**Introduction**

Unmanned vehicle is very popular in military for navigation and transportation, because it can access lethal environments without threatening human lives. It can operate in an extreme environment such as continuous exposure to high pressure or high temperature. The technology in unmanned vehicle can also be applied in other commercial products such as toys and different forms of vehicles.

**Aims and Objectives**

New motion drivers, sensors and processor will be designed and integrated into a robust robotic platform. At the end of our project, the robot should be capable to obtain its coordinates and orientation, plan its path and control its motion, such that the robot can navigate to its target by itself. Other peripherals could be added to enhance the performance if necessary.

**ARM9 Core System**

The central core of our Robotic platform is extended from s3c2440 processor built by Samsung. On top of the uClinux OS, the software platform coordinate different parts of the robotic system including the positioning system (Gyro-board), the dual-motor controller we built and PC computer and etc.

Functions:
- Path Planning
- Sensor management
- Receptor management
- Debug and control

**Positioning System**

The positioning system can operate at 450Hz internally which is twice as the previous version. In addition, the new system supports 3D navigation. However, the error is relatively larger than the previous design. Further testing is needed for this new design.

Functions:
- 3-AXIS Gyroscope.
- Digital Accelerometer.
- Supporting up to 11 line sensors for calibration.
- Included 3 LM629 for rotary encoder.

**Motor Driver**

The Motor Driver was designed with the following features:
1. Add a MCU to calculate the PID and do the protection.
3. Over-current will not cut the power instantly.
4. Current feedback to the MCU on the Motor Drivers.
5. Motor's Encoder connected to the MCU on the Motor Driver.
6. Use heat sink cover instead of fan to reduce the heat.
7. Reduce the size and the height of the motor drivers.

**Further Work**

ARM9 Core system:
- More kernel modules can be added to support other device control
- A Graphic User Interface can be developed by Utopia
- FPGA can be added to provide more I/O ports for sensors

Positioning system:
- a faster MCU should be used to increase the sampling rate.
- GPS module can be added to improve the accuracy.

Motor Driver:
- More function for safety and error detection can be implemented.
- BLDC control can be developed.