

Open Source GPS Collars – James Foley – University of Oxford

The devices are built using the open source electronics and programming platform Arduino. The primary component of the device is a microprocessor board with wired micro SD card storage (used in this device was an Adafruit Feather m0), there are a variety of such boards that are compatible with Arduino that could be chosen depending on the storage, power, shape or size requirements of the project. Soldered onto the board is a separate GPS board with a GPS chip with 66 band antenna and a backup coin cell battery. Wired onto the processor board is a 3-axis accelerometer. The collars are powered by a 4400mAh rechargeable Lithium ion battery pack, however a battery of any size with a JST connector can be used depending on the power or weight requirements of the study or species that it is on. To protect the components from damage they were placed in plastic housing that was 3D printed, allowing the size, shape and attachments of the housing to be varied based on what is needed, the 3D printed housing is then coated in a clear polyester resin that helps to increase the weather resistance of the housing and to provide added durability, the housing is sealed with a lid around which a rubber seal is glued to ensure water cannot get in. The housing was attached to a standard durable leather dog collar fastened with a metal buckle. The devices are programmed using the Arduino repositories based on the C++ language. The programming allows for the frequency of data collection to be easily changed by altering parameters in the setup code. The collars can be programmed to sleep if there is no movement detected in the accelerometers to improve battery life. The collars have no satellite or radio reporting components however these can be added by adding further components to the collars. The completed collars are extremely lightweight with further ability to reduce weight by using different components or smaller batteries, housing or collars. Full step by step instructions for construction, with pictures, can be seen in figure 1.

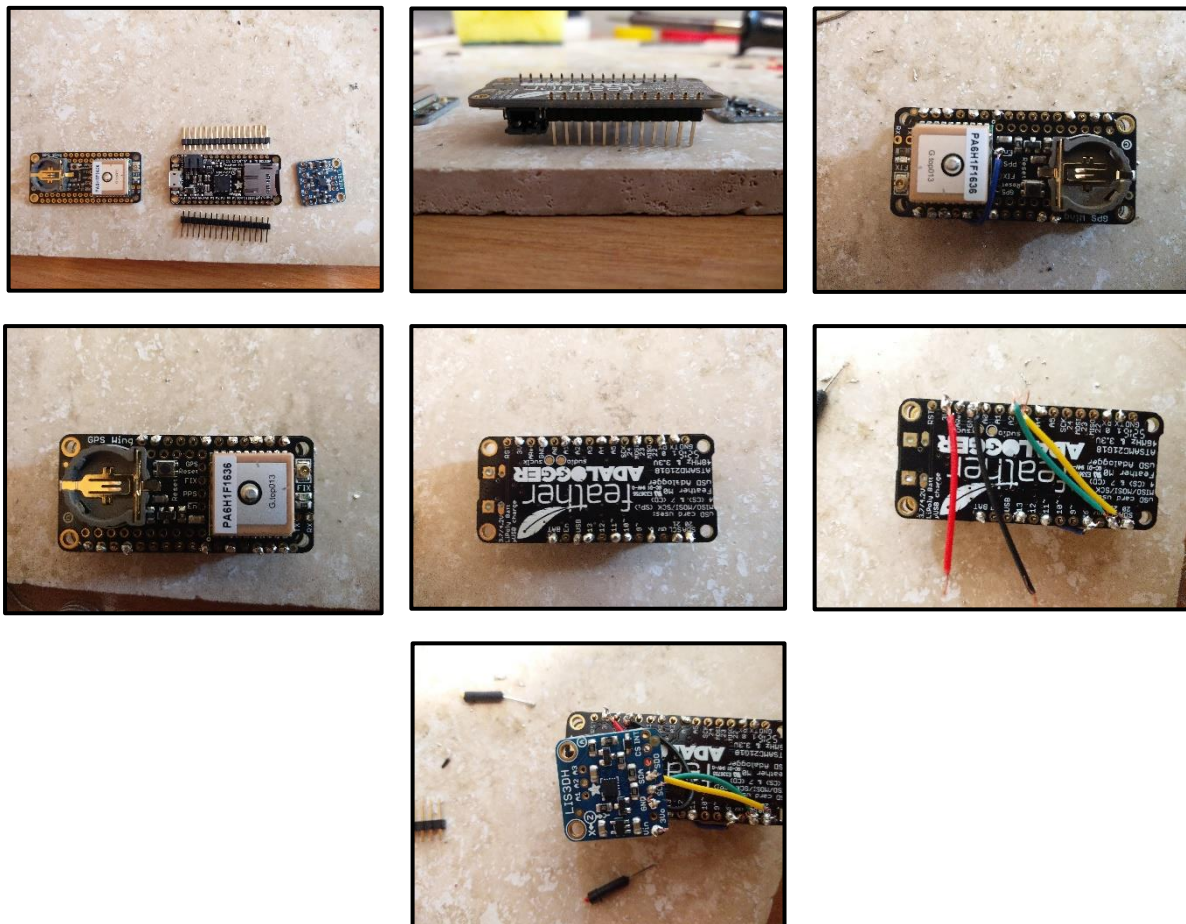


Figure 1: a) Starting components from left, GPS Board, MicroController Board with header pins, Accelerometer. b) First step is to place the header with the smaller pins through the controller board. c) Solder the pins into the board making sure that at least the gnd, 3V TX and RX are securely connected. d) Solder the GPS board onto the longer pins above the controller board. e) Solder a wire that connects a data pin in the controller board to the Enable pin in the GPS board. f) Solder wires onto the 3V (red) gnd (black), SCA (green) and SDA (yellow). g) Solder the wires into their corresponding pin on the accelerometer.