# From Manhole Lock to Manhole Cover Open Detector

## Introduction

Manholes leading to underground supply systems are essential for their maintenance, for example, it concerns telecommunication networks, water supply networks, gas supply networks and electricity networks, and so on. Although it is very crucial to a city's operations, the manhole can be one of the least protected and most vulnerable assets.

*Manholes and manhole covers are everywhere.*

Nowadays manhole cover failure such as metal theft (for manhole cover or copper cable underneath it) is on the rise and generally becomes a society issue. An unauthorized opening of manhole is very dangerous, it can cause deadly fall-in accidents to people and also inflict a huge amount of damage to public property.

*Manhole cover losses & accidents in China*

# The conventional manhole locks

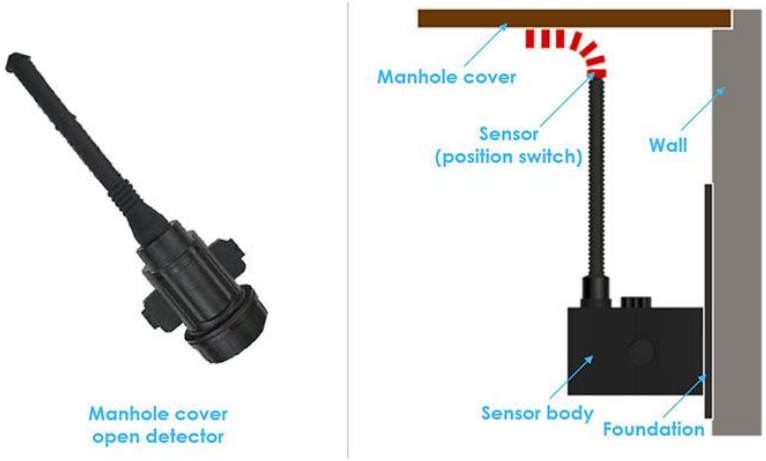
To protect the manhole and prevent it from being opened by simply a manhole cover hook, conventionally, people like to use the manhole cover lock, as shown in below picture. One problem is that it is hard for the manhole O&M agency to manage so many manhole keys, sometimes the worker out there may just forget which key to open the manhole, and increases the job difficulties. Another problem is that it may make the road surface uneven with the additional key structure on the manhole.

*Manhole cover lock and protector.*

With the technology develops, the need for a fully automated manhole monitoring system has become practical. Automated monitoring of manhole and manhole cover is part of the development of smart cities and Internet of Things (IoT) which are the targets for modern governments to control and monitor the assets in cities.

# Manhole cover open detector

With WiiHey's Manhole Cover Open Detector, you can deploy real-time monitoring and protection against metal theft, vandalism, and unauthorized access of manholes. The product utilizes a range of commercially available, off-the-shelf sensors to detect and prevent manhole related incidents. Signals are transmitted from the sensor device to a cloud platform via LPWAN (Low Power Wide Area Network) technologies, such as GPRS, NB-IoT, SigFox, etc. The sensors in combination with the cloud-based dashboard will allow you to monitor and well plan the maintenance of manholes.

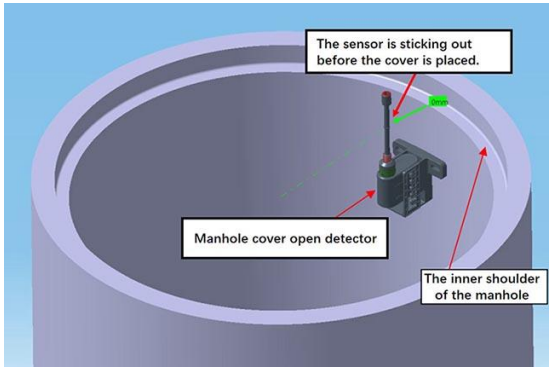



*Manhole Cover Open Detector*

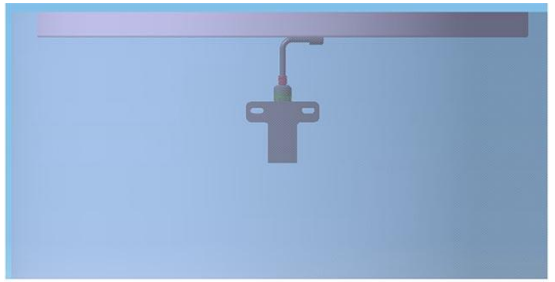
# How it works?

The sensor detects two statuses of the manhole cover - opened or closed.

During installation, the sensor is sticking out of the manhole surface, indicating the manhole is in "opened" status.



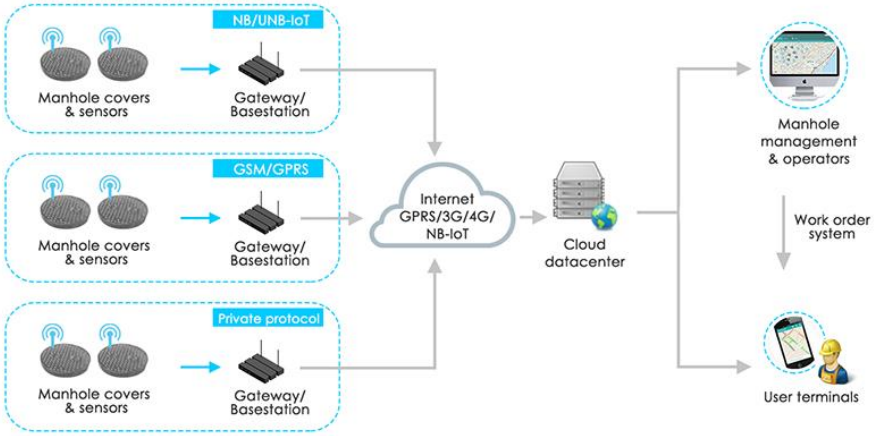

After the manhole cover is placed on it, the sensor is bending over, knowing now the manhole is in "closed" status.



If the sensor becomes straighten again, then it knows the cover is opened, it will send out message and trigger alarms.

# Architecture

The sensor supports LPWAN IoT communications technologies, such as GPRS, NB-IoT, GPRS, etc. They combine high transmission ranges of up to several kilometers in urban environments, with low power consumption. Data are transmitted to cloud data center for processing and fusion. Eventually, operators could view every manhole status from a cloud-based GIS dashboard.




*System architecture*

# Tech specs

- Minimum time required to trigger alerts – 0.7 seconds;
- Compatible wireless connectivity with GSM/GPRS/NB-IoT/Sigfox;
- Battery life for typical operations: over 5 years;
- Fully sealed with IP69 level protection;
- -25°C to 65°C operating temperature range;

# Key features

- Detect open/closed status of a manhole cover;
- Easy to install, wireless communication and free maintenance;
- Cloud based platform with GIS (Geographic information system) dashboard;
- Automatic alarm and message notification support;

# Benefits

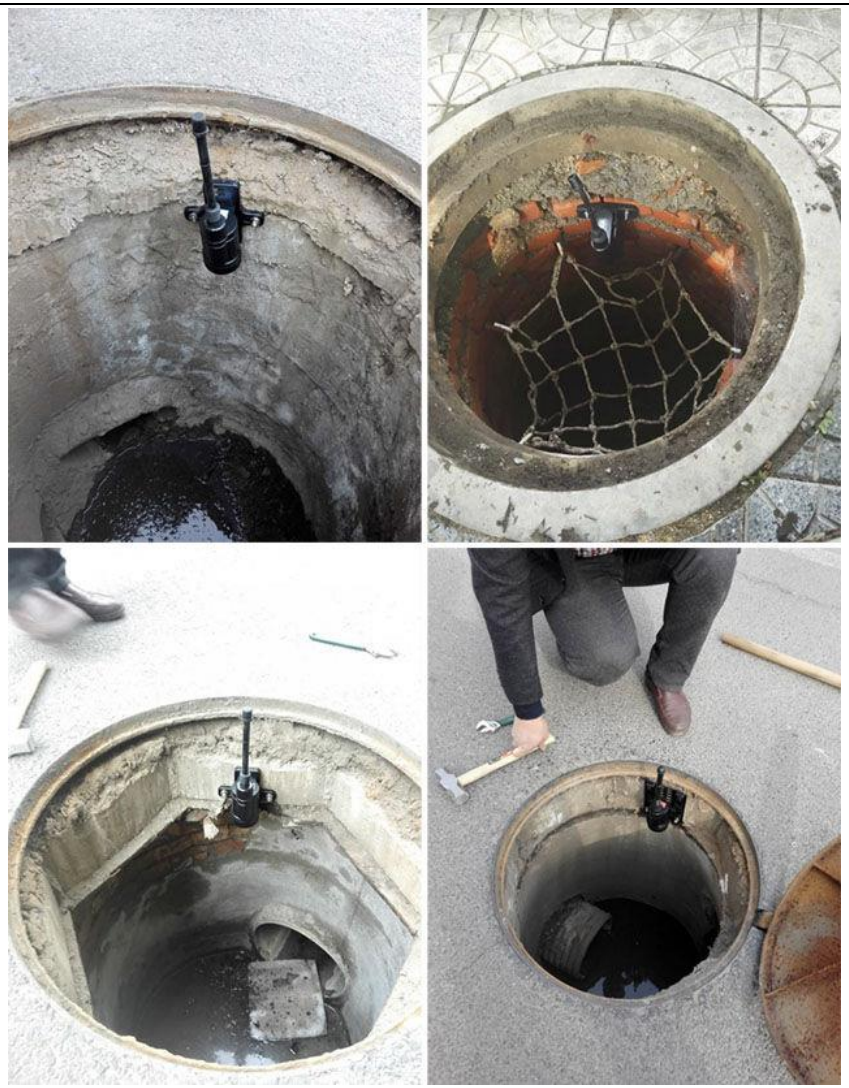
- Monitor, report, predict and optimize your manholes;
- Pick up on unauthorized activities and well plan maintenance schedules;
- 24/7 monitoring with multiple status messages updated per day and instant alarm notification;
- Total flexibility and reliability, can be deployed in urban or rural environments;

# Applicable to...

- Manhole cover;
- Sewer cover;
- Sewer lid;
- Pipe hole cover;
- Cable hole cover;
- Drain cover;
- Square manhole covers;
- Concrete manhole covers;

## Hardware installation

Detailed information of manhole cover sensor could be found here - WiiLSW Sensor.



*Manholes and WiiLSW sensors*

# Software


*GIS dashboard*

# Extension & customization

WiiHey manhole monitoring solution is a framework. The hardware devices and the dashboard application is a perfect example of customization. Depending on your application we have range of sensors and technologies at our disposal. Whether it is for gas detection, heat detection or flooding detection through manhole monitoring, we can customize the solution and tailor them to fit your needs.

# Summery

With WiiHey manhole monitoring solution, thousands of covers are monitored simultaneously, and every cover is individually identified and mapped. It allows immediate positioning of unauthorized attempts on each manhole. This facilitates an immediate focused response by security or management operators via the GIS cloud-based software application.

# Data integration guide

For sensor data integration, 3rd party companies could view following programming guides to learn more about WiiHey's DaaS (Device-as-a-Service) Platform:

Sample Project based on NodeJS

WiiHey Manhole DaaS (Device-as-a-Service) platform client in Web Browser

WiiHey MQTT API references

WiiHey Manhole Cover Sensor Programming Guide

# Ordering and Shipping

Details of the sensor hardware could be found here - WiiLSW Sensor.

Contact us by this E-mail jiayan@wiihey.com for ordering and shipping information.