CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

4-wheels ground vehicle can be referred to as an advance technology operate without the present of human nearby thus it is called as unmanned system. This technology emerged from a complex combination of artificial intelligence, computer technology and advanced processor developments. That complex combination give birth to a highly advance technology capable to operate on any extreme condition. This advance technology also classified as an intelligence vehicle as it put robotic technologies one step forward to the future.

This technology is a land-based vehicle so it can only be applied to an operation while in contact with ground counterpart to unmanned aerial vehicles and remotely operated underwater vehicles. The special about this advance technology vehicle is it capability to move on a clear road to an uneven road with ease. Typical field conditions include urban road, meadow, sand, forest, rocky area, mountainous area, watery area and muddy terrain. This piece of technology can also withstand the possibility of being heavily impact from an extreme condition.

As this robotic vehicle can withstand any extreme condition, it will be paid more attention in future combat field and play a far more important role as a military support. When the robotic technologies become more mature, more and more advanced ground vehicle will be designed and produced for military operations, in order to reduce casualties. Ground vehicle will be even more widely used in some other new area, such as new weapon testing, pollution elimination, military production, and electronic warfare.
1.2 PROBLEM STATEMENT

The student will program the control system of a 4-wheels ground vehicle using Arduino board. The program of control system must be able make a ground vehicle to climb a standard height of stairs. Every parts and components involves inside a ground vehicle must be considered precisely in order to make a ground vehicle to operate perfectly according to the program and able to climb stairs successfully without any error or malfunction happened during the operation time.

The student also will improve the part of a ground vehicle so it can be able to climb a stair successfully. For example, the chassis of the ground vehicle need to be improvise according to the movement of the ground vehicle so it can climb a stair without any problem. Any part involved with the movement of the ground vehicle while climbing a stair need to be analyse in order for the ground vehicle to climb a stair smoothly.

1.3 OBJECTIVES

The main objectives that need to be fulfilled to finish this project is:

i. To change the control system of a 4-wheels ground vehicle from using radio remote control transmission to using programmable electronics board.

ii. To program the control system of a 4-wheels ground vehicle using Arduino board to climb a stair.

1.4 SCOPE OF PROJECT

To fulfil the objectives specified above, the scope of project study is to use a standard rock crawler radio remote control as a model 4-wheels ground vehicle. After that, program the movement of a 4-wheels ground vehicle climbing a stair using Arduino UNO. Then, simulate using Tracker software to analysis the movement of a 4-wheels ground vehicle climbing a stair. Lastly, the project required to be accomplished within the 6 month of period based on the Gantt chart schedule proposed (Appendixes A).
CHAPTER 2

LITERATURE REVIEW

2.1 WHAT IS 4-WHEELS GROUND VEHICLE?

There are a question that must be answered first in order to design a full functioning 4-wheels ground vehicle to climb a stair which is the purposes of a machine categorized as 4-wheels ground vehicle as well as it usage to the surrounding. 4-wheels ground vehicle is a vehicle that operates while in contact with the ground and without human presence inside it. It can be used for many outdoors applications located on inconvenient, dangerous, or impossible condition which not require to have a human operator present as it will harm them. For a field ruggedized 4-wheels ground vehicle such as rock crawler, it have a capability to withstand any extreme environment which make this vehicle more superior to human capability in certain condition. Usually, most of a 4-wheels ground vehicle will have a set of sensors to observe the surrounding environment, and will either autonomously make decisions about its behaviour or pass the information to a human operator at a different location who will control the vehicle through radio remote control.

A 4-wheels ground vehicle is a successful products with a combination of artificial intelligence, computer technology and advanced processor developments. As a field ruggedized vehicle, a 4-wheels ground vehicle are being actively developed for military use to perform a variety of dull, dirty, and dangerous activities on clear or uneven grounds. Which is why a lot of 4-wheels ground vehicle applications used for military operation. There are two classes of 4-wheels ground vehicle in terms of their basic handling which are remote operated and autonomous. Remote operated is controlled by a human operator via a communications link such as radio transmission. All actions are determined by the operator based upon either direct visual observation or remote use of