Face Collapse Detection System: Rock Fall Finder

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In the mountain tunnel construction, constant monitoring for a sign of face collapse is crucial to prevent labor accidents from rock fall. In Japan, it is mandatory to appoint a full-time face guard for the construction of tunnels with cross sections of 50 m^2 or more, but finding all signs pebble falls visually has been difficult.

Rock Fall Finder detects the pebbles falling from the tunnel face, a sign of face collapse, by image processing technology and immediately issues an evacuation alert to face worker. Monitoring the whole tunnel face with the webcam in addition to the conventional visual monitoring drastically improves the safety of the face operation and contributes to the prevention of labor accidents.

The features of Rock Fall Finder are as follows.
· A warning light, a buzzer, a webcam and a laptop computer are installed in a tunnel jumbo. Monitoring state can be checked on a tablet (Fig.1).
· Using an image processing technique called background difference method, it detects a rock fall within 0.5 seconds. At the same time, a warning light and a buzzer give an alarm (Fig.2).
· It excludes the movement of people and heavy machines from the monitoring area to monitor only the falling rocks.
· Easy to operate, it can be handled by anyone.
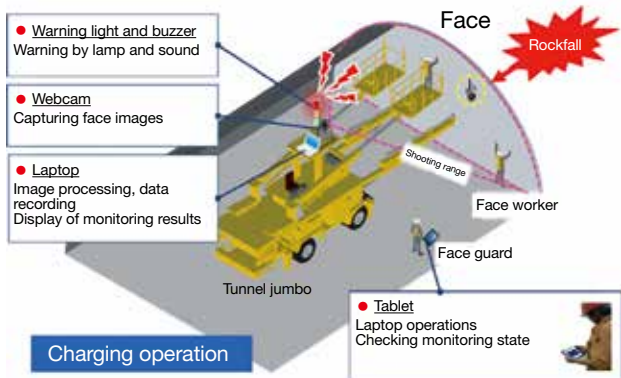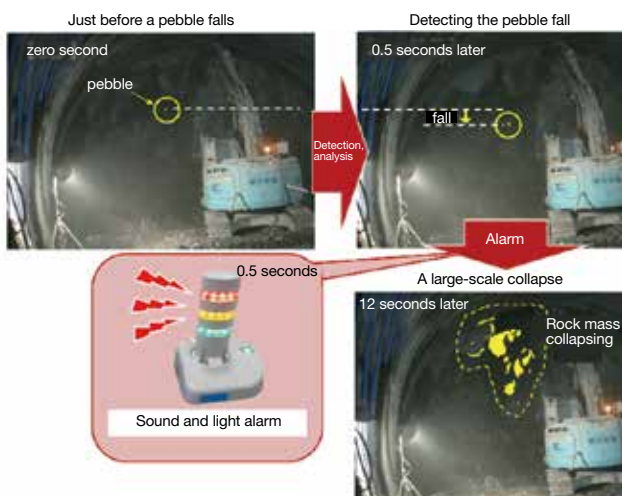

Fig.1 Detection system

Fig.2 Rockfall detection using moving image during excavation