

Spiderman: Outdoor Wall Cleaning & Painting Robotics System

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PROJECT DESCRIPTION:

Motivation & Objectives

Currently, outdoor wall painting process on buildings is done manually by painting workers who are carried by a manually controlled gondola platform. For each horizontal axis movement, worker will need to shift the gondola manually and the whole painting process becomes time-consuming. This is also hazardous as the painter may fall off from a great height. This project aims to develop an automated outdoor wall cleaning and painting robotics system, named Spiderman. When successful, it will provide cleaning and painting services on outdoor walls which such as HDB flats and high rise buildings.

Methodology

Spiderman is a robotics system which consists of an automated moving gondola platform, a UR10 robotics arm and paint/water spraying mechanism. The horizontal and vertical movement of the gondola is controlled by an industrial PC without human intervention. On the gondola platform, there is a gondola stabilization system which will stabilize the gondola onto the wall before performing painting task. Four linear actuators each equipped with one suction pad are installed at the front face of gondola. These linear actuators will be extended out to suck onto wall surface in order to prevent gondola from swinging due to air conditions. The painting system will scan the wall geometry through a 3D TOF camera, analyze and generate painting path for the respective wall. The cleaning and painting actions are executed through an electrical controlled spraying valve in combination with the movement of UR10 robotics arm.

Advantages of Spiderman

- An innovative invention consisting of **automated computer controlled** and **self-stabilized** gondola platform
- Consists of automated system which can be fully controlled wirelessly at the ground station
- Consists of automated water/paint spraying system
- Less manpower needed: from 4 to 2 workers
- No human is required to be present on the gondola hence reducing human falling risk

Results / Progress

- Spiderman is able to perform wall painting tasks on buildings' outer wall
- Gondola platform is able to move automatically without human intervention
- Gondola platform is able to stabilize itself through suction mechanism



Figure 1: SPIDERMAN doing outer wall automatic painting/cleaning system

GRANT: ELID Technology International Pte Ltd, 6 Aug 2016– 6 Feb 2017

PERSONNEL:

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