

An RFID-based Monitoring System for the Location of Scientist around King Sejong Station in the Antarctica

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Abstract

Antarctica is known to have the strongest wind and the lowest temperature in the world. This place is dangerous place for scientific research.

This system is provided for tracking in real-time the location of a scientist around the King Sejong Station in the Antarctica, for providing information to an central control center in the Station. An active identification beacon with GPS and motion sensor worn by each scientist have own transmitter and power source. It has means for communicating with receiver as it moves through the research area. This beacon can monitor movement and GPS coordinates and send to central control center and display the information on the map. This system will be very useful to protect safety accident for the Antarctica research.

Components

System Specification:

Item	Details
Beacon	Frequency: 902 to 928MHz Nominal Voltage: 3.7V Dimension: 42*75*28mm GPS module Accelerometer
Receiver	Frequency: 902 to 928MHz 115kpbs Max RF Data Solar Panel with solar controller Solar Battery(Sun Xtender PVX-490T)
Reader	Frequency: 13.56MHz Maximum effective distance: Up to 8cm Bi-color LED and buzzer
Monitoring Software	Display Position/Motion on map Normal/Emergency Status Beacon Management



Figure 1. System Components

System Diagram

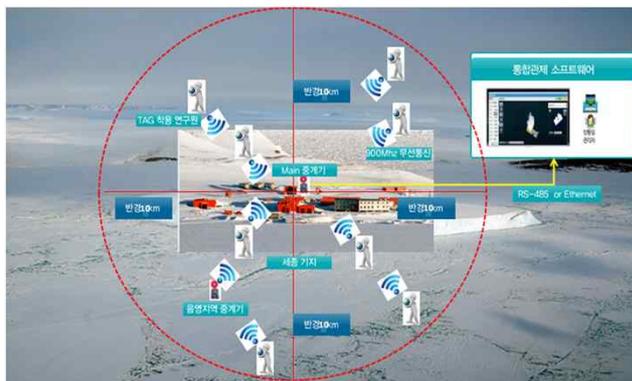


Figure 2. System diagram.

Fig 2 is RFID-based monitoring system diagram and show a summary of system operation. System components are active beacon, relays and receiver, monitoring software. All components operation temperature is up to -20°. The power source of relays in summer is rechargeable battery from solar panel, relays change to sleep mode in winter. Active beacon with antenna is attached to scientist's suit to send signal. Beacon has GPS for positioning information, accelerometer for motion information. This system provide automated responding signals to identify scientist movement. In normal status, beacon periodically send position and acceleration information. If there is no scientist acceleration, beacon send emergency signal with GPS coordinates to central control center in the King Sejong Station. Red dot line is communication coverage. We used MS connector, teflon electrical wire for cable harness.

Location



Figure 3. The location map installed around King Sejong Station

Fig 4 displays the location installed this system around King Sejong Station in the Antarctica. This system will be operated during summer season. The maximum communication distance is 10km.

Active beacon 70 EA
Main Receiver 1 EA
Relays 4 EA
RFID Reader 2 EA
Software 1 EA

Conclusion

KOPRI will install Monitoring System in the Antarctica. For the next season, this system will be upgraded with advanced components and installed at Jang Bogo Station.

Future work:

- ✓Design active beacon for less current consumption.
- ✓Design long distance communication
- ✓Test system environment
- ✓Modify System Housing design