WINS@HI

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Wearable IoT Network Solution for Work Safety in Hazardous Industrial Environments

The WINS@HI project proposes to advance an ad-hoc, agile and reliable communication solution for both condition monitoring of the operations and safety of the workers in hazardous 'Industry 4.0' work environments in order to prevent operation failures and work accidents.

Main focus

The proposed solution will focus on tunnel/underground transportation construction sites as the primary application fields of these work environments are excellent examples of hostile 'Industry 4.0' production sites where radio communication is very challenging.

Different kinds of IoT sensors will be exploited, such as wearable devices, and environmental sensors, deployed to obtain data like vital parameters of work safety and environmental sensors which could extract the maximum amount of information from the hazardous production sites.

The goal is to achieve a better understanding of the behavior of risk factors concerning the workers' H&S on hazardous environments, by achieving a higher granularity of data, and alert on high risk probability. By aggregating and analyzing the sensors data, the project aims to mitigate some problems which are in common to these work environments, like respiratory diseases due to the pollution and increased air humidity, a raised stress level caused by the noisy environment, physical work activities that may lead to skeletal or neuromuscular affections.

Approach

To reach its objectives, the project will develop a unified sensor platform which can provide valuable information, based on which WINS@HI expects to improve work safety in industrial environments.

The project will approach the following tasks:

♦ assess the risks, health issues, specific to the work environment;

♦ analyze various technologies in order to advance a reliable network communication system;

♦ test the environmental sensors;
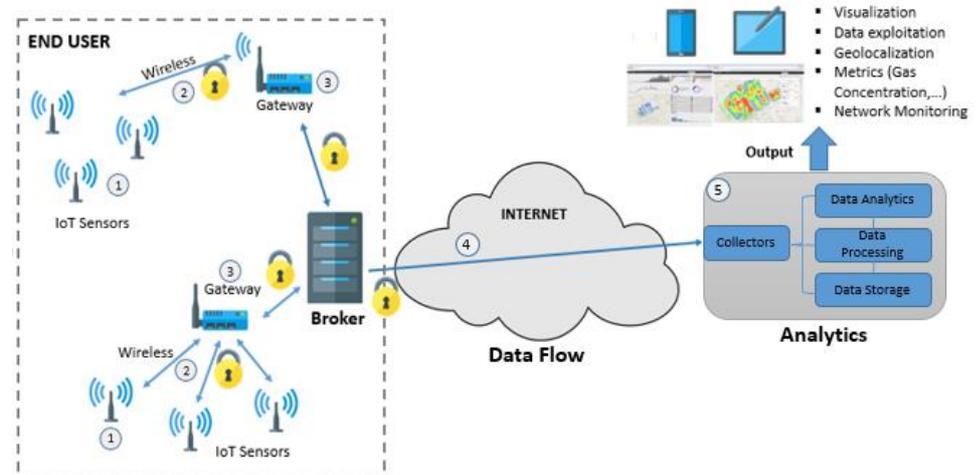
- ♦ test the wearable devices;
- ♦ data aggregation solutions, advance a unified platform to collect, present and analyze the sensors data;
- ♦ develop a decision support system that could send alerts in specific situations.

Main results

The major results of WINS@HI are:

i. Integrate wearable sensor devices for industrial environments with greater adaptability and better prepared to think about the direct integration into systems and PPEs;

ii. Advance an IoT Sensor Network based on:
- Wireless and wired local distributed communication solutions;
- Cybersecurity features over the IoT sensor networks (access control, cloud security, authentication mechanisms, etc.);
- Network operation and cybersecurity status monitoring.

iii. Propose a decision support system based on: Data Analysis, Event processing, Monitoring, and Alarm Management Algorithms;

iv. Improve several working environment factors: advanced communications, and workers training;

v. Finally, achieve a worker-centred manufacturing processes optimization.

Taking in consideration the development of new forms of wearable devices and different test environments, relevant standards will be verified towards the wearable's performance and correct functioning.

Impact

The current situation of the European manufacturing sector has an urgent need to develop and deploy technologies and methodologies to improve the effectiveness of the workers and production processes.

Latest technologies such as IoT sensor networks present themselves as reliable solutions to enable failure prediction for continuous operation, tracking of health status and physical location of workers which will guide search and rescue units in case of emergency.

Moreover, the analysis of the data from the wireless sensor network will lead to more efficient industrial processes and training for workers to avoid accidents.

About Celtic-Plus

Celtic-Plus is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects in the area of telecommunications, new media, future Internet, and applications & services focusing on a new „Smart Connected World" paradigm. Celtic-Plus is a EUREKA ICT cluster and belongs to the intergovernmental EUREKA network. Celtic-Plus is open to any type of company covering the Celtic-Plus research areas, large industry as well as small companies

or universities and research organisations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.

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