Hardware Plan of Action

FPGA Block Diagram
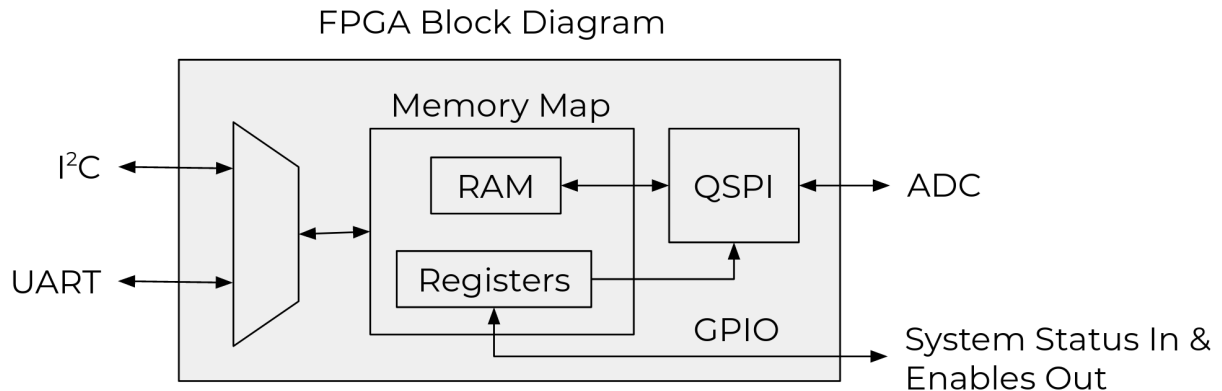

~Assuming this is a small team of maybe 5 people~
~Assuming all parts have been given the go-ahead to be purchased~
~Timing is variable due to unknown complexity~
~These are Rough Time Estimates, Every Step is Repeatable or able to be revisited further in production~
~Documentation is a must, no excuses~

1. **Hardware Verification** *(28 weeks roughly)*

   We are physically testing the parts to make sure they respond accordingly based on prior calculations.

   a. *FPGA (12 weeks roughly)*
      i. Verify the board has been assembled correctly
         1. Make sure all the components are on the board and soldered or attached to the board properly
      ii. Verify the components on the board work as intended
         1. Test all the components on the board
            a. Make sure all components reach minimum requirements
            b. Make sure all components do not go past threshold in normal testing environments
            c. Make sure all components can be used to their fullest extent without burning out the board
            d. Signals hold their integrity and components can be validated
            e. Power of the board is strong and stable
      iii. In short, make sure the board and all its components are reliable, meet all minimum requirements, and when in normal testing environments thresholds are not met unless intended to.
      iv. If the board has to be connected to anything, make sure those busses are functioning properly and signals are held throughout transport
   b. *I^2C & UART & ADC (16 weeks roughly)*

       i.   Make sure before purchasing such external devices they can communicate with the main development board (FPGA)

     ii.   Make sure all components of each individual board work separately and meets minimal requirements

          1.   Power the board on

          2.   Make sure it can send and receive data correctly with no issues

    iii.   Make sure that the components of all external devices not to push either counterpart device to a threshold.

    iv.   When working in union with the other devices make sure the devices can test and compute together and hold stability in typical test environments/situations

     v.   When testing thresholds, make sure that if thresholds are met, that the repercussions are not hazardous.

    vi.   In General, make sure the devices can achieve the basic functions with no problems, no software involved

   vii.   For the ADC in particular, need to do extensive DSP testing on the device to make sure it is functioning properly.

2. **Software Verification (15 weeks roughly)**

   a.   Install the firmware for all devices & any low-level software that needs to be applied onto the board

   b.   Install any of the essential operational software needed for the board to get it operating the way it is intended.

   c.   After installing all the necessary firmware and essential software to get the board functioning at its basic level, start to debug each device individually

   d.   After verifying that all devices work individually one by one, add them together and test the connectivity and the data send and receive.

       i.   Make sure all levels are stable, and all functions stay strong through testing

3. **Memory Testing & Data (16 weeks roughly)**

   a.   Test all devices individually and make sure all memory blocks and registers are accessible and functional

       i.   Be able to send and receive data from registers and memory blocks

   b.   Test components in pairs and make sure they have stable and successful handshakes of data.

   c.   Test all components together and make sure handshaking between all devices is stable and successful

       i.   No data is lost

     ii.   Make sure to validate the data

   d.   thoroughly test all situations that could arise when sending data between the external devices

4. ***Operating System and Embedded Software (17 weeks roughly)***

   a.   Install the operating system for the FPGA

       i.   Make sure it is stable when working in union with the other devices

      ii.   The operating system should not hinder the overall integrity of the system, make sure the board can still manage minimal requirements like the beginning hardware verification

b. Embedded Software

      i.   Install the software to be embedded into the FPGA

          1. Make sure the program can compile

              a. If the program compiles test to make sure it meets minimal requirements

          2. Make sure the embedded software works in typical testing situations and environments with external devices.

          3. Make sure all devices still hold stable minimal requirements with no problems

      ii.   In general, make sure the FPGA works perfectly stable and meets all requirements by itself with the software installed, then one by one add the external devices and make sure they hold stable minimum requirements with no issues.

          1. Test thresholds and make sure that in the future, the software takes into account the thresholds and diverts the devices from going any further if it starts to approach a threshold.

          2. Make sure there are protocols in place if a device is not working at intended.

Total Time = 76 weeks = 1 year and roughly 5 months