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LandDemarc

LAND DEMARCATION USING LOW-COST MOBILE GEOREFERENCED DEVICES

LandDemarc project is being developed in the scope of the Information and Communication Technologies for Development Competence Center (ICT4DCC).

LandDemarc main objective is to give an alternative method to demarcate land and property in Sub-Saharan Africa, using only low-cost technology.

Motivation

In Africa, land is the source of 50% to 75% of the country wealth; however, borders have been a recurrent source of conflict with a higher incidence in Sub-Saharan Africa.

Aware of this fact, the World Bank has launched projects to correctly demarcate borders and land using diverse techniques, some of them in use in other parts of the world, but with low success rates. Their main failure can be attributed to the particularities of the African continent, such as the multiplural land properties, the conflicts over property and the lack of skilled workers.

Problem

The lack of specialized teams, infrastructures and government

Fig1. LandDemarc demarcation example.

capabilities to support demarcation, are an indication that other solutions must be provided to solve this problem and make land property more clear to avoid more disputes over land, facilitating the attraction of foreign investment. GPS is a commonly used technology to make the land demarcation easier but in Africa, it is failing due to well-known difficulties for sending high cost hardware to the continent, to educate large specialized Geographic Information Systems (GIS) teams and even for the instability provided by an insecure political system, making the borders and property constantly change.

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Key Features

- Possibility of use more than one device in the demarcation, connecting via WiFi-Direct
- Integration of sensors and GPS signal
- Capable of manual corrections after the map demarcation
- Use it anywhere, the only requirement is GPS signal available

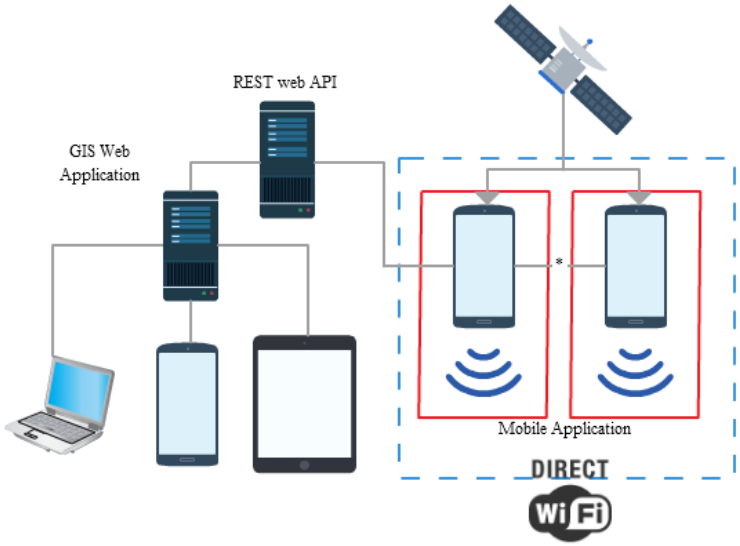

Fig2. LandDemarc Solution Architecture Overview.

Solution

What we propose is the use of an application for regular low-cost smartphones with a simple mobile interface to be used by non-expert users. Its goal is to capture geographical coordinates and make the land demarcation possible without specialized teams and high-cost hardware. Along with the two other components, GIS Web Application and Representational State Transfer (REST) Webserver form the LandDemarc solution.

Mobile Application

The mobile application is the main piece of the solution. Is where the users can build their maps, just by walking around with their georeferenced mobile devices. It is possible to check the resultant map and do some manual alterations if the map is not right. Before the demarcation process start, the user has the option to connect more devices via WiFi-Direct, which will enable the demarcation with more than one device, resulting in a more precise demarcation.

GIS Web Application

The GIS web application is a tool where all the users can analyse the performed demarcations and sent them to approval to the competent authorities that may also have a role in this solution.

REST Webserver

Another component of this solution is the REST webserver, which will remotely store the data and feed both the GIS web application and the mobile application, guaranteeing that all data is always updated.

Conclusion

The achieved result is very satisfactory: the demarcation process has an acceptable accuracy, providing a clear path as a result of the LandDemarc solution

Future Work

Continue the development and testing of the used demarcations algorithms, and apply new filters to the demarcation. Explore the use of different smartphone sensors to discard/filter possible bad geolocation points returned by the GPS.

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