Chipkit Portable GPS (draft)

By Justin Lex and Petr Kocián

Objective and requirements

Main goals

- Send and Receive UART messages from Ublox GPS module
- Interpret NMEA messages from GPS, such as XXGGA to print out lat/long
- Interpret more advanced NMEA messages from GPS, such as speed, altitude, time
- Create an interface to show GPS data on the OLED screen
- Do interesting data manipulations, such as beeping to represent current speed, or LEDs showing number of synced satellites

Optional goals

- Implement map of Kista with current location
- Implement I2C communications with compass module
- Implement rotating compass graphic
- Implement UBX protocol and fully utilize the GPS module's features

Solution

We plan to use the secondary UART bus on the ChipKIT to send and receive messages to and from the GPS module. We can then process the messages and format them for the OLED display on the basic I/O shield. We plan to have some sort of interface on the display in order to show all the different kinds of data sent by the GPS module, and we would like to hopefully implement graphics such as a live map and compass pointer. This interface will be controlled with the I/O Shield buttons and will have a refresh rate based off of timer interrupts. The project will be powered by a 9V battery, which will allow for the GPS to be completely portable. The code will likely be written entirely in C, and compiled for the ChipKIT using the MCB32 toolkit.

Verification

We plan to verify the code by manually checking the NMEA/UBX codes received by the ChipKIT, and comparing the GPS data to GPS data from our smartphones. We plan to test out the UI to make sure it responds properly in all conditions.

Contributions

Our initial plan is divide up the program into UI and UART processing, and Justin will mainly work on the serial communications, while Petr will mainly work on the UI. However, we plan to collaborate heavily, and utilize Atom Teletype for buddy-programming in order to speed up the code-writing and improve the quality of the code. The actual contributions made will be described in more detail in the final report, and will also be mentioned in the code comments.

Reflections

We will reflect on the project after it’s finished in the final abstract.