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Introduction of Beacon Control Points using IoT

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Geospatial InformatiX Corporation

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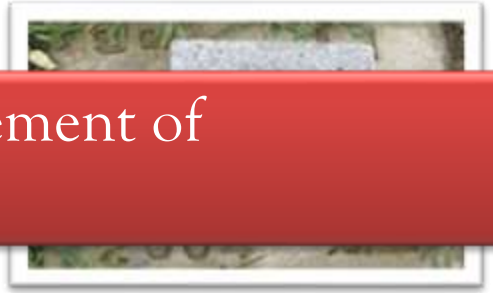
1. Introduction

- Background

◆ Cadastral Boundary Surveying

◆ Cadastral Control Points



Accurate maintenance and management of control points is essential.

1. Introduction

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◆ Problems of Points management

Type of Cadastral control points	Last year cumulative	Installation performance			Disposal	Total	Management status		
		total	New-install	Reinstall			perfection	Point loss	ETC
Total	784,212	55,146	45,034	5,011	14,095	815,151	800,760	13,058	1,063
Cadastral Triangulation point	4828	74	71	4	12	4,887	4,607	170	110
Sub Triangulation point	33,329	2,798	2,108	112	1,114	34,323	33,744	209	100
Cadastral Supplementary point	746055	52,274	42,855	4,895	12,969	775,941	762,409	12,679	853

(unit: point)

-Triangulation point : the initial surveying, mostly on the mountain top

-Sub Triangulation point : installed in the middle of the mountainside or the roof

-Supplementary point: For boundary surveying, installed around the city roads

1. Introduction

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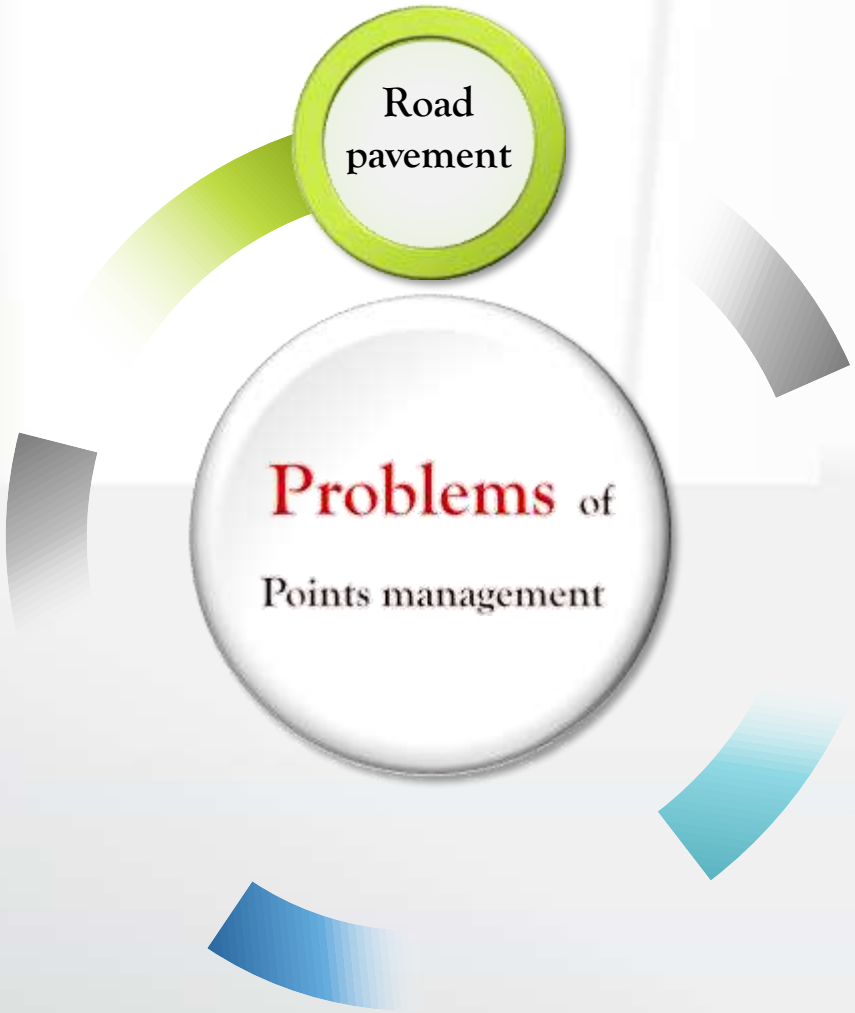

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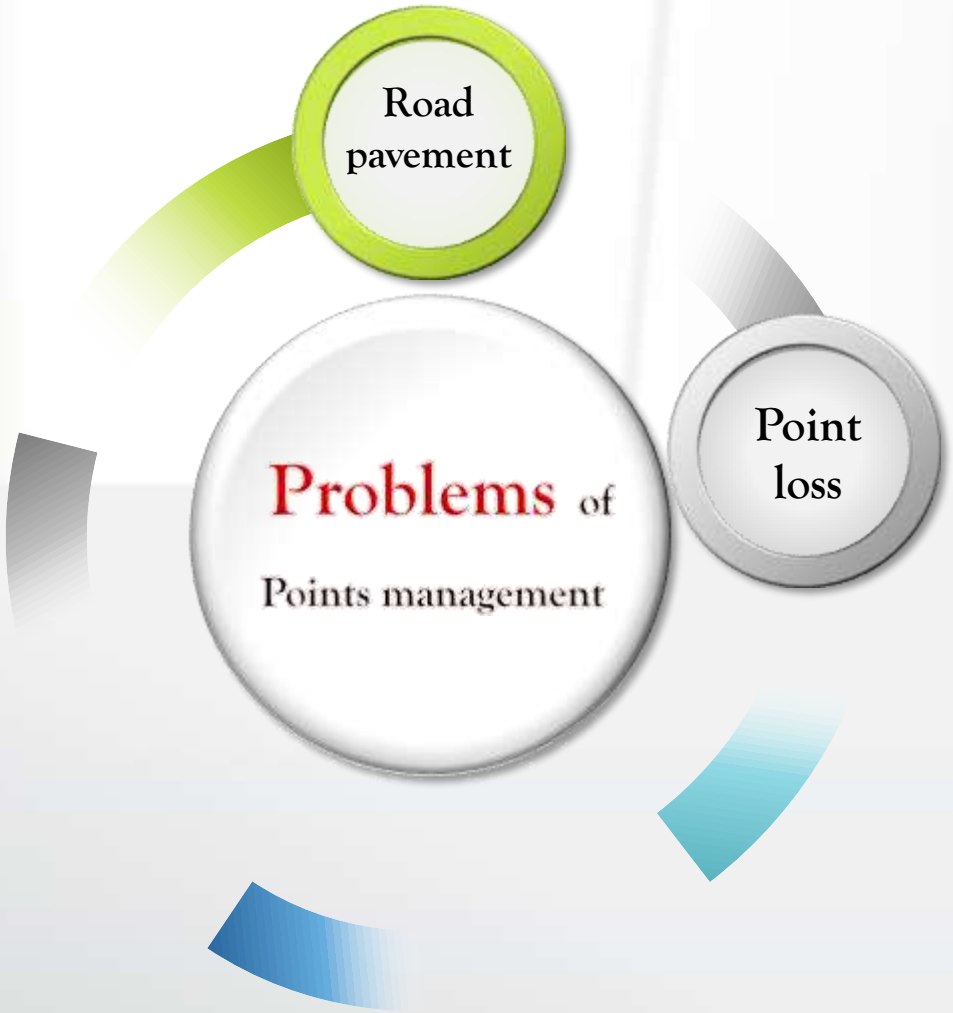

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1. Introduction

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1. Introduction

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1. Introduction

Point loss

Road pavement

budget

proper investigation and management are not being carried out.

2. Main Subject

2.1 What is the Beacon?

2.2 The use of Beacon Control Point

2.3 The test of Beacon Control Point

2.4 The advantage of Beacon Control Point

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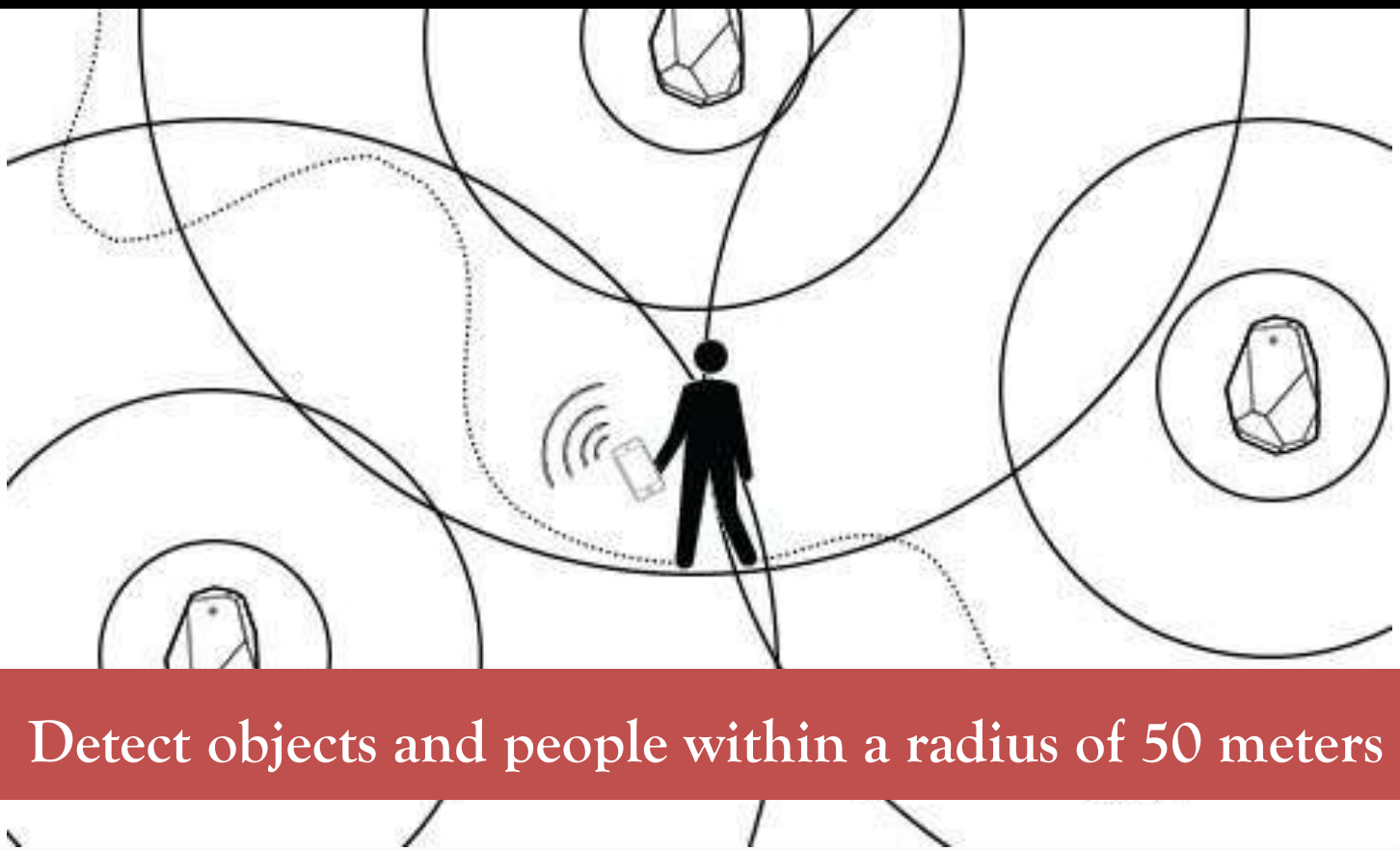
2. Development

- What is Beacon?

Bluetooth 4.0-based low-power signal tranceiver.



Detect objects and people within a radius of 50 meters

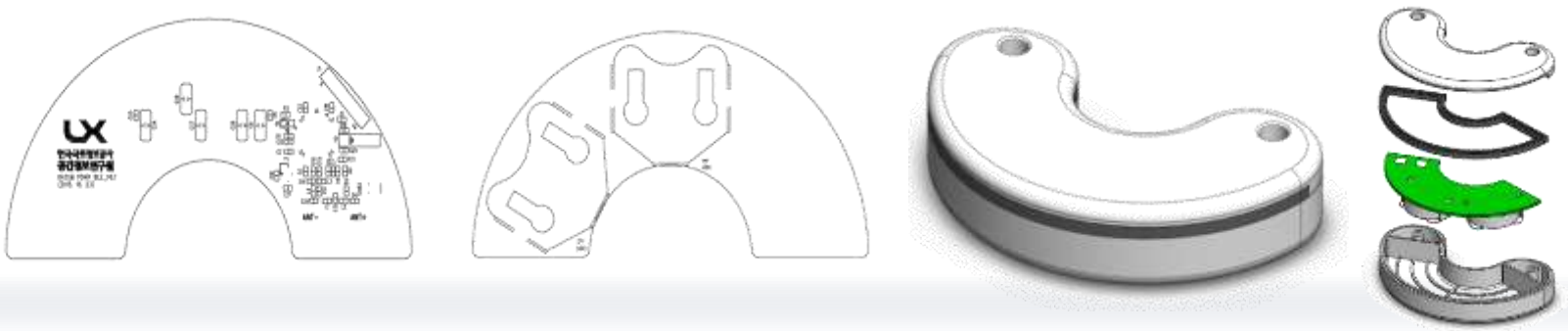
2. Development

- What is Beacon?

LX beacon production

BLE (Bluetooth Low Energy 4.x) Board product

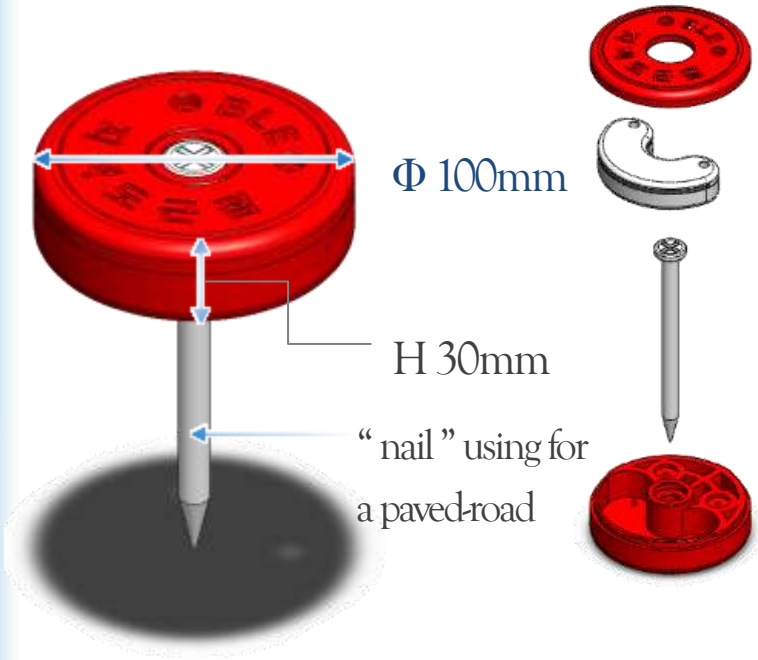
Item	Contents	Item	Contents
Memory	256KB Flash	Type of Battery	Coincell Battery
Antenna	PCB pattern antenna	Life of Battery	30~48months (replaceable)
Feature	2.4-GHz Bluetooth low energy	Size of Product	Diameter : 37.6mm Thickness : 11.7mm
Detected distance	30m(normal)	Housing	Reinforced Plastic



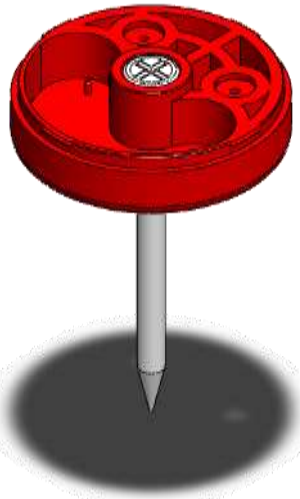
2. Development

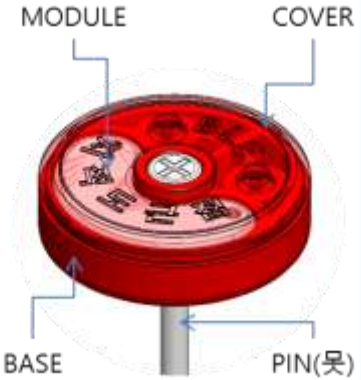
- The use of Beacon Control Point

For a paved-road



- Structural concept of for paved, and off- road point is the same
- Cover structure applicable to both types





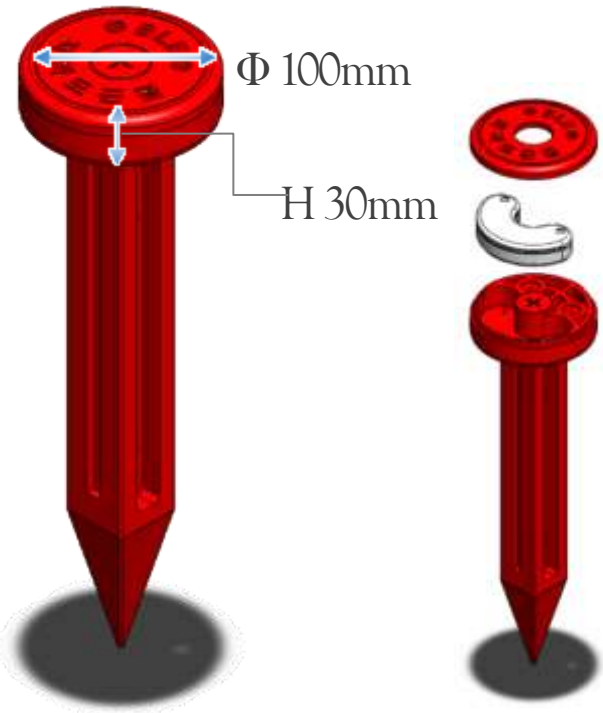
Module mounting and cover removal

Fixing nail to the center of body

2. Development

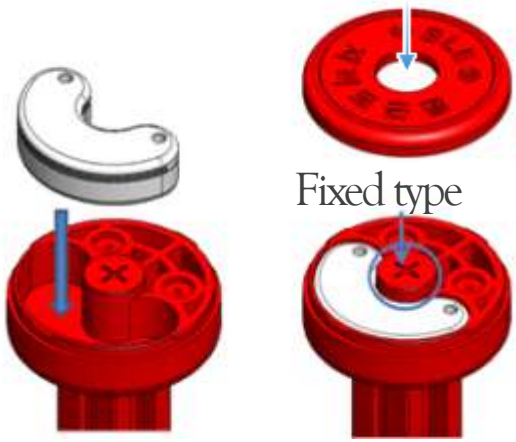
- The use of Beacon Control Point

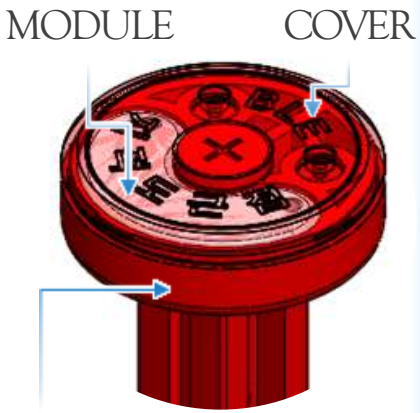
For an off-road



- centre (“+” mark) position fixed type
- COVER removable
- LX Beacon replacement type

Cover can be fastened and removed





Equipped with BLEmodule

2. Development

- The test of Beacon Control Point

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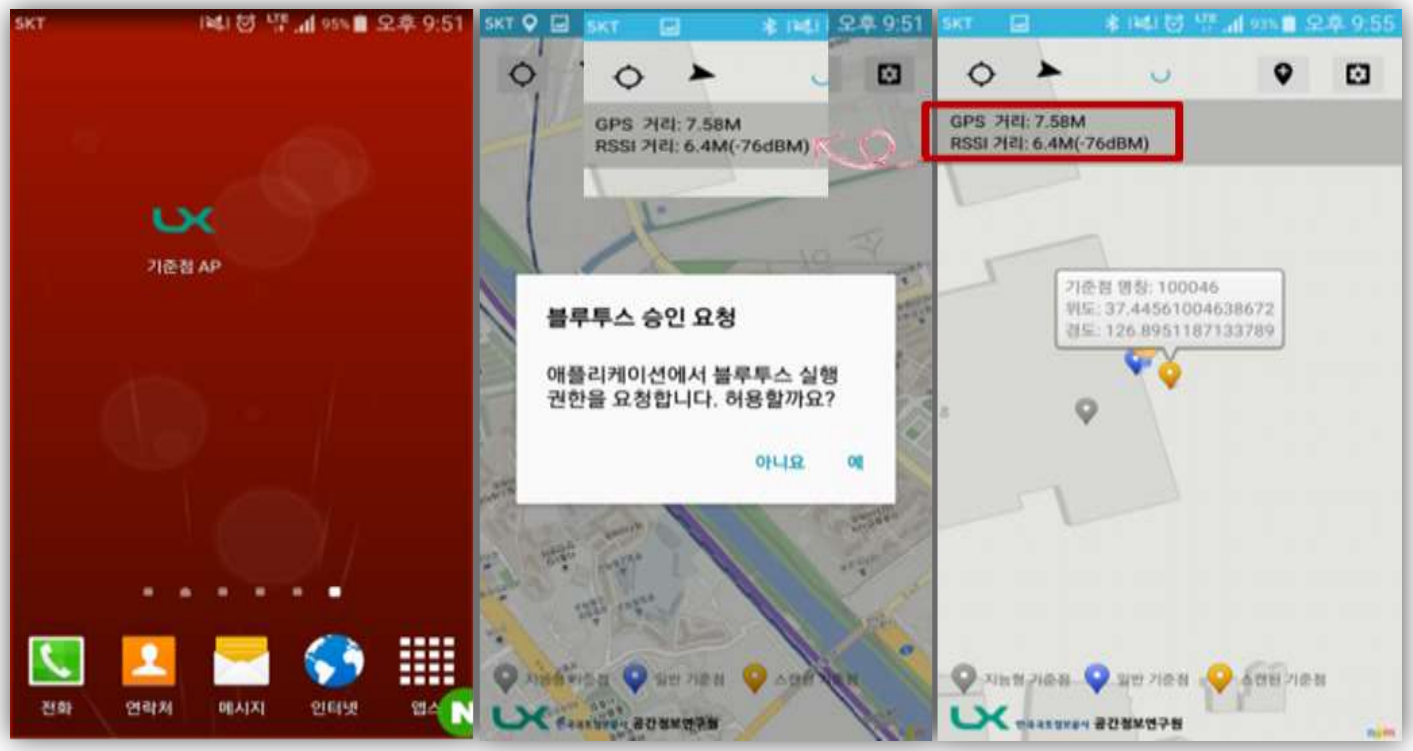
Beacon Control Point Application Development

➢S / W for viewing existing control points and adding and tracking new beacon control points



2. Development

- The test of Beacon Control Point

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Beacon Control Point Application Development

Main Functions

Beacon sensor Management	▪Communication with Beacon Sensor (Bluetooth 4.0) ▪Receive Beacon status information
Find control point	▪Control point inquiry and display function ▪Add, delete, modified Control points
Control point management	▪A function of BLE control point setting

2. Development

- The test of Beacon Control Point

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Installing and Testing Beacon Control Points

➢ Area of installation : Bucheon, Sejong, Gimje city (definite districts, urban rural complex area)

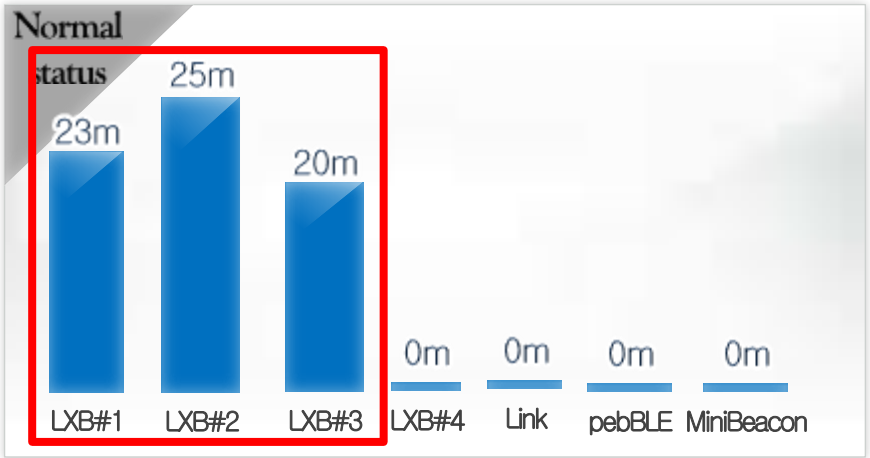
Test items

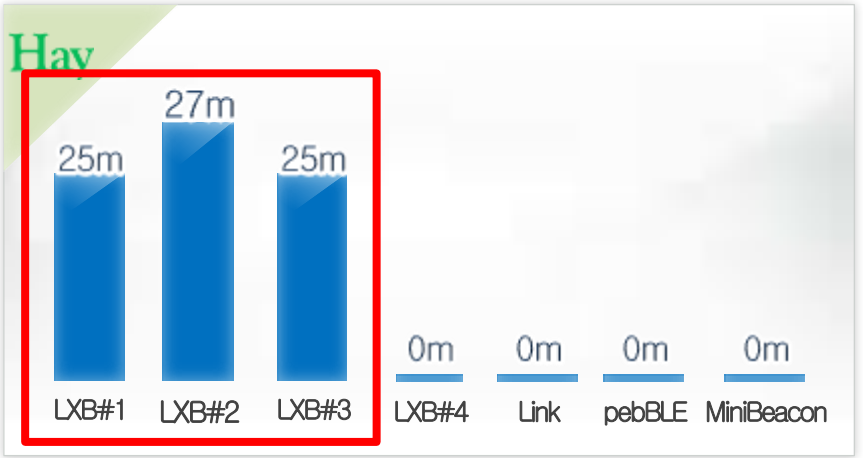
Unit items	Contents	Test classification
Regular Beacon	Burial	Signal Detecting (normal, water, dirt, hay)
(Primary) RegularBeacon+ 3D-printer products	Prototype burial	
(Secondary) LXBeacon + Manufacturing production Control point	Antenna improvement production buriial	View Beacon control point by distance.

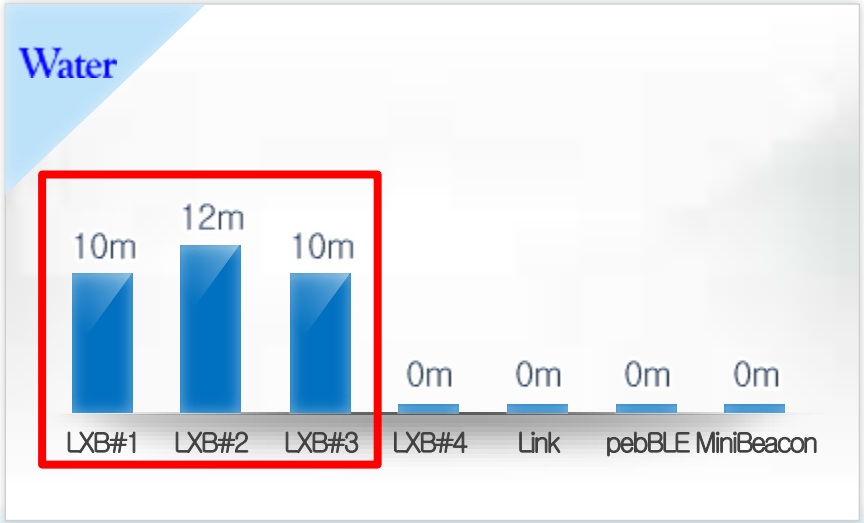
2. Development

- The test of Beacon Control Point

Test result







2. Development

- The advantage of Beacon control points

2. Development

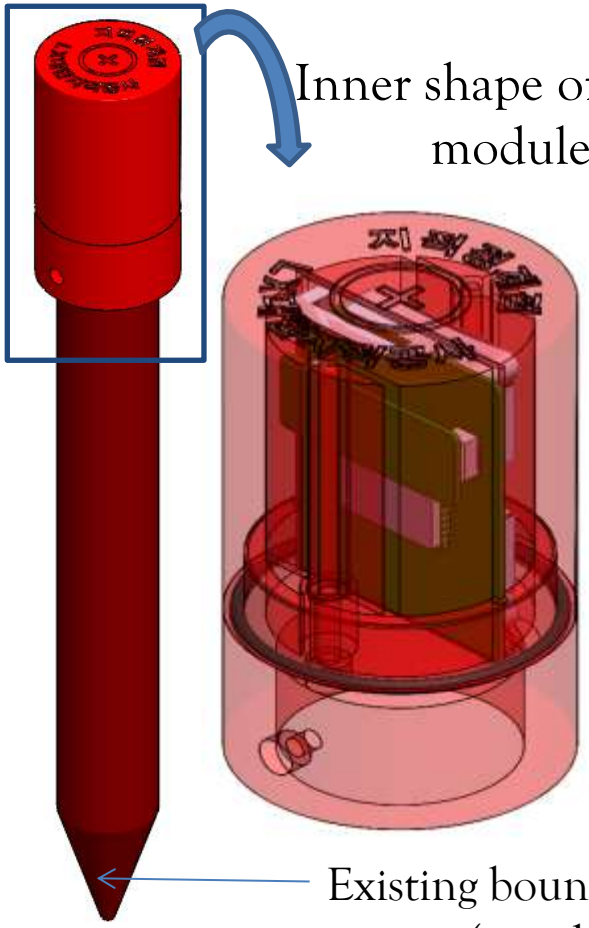
- The advantage of Beacon control points

- Manage systematically with digitized cadastral control points
- Reduce the problem of manpower
- Shorten the investigation time
- Be excellent for budget reduction

2. Development

- what to do next

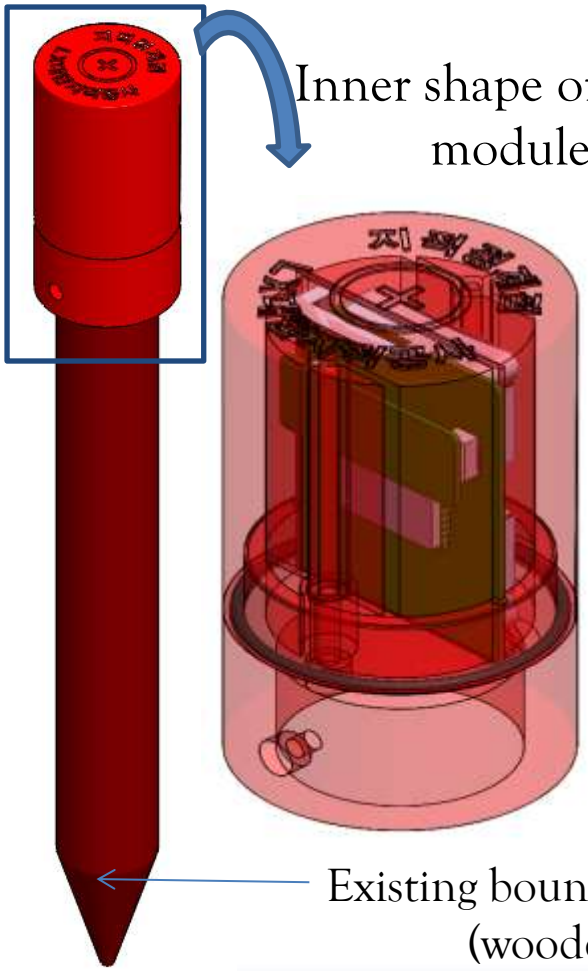
Development of boundary point mark module Details



2. Development

- what to do next

Development of boundary point mark module Details



Inner shape of LoRa module

Existing boundary point (wooden)

Construct multi-modal sensor

Detection of damage

Temperature, earthquake

3. Conclusion

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3. Conclusion

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Introduction	Development	Conclusion
What's the problem?	How to solve?	What to do?
• Outline of cadastral survey • Problem of current control points	• Beacon control points as a solution method	• Tests and results analysis for more control points • Institutional improvement

In the future

-Bring innovation in surveying

-Be the basis for digitized surveying


Thank you