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ever the user wants within the range of the user’s Smartphone Wi-Fi connection (eg, the roof of a bus).

From the droid perspective, the drone is just a service that is used to acquire data. The droid is a mobile application that uses the smartphone geolocation to complete air pollution data from the drone. It is implemented using Apache Cordova multi-device development framework that can run in up to nine different mobile platforms such as Android, iOS or Windows Phone. Apache Cordova was also selected because its applications are coded using standard web development technologies (ie, HTML, CSS and Javascript).

When not connected, the droid tries to locate the drone and checks server connectivity. When the drone is detected, data capturing starts and the droid saves all measurements into a local database on the smartphone, which is cheaper than storing them in the drone (ie, additional storage hardware is not required). In order to upload data, login is required. Once logged in, the droid begins to send data (ie, the pollution data from the Drone augmented with the smartphone geolocation). In parallel, the droid requests data from a server in a range of coordinates to show a map in the smartphone. The trend in the Web of Things field is to use REST for the Web services provided. However, to prove that our approach does not fix the Web service technology used, REST and SOAP (Simple Object Access Protocol) are mixed in the final solution.

All the cloud services have been specified using a model driven development environment called WebRatio. All the Java code generated by this tool is open source. The cloud services provide anonymous data pollution concentrations and provide an open access to data. To avoid problems with multiple connections (also known as the c10k problem) a JSP and c10k capable server, such as JBoss, is required.

The main idea behind U-AirPoll is to set the foundations for an open, distributed and mobile air pollution measurement system which allows data to be easily consumed by custom end-user applications and services (eg, a user or organization that wants to create green traffic routes to run or to cycle). Since U-AirPoll is an open hardware project, other people can add more pollution sensors, design their own enclosures or modify any piece of the project to better suit their needs.

Currently, U-AirPoll supports only 1:1 droid-drone connections. Our research is currently investigating N:N supports (multiple drones and droids shared among users).

This work has been funded by the Spanish Ministry of Science and Innovation (TIN2011-27340) and the European Regional Development Fund (ERDF).

Links:
http://sites.google.com/site/U-AirPoll/
http://www.openpicus.com
http://cordova.apache.org
http://www.webratio.com

Reference:

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ARGO Sentinel: The Mobile App for Reporting Oil Spillages at Sea

by Massimo Martinelli, Davide Moroni and Ovidio Salvetti

We believe that the contribution of volunteers could play a fundamental role in monitoring and protecting the environment. People at sea sighting pollution caused by oil or hydrocarbon spillages can now immediately report this using a freely downloadable mobile application.

At the Signals and Images Laboratory (SI-LAB) of the Institute of Information Science and Technology of the National Research Council of Pisa (ISTI-CNR), we have developed a Marine Information System (MIS) for monitoring vessel traffic and oil spills within the Mediterranean basin. The MIS collects and integrates geotagged data...
related to safety and health issues of the sea from various sources (satellites, optical sensors, electronic noses, autonomous underwater vehicle systems) and provides predictive models to assist the authorities in the management of emergencies at sea.

An integrant part of the MIS is represented by the data that can be collected and shared by volunteers who want to collaborate in monitoring the status of the sea.

For this purpose, we have developed ARGO Sentinel, a free application for smartphones with a Geolocation System (GPS)[1]. Two versions of the app have been implemented: an HTML5 version, running as an Opera widget distributed only to our partners of the ArgoMarine project, and a native Android (v2.2 or higher) publicly distributed because of its level of stability, and downloadable by anyone from Google Play (see Link below).

The app was conceived on the intuition that the contribution of volunteers could play a fundamental role in monitoring and protecting the environment. Using the app, whenever someone at sea sights signs of oil or hydrocarbon pollution they can immediately report this to the SI-LAB in Pisa. The information is recorded in the MIS and complements the data obtained from more traditional sources (eg satellites), improving the quality and coverage of marine monitoring, especially in protected areas. In this way we can build up a detailed map of the status of our seas.

The application – distributed in Italian, English and Greek – sends reports of suspected spills to our Lab, providing a description of the spill and specifying the precise point and severity.

The main screen of ARGO Sentinel shows: a "Message" area where a description of the sighting is entered; a "Red Alert" button to signal a major oil spill with a diameter greater than or equal to 20 meters approx.; a "Yellow Alert" button: to report a mild/moderate amount of oil spill with a diameter less than 20 meters approx.; an "i" button: for information on the use of the app; an "exit" button to close the app (See Figure 1).

By clicking on the red or yellow alarm buttons, an SMS is sent to the CNR headquarters, which will process the received data.

The app has been installed by about 700 individuals all over the world. By integrating the alerts sent by the volunteers with all the other information sources collected in the MIS, a semi-automatic analysis eliminated the alerts identified as false positive. Even though we have no formal obligations as the project is for research purposes only, we forward all the significant information to the General Command of the Italian Coast Guards in Rome, Italy.

Our field tests demonstrate that the use of this new technology could be really important in combating pollution. Our experience suggests that this kind of technology can be applied to many other fields where environmental monitoring and safety is crucial.

An important result is that, during the period of the project’s activity, we have acquired a more detailed and immediate knowledge of the conditions of the sea. The use of this application represents a step forward in marine environmental monitoring, because, in addition to the other technologies that are used by the Argomarine project, it also adds the contribution of volunteers who can easily communicate the sighting of a spill. Knowing that deliberate spills can be detected in a timely fashion is in itself a deterrent to malicious actions. Possible developments may allow a more effective intervention by the authorities.

A new version of the ARGO Sentinel app is now under development and will also be released for iOS user.

ARGO Sentinel is has been developed in the framework of the European research project ArgoMarine, ("Automatic Oil spill Recognition and Geopositioning integrated in a Marine Monitoring Network") which aims at traffic and marine pollution monitoring. Coordinated by the Tuscan Archipelago National Park, the partners of ArgoMarine include ISTI-CNR, the National Technical University of Athens, the Nansen Environmental and Remote Sensing Center, the Centro de Investigação Marinha e Ambiental, Universidade do Algarve, the National Maritime Park of Zakynthos, the Joint Research Center and the NATO Undersea Research Center.

Links:
ARGO Sentinel:
http://tinyurl.com/argosentinel
Argomarine Project:
http://www.argomarine.eu

Reference:

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