ENVIRONMENT”

Scouting of the state of the art of the topic, with a focus on the EdgeX Framework. Contribution to the architecture definition and to the development/configuration of security layer using microservices on the edge, specific protocols and algorithms for communication sensors-gateway, microservice, gateway and cloud services.

Business scenery

Internet of Things (IoT) market forecasts show that IoT is already making an impact on the global Economy, but security is still a major concern in IoT-enabled nodes networks.

In a R&D project, the edge computing platform have to acquire sensible data from IoT devices (e.g., human presence and voice, air quality or other environmental parameters of a public/private building).

Technologies

Sensors, EdgeX framework, Docker containerization, message brokers, web services

[Start Availability Date - End AvailabilityDate]: [01-10-2020 – 28-02-2021]



THESIS DESCRIPTION

“VIBRATIONAL ANALYSIS USING MULTISENSOR DEVICES”

Scouting of the state of the art of the topic. Contribution to the algorithm design and development of a software to analyze data from an industrial sensor detecting acceleration, angular velocity, magnetic fields, as well as environmental conditions (eg. temperature, humidity, light, air pressure, and noise).

Business scenery

Condition monitoring and predictive diagnostic for industrial machinery is of considerable interest to prevent unexpected interruption of the operations. An edge computing platform have to acquire data from the sensor, and process them in order to provide information useful for the scope.

Technologies

Industrial multisensors, EdgeX framework, Docker containerization, message brokers

[Start Availability Date - End AvailabilityDate]: [01-10-2020 – 28-02-2021]



THESIS DESCRIPTION:

“PERSONALISED CONTEXT-AWARE TOUR GUIDE COMPOSITION”

Contribution to design and development of a modular web/mobile application to offer smart and enhanced services to tourists.

PoC development in a remarkable consortium of Italian partners.

To improve cultural tourism, tourists should be offered proper information based on his preferences, location, available time, prior visits. The thesis requires to contribute to the definition and development of a modular web/mobile application offering smart services for tourists, based of the information provided by an external recommendation engine and enhanced contents (streaming/VR/AR) provided by a fog back-end architecture.

Technologies: web/cross development frameworks and libraries (e.g. Ionic). Knowledge of VR/AR/geolocation/UX /web analytics concepts is appreciated.

[Start Availability Date - End AvailabilityDate]: [05-10-2020 - 31-08-2021]



THESIS DESCRIPTION:

“Privacy-preserving personalized services”

GDPR compliance requires careful decisions on how to handle Personal Data from both the technical and organizational point of view. Based on the provided case study, the thesis requires to identify proper measures.

[PoC related to a project by a remarkable consortium of Italian partners]

A modern IoT-enabled digital platform will offer tourists proper, personalized contents and information and recommendations based on preferences, location, available time, prior visits. The thesis requires to assess alternative options and define proper measures (e.g. data encryption both in transit and at rest, methods for pseudonymization of real user data) while considering risk and practical viability e.g. in terms of application and business requirements, scalability.

Technologies: Knowledge of software architectures and security concepts, interest in data protection (possibly also in the related legal and management aspects)

[Start Availability Date - End AvailabilityDate]: [20-11-2020 - 08-08-2021]



THESIS DESCRIPTION:

“INTEGRATED COLLABORATIVE SYSTEMS FOR SMART FACTORY”

Contribution to design and development of software tool for analysing and real-time monitoring of cooperative logistic processes. PoC development focused on the HMI application in a remarkable consortium of italian partners

The thesis requires to explore, evaluate existing technologies and develop a software tool for advanced HMIs for wearable devices to allow an efficient interaction with AGVs for logistics and manufacturing environment.

Technologies: SW development, integration

[Start Availability Date - End AvailabilityDate]: [10-10-2020 - 31-12-2021]



THESIS DESCRIPTION:

“SALS - Gestione della sicurezza alimentare lungo la supply chain: strumenti avanzati”

Contribution to design and development of sensing platform and software tool for analysing and real-time monitoring of food processing process. PoC development focused on the data acquisition from the IoT devices for the food chain quality monitoring and real time data visualization.

The thesis requires to explore, evaluate existing technologies and develop a software tool for advanced monitoring of the security and quality of the food supply chain.

Technologies: SW development, integration

[Start Availability Date - End AvailabilityDate]: [30-10-2020 - 30-05-2022]



THESIS DESCRIPTION

CLAY TARGET SHOOTING DATA ANALYSIS

Big Data Analytics is a hot research area under big data. It is a strategy to analyze large volumes of data collected from a number of resources. The main aim of data analytics is to identify different data patterns from large datasets. Data analytics helps in getting useful insights for the business and will help in making better business decisions.

Big data analytics help companies to achieve financial efficiency.

It speeds up the decision-making process.

Provides new business opportunities to the companies.

Data can be visualized in a better way using charts, graphs, and slide decks.

The thesis is about the Big Data Analytics on data collected from the clay target shooting application we have developed. The aim of this thesis will be to provide data analytics in order to organize big data using graphs to provide information on the user experience.



THESIS DESCRIPTION

CLAY TARGET SHOOTING WEARABLE APPLICATION

Wearable devices like smart band and smart watch are able to collect biometric and environment data.

Aim of the thesis will be to study, analyze and develop a solution to integrate data from wearables into our clay target shooting platform in order to correlate data from the field with environment and biometric data.



THESIS DESCRIPTION

“Indoor precise localization with RTLS systems”

Automated positioning technologies have become pervasive nowadays, especially in outdoor environments thanks to the use of GPS.

The new frontier is now indoor Real Time Location System, where the research is leading to different and increasingly precise solutions (<10 cm), leveraging on new wireless technologies.

Business scenery of the Thesis

By contributing to a leading real-time localization system already available on the market, you will be involved in the development of RTLS features on an innovative product, ensuring people safety and improving work processes. You will be part of REPLY's development team and work on custom hardware and back-end cloud systems.

Technologies: Microsoft Azure, Node.js, React, Python, C

[Start Availability Date - End Availability Date]: [01-02-2021 - 31-07-2021]

Temporal window of availability of the Thesis for potential candidates



WE'LL TOTALLY LIKE YOU IF:

- You're a fast learner, with interest in new digital technologies
- You have skills in programming
- You have knowledge of AI methodology and concepts
- We appreciate proficiency in English and interest in design of software architectures

