

2014 年臺灣國際科學展覽會 優勝作品專輯

| | |
|------|------------------------|
| 作品編號 | 100036 |
| 參展科別 | 工程學 |
| 作品名稱 | Robotic Window Cleaner |
| 得獎獎項 | 四等獎 |

| | |
|--------|-----------------------|
| 國 家 | New Zealand |
| 就讀學校 | Mount Roskill Grammar |
| 作者姓名 | Sohail Abdulla |

Abstract

My project is a robot designed to clean windows and eliminate the need for human labor. My ultimate aim for this project is to develop my robot to clean high-rise buildings as well as homes. The current version of my robot is designed to clean only house windows.

The idea to invent a robot that would automatically clean windows came to me when I arrived home from school one day and found my father struggling to clean the outside of our living room windows because he suffers from back and knee pain. During my research I stumbled upon high-rise window cleaning accidents in which people have lost their lives and this gave my project greater purpose.

The major challenge I faced when designing my robot was getting my robot to stick to a vertical window while maneuvering around its surface without falling off. My solution was to use vacuum technologies, suction cups and direct current motors in my design. My robot is made up of a mechanical system, an electronic system and a pneumatic system. The mechanical system consists of direct current motors that drive the two arms of the robot backward and forward through a rack and pinion enabling movement. The pneumatic system provides the vacuum that enables my robot to stick to the window and also consists of pistons that lower the suction cups onto the glass. The electronics system is made up of a microcontroller that uses transistors to control the robots various components.

Some key features of my robot include the new split unit design which includes a cleaning unit and a control panel that allows for a decrease in the weight of the device, ultrasonic distance sensors for window edge detection and a self drawing cleaning

progress map which the robot displays on the LCD screen on the control panel. Gauges have been added to monitor pressure and vacuum levels in the system so that the user is aware if a problem were to occur. The dual squeegee design includes a squeegee on either end of the horizontal arm which are raised and lowered at certain times while the robot maneuvers across the window to result in the most effective clean. Attached to the squeegees are microfiber cleaning pads that are used to clean the window.

I plan to one day develop my robot to clean high-rise buildings so it minimizes the risk of workers losing their lives.

評語

因為要解決父親高樓清潔窗戶的問題，而開發此研究問題。

市面上已有相關產品，應該就價格競爭力或是產品特色上來比較並展現成果。

對於較窄的窗戶，恐有死角，而吸盤也有機會在窗戶留下”足跡”而不利清潔。