Proposing a bridge inspection device capable of operating in complicated structures with an extendable arm mechanism, inspection is carried out with a movable camera and illumination solution.

Easy inspection is obtained by stitching the acquired additional data with a tapping device.

The inspection device is controlled under the bridge surface by controlling simultaneously the length of 4 wires.

Possibility to carry out visual and tapping inspection close to the surface.

By extending the arm equipped with an attitude sensor, operator can further inspect the surface.

Wires are fixed utilizing clamping devices and the arm is control from a movable compact control cart.

UAV and slingshot devices are used for the guiding of the initial wire.

Database for the acquired data to facilitate the inspection.

New robotic system to allow new detailed inspections.

The following images show the operation of the new system.

Supporting winches (prototype)

Supporting winches (prototype)

- Each winch can be firmly set on the bridge using clamps and auxiliary wires.
- By controlling the four winch wires length, the arm can be arbitrarily set in an area of 5 m by 10 m.
- Arm can be moved at a speed of 8 cm/s.

UAV for wire guiding (prototype)

- Confirmed the hovering function based on several sensors’ data, such as from cameras, gyro, etc.
- Confirmed stable flight while taking a wire of 10 m under the bridge to connect the lateral sides.

Current Accomplishments (1/2)

Overview of the robotic system “BRIDGEVIEW”

New Robotic System (March 2019)

- Extendable Arm maximum length: 2.5 m
- Arm roll control range: More than 20 degrees
- Continuous operation time: More than 3 hours
- Mass of the extendable arm: Less than 15 kg
- Largest area covered by four winches: 30 m × 30 m
- X, Y arm position resolution: within 100 mm

Guaranteed specifications for the visual inspection Unit (March 2019)

- Pitch range: ±90 degrees
- Yaw range: 360 degrees
- Minimum crack width: 0.05 mm
- Dust and water protection: IP56
- Mass: Within 2.0 kg
- Continuous operation time: More than 3 hours

Goals

Experiments and demonstrations were carried out on November 1st 2016 at Sakiku Bridge (Ibaraki Pref.) and on January 26th 2017 at Tozawa Bridge (Kanagawa Pref.).