



<i>Project Title:</i>	Autonomous Mobile Robot for Material Delivery and Site Inspection
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<i>Project ID:</i>	CICR/03/22
<i>Research Institution:</i>	Shui On Construction Company Limited
<i>Subject Area:</i>	Construction Productivity
<i>Duration:</i>	12 Months

Background

In view of the current labor shortage and increasing safety and health issues occurred in site, we would like to adopt more robotic technology to ease the condition. As construction site is getting more complex, larger and challenging, labors usually required to transport material from one point to another. Material transportation is a very common and repetitive task which cannot be avoided. However, it is observed that a majority of injuries, like back strain and sprain, are easily caused by moving and delivering heavy materials or tools from one location to another location.

After searching market-ready solution, most of them are not designed for site condition, while some products, although they are able to navigate at site environment, they require manual control. Therefore, we would like to develop an automated mobile robot for material delivery in site environment.

Conventional automated guided vehicles (AGVs) can only follow fixed paths and move to predefined points on the guide path. Whereas, Autonomous Mobile Robots (AMRs) can move to any accessible locations with obstacle avoidance within a given area. Small changes due to, for example, a machine layout change would typically take substantial time for most AGVs guidance systems to adjust, cause periods of inactivity, risk economic losses and decrease in productivity. AMRs, however, can adapt quickly to changes in the rough terrain construction sites. To solve this problem, an AMR that has obstacle avoidance, path recognition, deliver materials or tools in the rough terrain construction sites is proposed.

Objectives

- To develop a new Autonomous Mobile Robot (AMR) that can deliver heavy load with maximum of 150kg by using auto navigation with obstacle avoidance, path object recognition and working in the uneven surface construction sites;
- To develop object recognition and video analytic technology for the AMR, for detection of the workers wearing personal protective equipment, using improper ladder, people smoking, and workers falling down etc. in restricted site area; and
- To develop image capture system for the AMR to monitor the construction project progress.

Key Deliverables

- A prototype of Autonomous Mobile Robot (AMR) which can deliver materials and tools by using auto navigation with obstacle avoidance with path recognition and working in the rough terrain construction sites.
- AI Object recognition for path recognition.
- Follow me feature which is the AMR follows human' s movement to move for robot control.
- An easy-to-use web service is provided for the user to control the AMR through mobile device via the Internet
- Safety and Progress monitoring video analytics modules, buzzer will be installed on AMR for alert.

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