



RFID-Based Cadastral Boundary Mark System (RCBMS)



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RCBMS : OVERVIEW



- Common navigation system rely mainly on satellite positioning (GPS/GNSS) for absolute position determination. Due to the main **limitation of GPS**, other positioning technologies should be integrated into the system design.
- Another **alternative geo-location** is to install RFID tags at specific landmarks and if the user passes by he can retrieve the tag information with its location.
- This would lead to the concept of **active landmarks** such as **RFID-Based Cadastral Boundary Mark System (RCBMS)**.



The current boundary mark

- Made from concrete in the form of a cylindrical shape with a dimension of 70 mm in diameter and 600 mm long, with weight approximately 7 kg.
- Heavy to transport, brittle and does not carry any information on site.

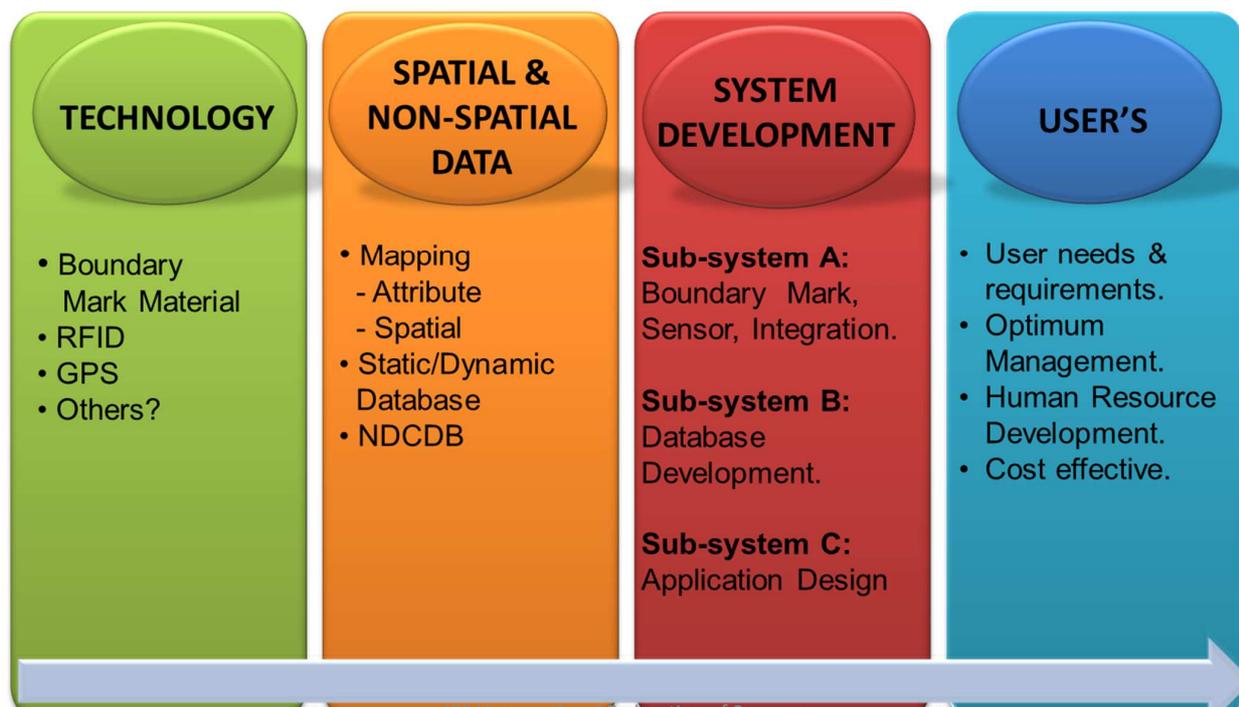
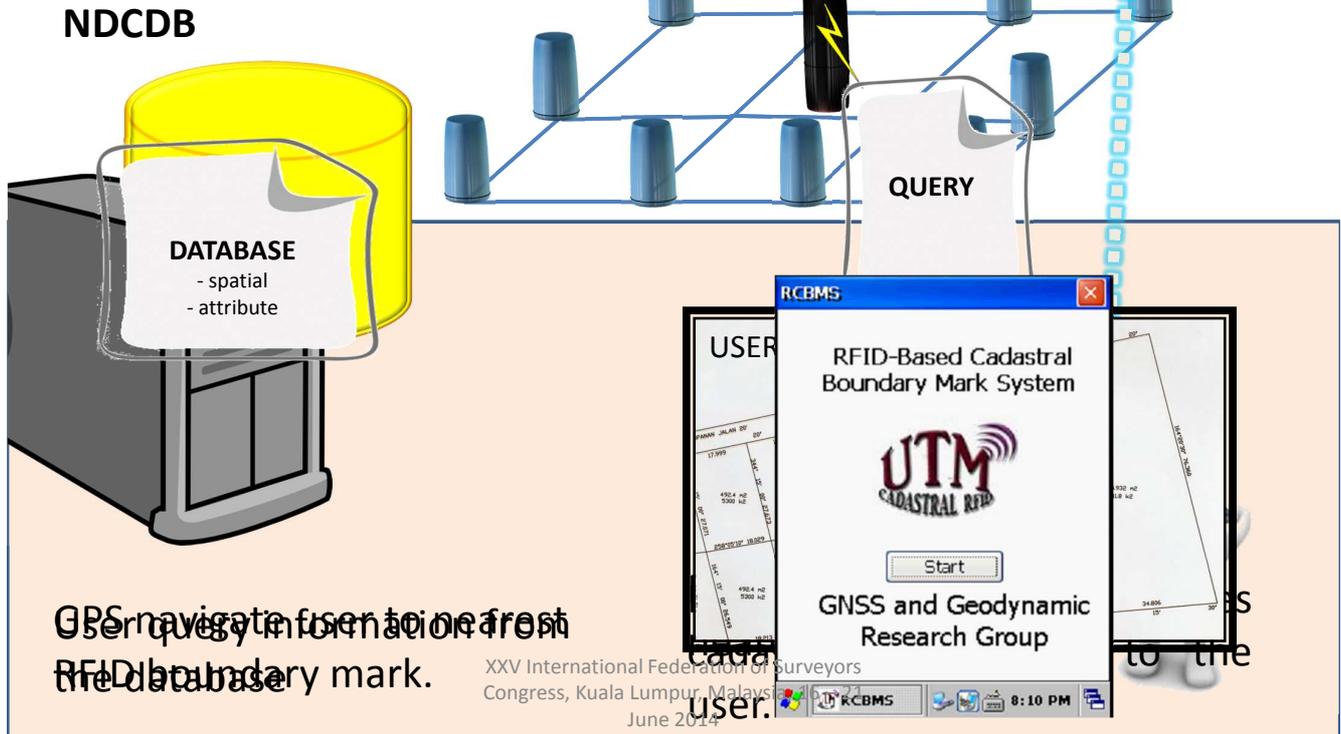


Therefore,

The main aim of the RCBMS is to modernize the conventional boundary mark with lighter, robust, easy to locate and carry spatial and non-spatial cadastral information

on site.

- Able to acquire spatial and attributes data of cadastral boundary mark directly on-site.
- A low-cost system and minimize time to locate cadastral boundary mark and retrieval of information.
- Technology update to utilize National Digital Cadastral Database (NDCDB).
- A single system to manage cadastral boundary mark information.



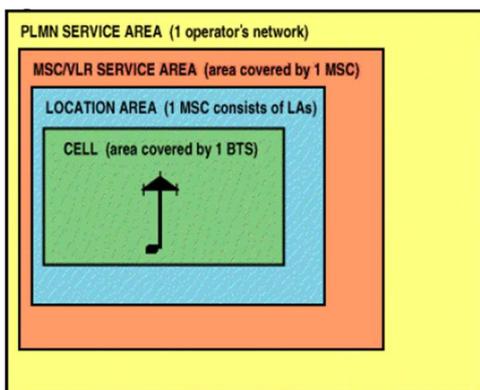
Subsystem A
RFID-based Boundary
Mark & Scanner



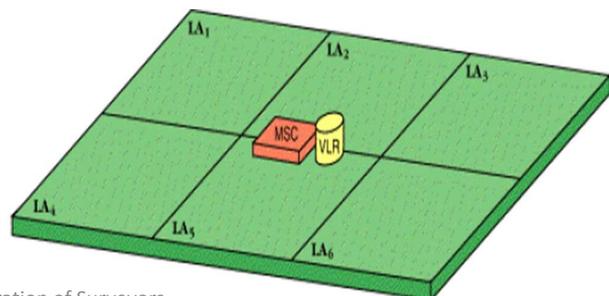
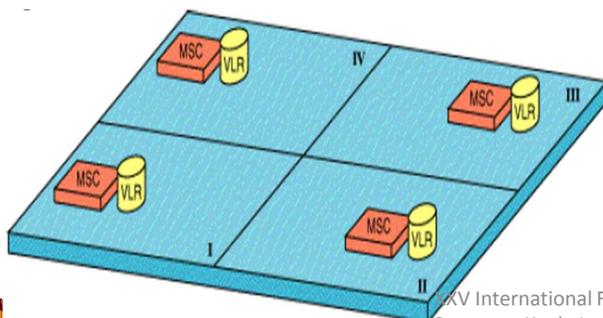
Subsystem B
RCBMS Cadastral
Database & Searching
Technique

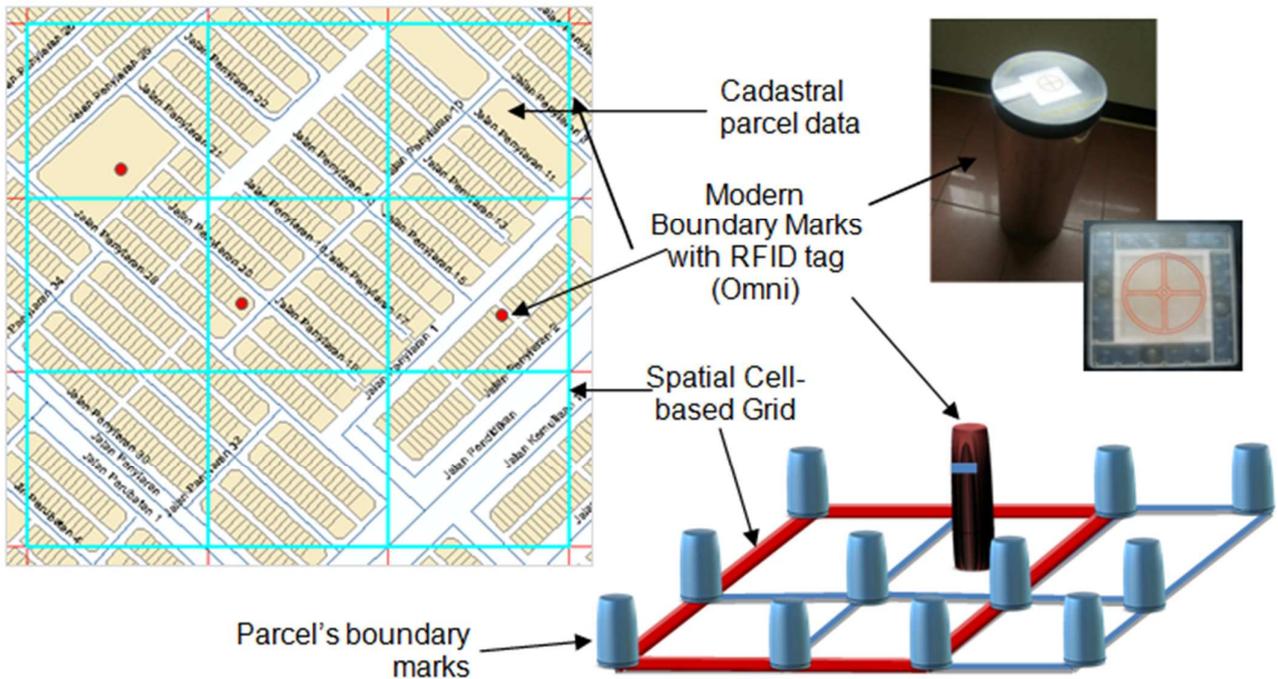


Subsystem C
System
Applications

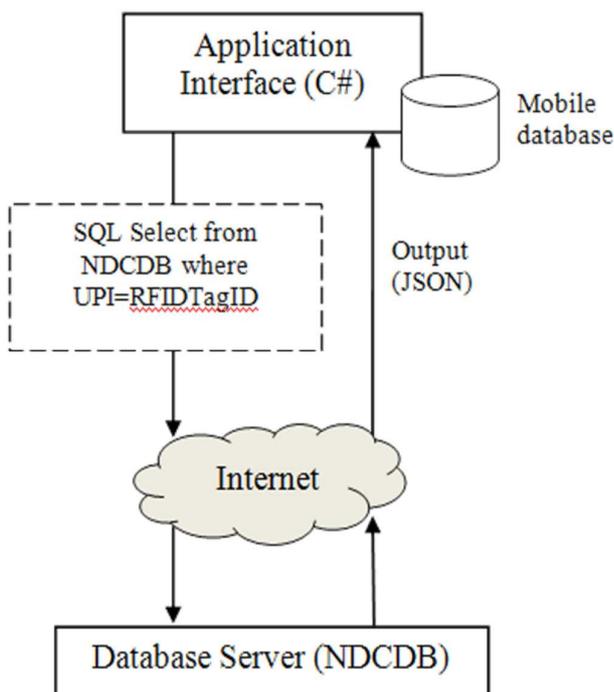


Musliman *et al* proposed to use the cell-based concept in the telecommunication industry – **Global System for Mobile Communication (GSM)** which its network is made up of geographic areas.





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MySQL database used to

- support the server side tasks and scripting.
- store RFID information of boundary marks & UPI key.

User will send request to the server and will be processed to perform SQL.

Results are the detail information of RFID-tag cadastral lot with its associated boundary mark and attribute information.

**PROTOTYPE 1:
RCBMS MODERN BOUNDARY MARK**

**PROTOTYPE 2:
RCBMS APPLICATION**



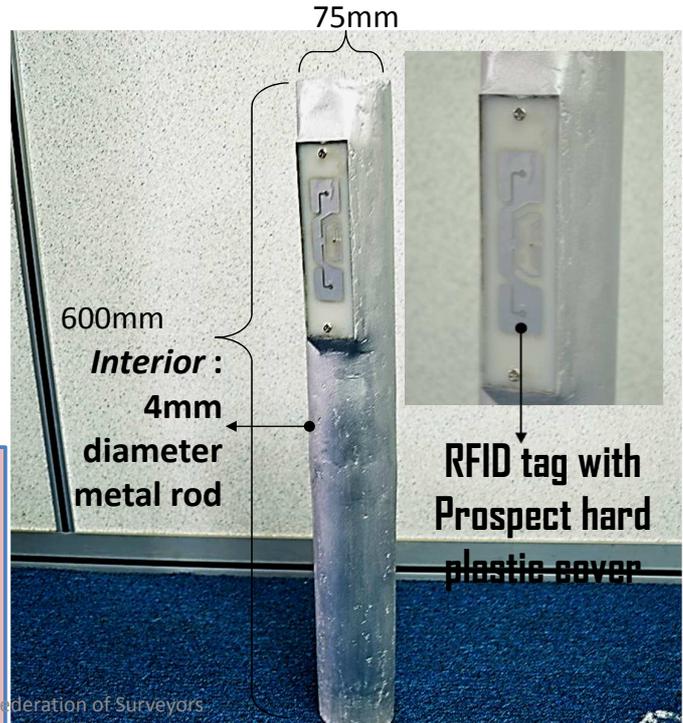
PROTOTYPE 1: MODERN BOUNDARY MARK



PROTOTYPE 1: RCBMS MODERN BOUNDARY MARK



Palm Oil Fuel Ash (POFA)
Palm Fuel Ash (PFA)
Bottom Ash
Lime
Gypsum
SP



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PROTOTYPE 1: RCBMS MODERN BOUNDARY MARK



CIVIL ENGINEERING TESTING UNIT (CETU)
Block D04
Faculty of Civil Engineering

Test Method	: MS 26: Part 2 : 1991: Methods of Testing Hardened Concrete : Section 3: Method for Determination of Compressive Strength of Concrete Cubes.		
Type of Cement	: POFA + PFA	Type of Mix	: 20
Code	A	B	C
Member	Boundary Mark	Boundary Mark	Boundary Mark
Date of Cast	25/3/2013	25/3/2013	25/3/2013
Date of Test	16/5/2013	16/5/2013	16/5/2013
Period of Curing (day)	52	52	52
Weight of Specimen (kg)	0.83	0.85	0.82
Diameter (mm)	70	70	70
Area of section (mm ²)	3,850	3,850	3,850
Crushing Load (kN)	13.3	13.9	13.1
Strength (N/mm ²)	3.5	3.6	3.4

CETU and tested at CETU. The laboratory personnel is not involved in the sampling and testing of samples for testing. This report is confidential and not to be used for advertising purposes. Reproduction of the report is not permitted except in full, with written approval from CETU Quality Manager.

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```

private void cmdView_Click(object sender, EventArgs e)
{
    foreach (int i in listView1.SelectedIndices)
    {
        //MessageBox.Show(listView1.Items[i].Text);
        txtUPI.Text = listView1.Items[i].Text;

        SqlConnection conn = new SqlConnection("Data Source=Program Files\\RFID\\CadastralRFID;");

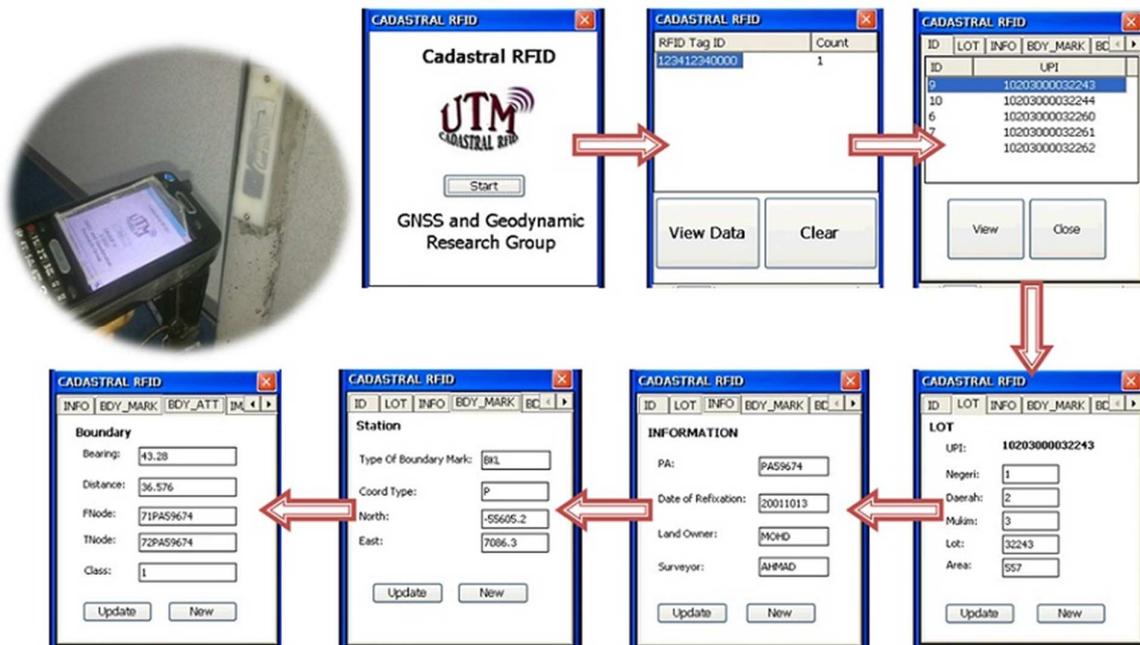
        // SQL for Layer LOT_ATT
        SqlCommand cmd1 = new SqlCommand("Select Negeri from LOT_ATT Where ID =@" + txtUPI.Text + "");
        SqlCommand cmd2 = new SqlCommand("Select Daerah from LOT_ATT Where ID =@" + txtUPI.Text + "");
        SqlCommand cmd3 = new SqlCommand("Select Mukim from LOT_ATT Where ID =@" + txtUPI.Text + "");
        SqlCommand cmd4 = new SqlCommand("Select Lot from LOT_ATT Where ID =@" + txtUPI.Text + "");
        SqlCommand cmd5 = new SqlCommand("Select Area from LOT_ATT Where ID =@" + txtUPI.Text + "");
        SqlCommand cmd6 = new SqlCommand("Select UPI from LOT_ATT Where ID =@" + txtUPI.Text + "");

        //SQL FOR LAYER INFO
        SqlCommand cmd7 = new SqlCommand("Select PA from INFO Where ID =@" + txtUPI.Text + "", conn);
        SqlCommand cmd8 = new SqlCommand("Select DATE_REFIX from INFO Where ID =@" + txtUPI.Text + "", conn);
        SqlCommand cmd9 = new SqlCommand("Select OWNER from INFO Where ID =@" + txtUPI.Text + "", conn);
        SqlCommand cmd10 = new SqlCommand("Select SURVEYOR from INFO Where ID =@" + txtUPI.Text + "", conn);

        //SQL FOR LAYER BOT_MARK
        SqlCommand cmd11 = new SqlCommand("Select COORDINATE from BOT_MARK Where ID =@" + txtUPI.Text + "", conn);
        SqlCommand cmd12 = new SqlCommand("Select TYPE_BOT from BOT_MARK Where ID =@" + txtUPI.Text + "", conn);
        SqlCommand cmd13 = new SqlCommand("Select NORTH from BOT_MARK Where ID =@" + txtUPI.Text + "", conn);
    }
}
    
```

RCBMS application were developed within RFID reader by using C# Microsoft Visual Studio programming language.

The source codes of two RCBMS applications for integration of spatial-attribute cadastral data and user RFID interface were coded in the RFID reader.



To integrate the GPS sensor with the RCBMS.

To improve the crushing load and strength of the cadastral boundary mark in Prototype 1

To classify the cadastral lots in that certain area, e.g. there are different numbers of cadastral lots in rural and urban areas.

To quantify the benefits of RCBMS.

To apply for other survey control monument

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EXPECTED OUTPUT

- New design of boundary mark.
- Obtaining cadastral information on site.

ECONOMIC

- Low in cost system.
- Fast data searching.

INFRASTRUCTURAL

- New equipment for CCI.
- New/improved facility for CCI.



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Thank you for your attention!

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