Project Overview

The Game Boy Advance (GBA) game console, which is produced by one of the TV game giants, Nintendo, has become a very popular electronic gaming device in Hong Kong. This game console has a high potential in both hardware and software developments. It is easy to find on the internet, with a huge number of websites about GBA.
The final year project "Virtual Joystick Interface for Small Handheld" is dealing with this wonderful game console.

The aim of the project is to design and produce an add-on to a GBA so that I can use the console itself as a joystick. That means when you move the GBA console to the left, it is the same as if you were pressing the left key, the same concept applies for other directions. The little change in the earth magnetic field can be sensed for distinguishing the player's hand movement. By using a magnetic sensing Integrated Circuit (IC) chip called 'HMC2003', I can analyze the output data and so I can determine the movement of the game console.

Since this is a continued FYP, the group of last year has decided the block diagram of a magnetic sensor circuit. The group of last year had written racing games where the GBA acts as a wheel itself, to demonstrate the effectiveness of my project and try to implement a compass by this magnetic sensor circuit. So the focus in this year is how to implement the compass more sensitive and user-friendly.

System Block Diagram
In the system, the HMC2003 will read change from surrounding magnetic field and give 0-5V output. Then the A/D converter will convert the reading into 8-bit digital signal. Then the microcontroller will read the signal in serial. Finally, the data will be converted by internal program of the microcontroller to RS232 data transfer standard and send to GBA by GART link pin.

There are 2 parts of software processing in the system. First one is the 8051 program in microcontroller. It control both A/D converter output and the GBA input by converting digital input into RS232 data transfer standard.

Second one is the C++ program for GBA. The data come from microcontroller is simple numbers, so a program is needed to process them to become useful information such as direction or movement. These GBA programs are compiled by Devkitadv, a GBA compiler for C++ language.

**Conclusion**

Although I cannot implement the whole system, it has been show that the direction sensing power of our circuit. And the GBA emulator has show the calculation ability.
in the microcontroller.

Schematics