Kanjana Chawbankor 2009: Design of Air-duct Surveying Robot. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Mr. Withit Chatlatanagulchai, Ph.D. 103 pages.

In this work, we design and build an air-duct surveying robot. We apply the belt-driven system to the car-like driven system. Two motors are used to drive the right and left wheels separately, and an RC servo motor is used for turning. There are three sets of wireless communication hardwares for controlling robot movement, transmitting the position data, and transmitting the video image. The robot is controlled by a microcontroller modeled dsPIC30F2010 as the robot's central processor. There are two control modes, which are the automatic mode and the human controlled mode. In the automatic mode, signals from three infrared distance measuring sensors are used in controlling the robot movement. The robot position data are transmitted to a computer via a wireless RS232 port using 2.4 GHz frequency signal to generate the map of the air duct system. In the human controlled mode, a radio control is used in the robot movement control by controlling the two axes, horizontally and vertically.

Experimental result shows that the robot can climb a slope of forty five degrees when a sand paper is used to cover the slope's surface. The maximum ground speed is 0.342 m/s. In the automatic mode, when the robot is placed in an air duct system model, the robot is able to follow its designed path according to the navigation algorithm and to come back to the origin. In the human controlled mode, the movement control is not complicated, and the robot can move quite well in limited space with good mobility. The maximum wireless transmission distance in an open area is thirty five meters. All wireless devices are operated normally. The generated map from the robot position signals is close to the actual robot's path. However, the map is in the wrong scale since distance, time, or direction data are excluded in the map generation.

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