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To design the tracker, background knowledge on what components will be required to create the device was required. Literature can be found in the journal of this project. During the literature study the required components were narrowed down to: a microcontroller, which will be used to communicate with all the other components and process their data; a GSM/GPRS module, which will receive user queries (SMSs) and respond to them; a GPS module, which will get the location of the device.

There was decided on using an Arduino as the microcontroller (MCU) of the first prototype, this decision was made because the project leader (Daniel Wykerd) already had experience using Arduino and its IDE, anther deciding factor was the fact that was that Arduino is open source hardware. There was also decided that on the use of an Atmel MCU with an Arduino bootloader burned on it for later prototypes as their MCUs are Arduino compatible. Research was done on multiple ATMega and ATTiny MCUs (all of which are listed in my journal) but there was decided that the ATMega328p MCU was the best option as it is the same MCU used in most Arduino boards, this will make the design and testing process much easier as this MCU is very well documented online.

Next, research was done on what GSM/GPRS module to use. The prime requirement for the module is to be able to send and receive SMSs. Two companies were found during the study that make modules that meet this requirement: Quectel and SIMCom. Both these companies were well documented, but further research into local availability revealed that Quectel was not readily available in the form of development boards (boards that already have all the support circuitry), thus SIMCom modules were chosen as they were widely available for purchase on development/breakout boards. It was necessary for the modules to be on breakout boards to create the first prototype on a breadboard for testing. There was decided on 3 possible modules: SIM808, SIM800L/H, SIM800C. The SIM808 seems like a good choice as according to its datasheet it has GPS functionality built in, but it does not have an integrated patch antenna (SIMCom, 2016). The SIM800L/H is also included in the list as it is readily available on breakout boards and has all the features required and more. This chip won’t be useable for the final prototype as it comes in an LGA (Land Grid Array) package which can only be reflow soldered. Thus, the SIM800C is also included on the list. It is like the SIM800L/H, but it has less unnecessary features and more importantly it has an easier to solder SMT layout.

Lastly research was done on GPS modules, there was decided on the GlobalTop Technology Inc.’s FGPMMOPA6H as it has an integrated patch antenna which will result in a smaller PCB footprint in the final prototype and less costs. The module is also used in Adafruit’s Ultimate GPS module and is well documented on their website.

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