

## Graduation Thesis Summary

The main objective of the final year project is to obtain the basic understanding of robotics in order to design and develop a mobile robotics system based on reconfigurable robotics concept. Reconfigurable robot is a new evolution in robotics history where the ability to transform into various shape is the key design to make robot more versatile in accomplishment of more sophisticated applications. The system is a combined design of both conventional robotics components and reconfigurable robot to produce a new robotics prototyping system. With the advantage of reconfigurable in the conventional components, the new system has eliminated the complicated robotics construction in conventional approach while it still remains the idea of current robotics design. With this combination, the new robotics system will have a great potential in robotics prototyping to assist the future development of robotics study.

The whole project consists of 3 main stages until the first prototype of the new robotics system is completed. Through the entire process, the author has given a chance to learn from the fundamental of robotics design and having hands-on training via the preliminary practical work and lastly to design and develop a new robotics system. The main focus in the first stage is concentrated on general autonomous mobile robotics development. Besides literature reviews, 7 practical implementations have been carried out. The study has been further continued but more attention has been put into reconfigurable robotics system.

In the second stage, the discussion is centered on the general concept of a new robotics creation system. CAD modeling software, Pro/Engineer has been used as the main tool to create the 3D model to visualize the conceptual design. A few conceptual examples have been presented and are categorized into 3 main groups for different proposed applications.

As for experimental and practical evaluation purpose, the first prototype has been developed in the final stage of the project. The main objective here is to implement the conceptual design into physical application. A simplified set of robotics components have been developed in order to demonstrate a line tracking mobile robot system.

The first version of the new robotics system consists of basic elements for general mobile robotics system invention. It has a main microcontroller, general purpose mechanical drive system, power supply, basic sensors, simple RF module, three-axis robot arm and camera system. These components have been categorized into 4 major groups of general robotics components; there are controller, sensor, actuator and power supply. Standard color scheme is used to distinguish the components among the groups. All the components have standard interface which compatible to each and other. There is a standard wiring system and everything is in plug-and-play basis. The new robotics system is not limited to certain microcontrollers as the control unit and it can even use wireless control. The main concept for the robotics programming is it has a standard programming module for each of the component as the programmer can just include the module to ease the programming for the components that are attached to the system. With this, it is just as easy as plug-program-play robotics creation system.

This is a complete robotics creation system which provides flexible robotics designing tools for rapid robotics prototyping and construction. This new robotics system consists of various robotics elements which provide the building units for robotics invention. The unique components design enables infinite combinations to represent the unlimited robotics inventions and design ideas. The flexible design also provides an easy and convenient construction concept which enable rapid robotics prototyping and reconstruction within just few simple steps. The simple plug-and-play design eliminates the major interfacing problems in robotics and introduces robotics invention to non-technical users and even young children. With this, it is a great educational tool to encourage robotics invention from younger age. Beside that, its ability to integrate conventional robotics components has established its great potential in industrialized robotics research and development. The unlimited expandability is the concept of robotics for tomorrow robotics invention development.