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Safety Alert System for Temporary Lift Shaft Gate

Hong Kong Housing Authority
Site Safety Seminar for
Capital Works New Works Contracts
27 April 2021

HKCA Construction Safety Fund (CSF)

Safety Alert System for Temporary Lift Shaft Gate

- Funded Project by HKCA Construction Safety Fund (CSF)
- Lead Applicant :
 - Shui On Building Contractors Limited
- Co-Applicant Organization :
 - SmarTone Mobile Communications Limited
- Duration of Research and Developed: 1 year
- Trial at PRH at Wing Tai Road, Chai Wan
- Total amount of Fund: HK\$250,000

“給你25萬，實現發明夢”
\$250,000 to realize the inventor's dream



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Temporary Lift Shaft Gate

- Safety measures to mitigate risk
- Monitor the status of Lift Shaft Gates in a reliable and effective way all the times without manpower

Background of Research and Development

Temporary Lift Shaft Gate	111 nos.
Commence Date :	March 2019
Completion Date :	March 2020
Location:	1/F to 36/F



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Progress of Research and Development

Commence Date :	March 2019
1 st Batch Installation:	June 2019
Full Set Installation:	Sep 2019
End of R&D:	March 2020



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Temporary Lift Shaft Gate

1) Four leaf of lift shaft gates installed as an essential safety measure for all lift shaft openings



2) NBloT Sensor installed at the inner side of keylock door

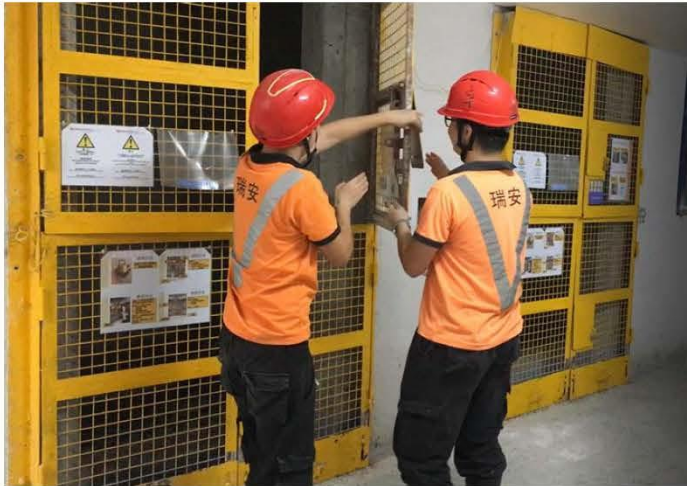


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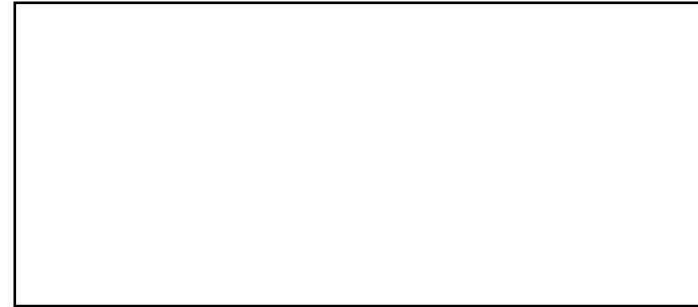
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3) Gate is opened



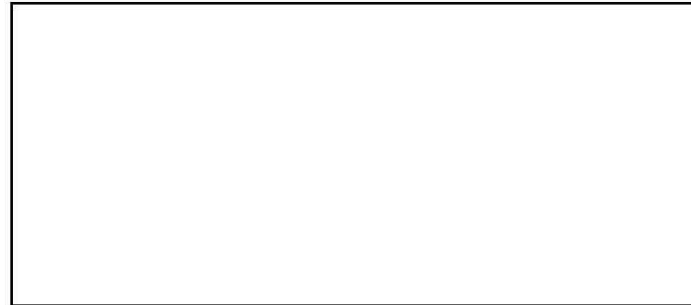
4. Message send to designated staff immediately



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Alert Message

- Alert message send to designated staff smartphone by Narrow Bandwidth (better penetration and fully coverage) if any lift shaft gate is opened.
- Alert message would be received around 20 sec to 60 sec depends on the strength of signal.



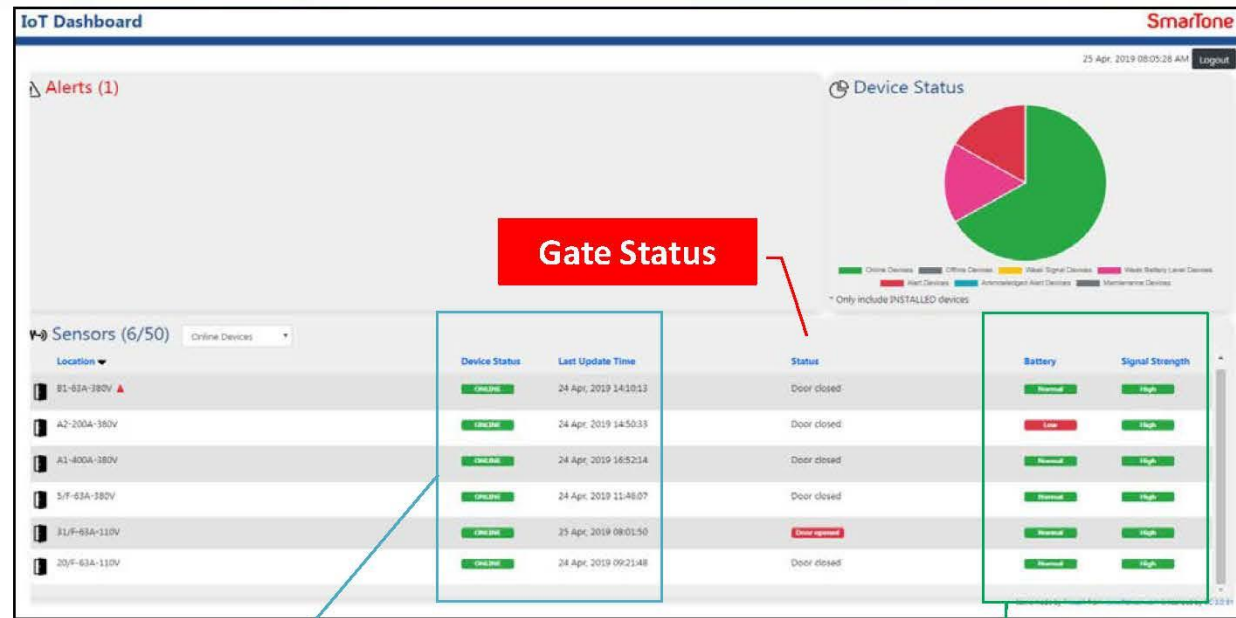
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IoT Platform (Dashboard)

- All devices condition can be monitored in IoT Dashboard all the times



Device Status

Signal Strength and Battery Status



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Figures

- R&D period is from 3/2019 to 3/2020 (12 months). Peak working period in lift shaft is from 9/2019 to 1/2020 (5 months). Figures of alert message within peak working period are as below:

Work Process in lift Shaft	Trade of worker	No of worker	Working Period	Nos. of message
Erection of metal scaffolding in lift shafts	Metal Scaffolding	10	Sept 2019	284
Concrete defect rectification in lift shafts	Miscellaneous Worker	2	Mid Sept 2019 - Mid Oct 2019	182
Lift installation	Lift Installation Worker	20	Mid Oct 2019 - Jan 2020	313
Uninstall lift shaft gates with IoT sensors	Shui On	2	Jan 2020	111



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Figures

- Total 890 alert messages were received. 880 numbers of alert messages came from approved applicants, 10 numbers of unauthorized cases are found. In average, 12.7 numbers of messages *per day* within this period.



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Strength of Product

- Installation is extremely easy. No electrical supply is needed. No wi-fi or broadband network is needed. No modification or damage to temporary lift shaft gate is needed.
- Battery consumption of IoT sensors are very low that no battery is needed to replace within entire trial period.
- All status of safety alert system can be clearly monitored in single IoT Platform in addition of other sensors applied and installed on site.
- Strong service backup from Grand Brand Supplier – SmarTone.



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Performance and Benefit

- Due to adequate training to workers such as induction training courses to all workers and special training courses to workers working in lift shafts, no intentional damage of the system is recorded.
- Battery consumption of IoT sensors are very low that no battery is needed to replace within trial period.
- No abnormal incident or fault message was found except 1 weak signal case is found.
- Compared with existing safety practice, frequency of inspection and checking of lift shaft gates can be released. The IoT platform showed the detail status of each sensor as well as each lift shaft gates as table below which can help us to identify any specific defect from IoT platform all the times.



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Difficulties and Experience during R&D

- Weaker signal at the upper floors is found. For further improvement, signal pre testing may be process one more time while the building is constructed over 60m height.
- If alert message is frequently that may reduce the alertness of management staff and frontline colleagues. New function may be developed to turn on or off the alert message at IoT Platform if permission is granted.



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Additional items

Safety Alert System at floor opening funded by CSF

Nos. of Safety Alert System 10

Size of floor opening : 600(L)X300(W)

Duct openings is seldom opened until installation of pipes, no finding is observed.



Safety Alert System at Electrical Distribution Boxes

Nos. of Safety Alert System 66



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Conclusion

Conclusion

- Conduct permit to work system in aid with NBloT alert system for lift shaft openings are reliable and effectively as well as prevent falling material from high levels.
- Pioneer innovation product applied to construction industry. First and Little Step Only. Further development is highly expected.



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Conclusion



Wider application of NB-IoT safety alert system in construction sites can be considered other than lift shaft openings, floor openings and electrical distribution boxes.



Key Contact Person

Key Contact Person	
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Thank you