I like working with microcontrollers from sunrise to sunset and then just a little bit more at night as a hobbyist building robotic applications. The time I enjoy the most while working with microcontroller is my spare hours at night when I develop robots and gadgets. This implies that I have to use my budget to buy all the necessary components, at the same time I pay my house and other bills. That is why I can not afford to buy a 10K emulator to make my embedded system design experience easier. While most companies think of hobbyists just as a group of people playing and not big spenders (reason for which our needs are not necessarily supported), I like to think that most us could easily be the future of many microcontroller based applications.

I knew I was not alone when a company decided to target designers with limited budget to use their microcontroller. Atmel’s AVR 8 bit RISC architecture is one of the greatest and easiest I have explored, but its real kick to me was that the tools were inexpensive and extremely powerful. With an ICE200 for around $200 (at the time, it sells for $100 now!) and the STK200 at hand, my home projects started to take place and my wallet to breath with ease!

I never found a complaint with regards to the ICE200. The STK200 on the other hand was a different story. The tool was great and economical when evaluating a particular microcontroller for a small project. Unfortunately it lacked a vital part for my style of development. I needed many boards where each could hold a microcontroller based application with little breadbording or wire wrapping as possible. Also, I wanted to interconnect these boards without having to use tedious harnesses.

What I needed was a development board with prototyping space and some means to connect more than one together. Browsing through the web didn’t help. That was when I designed the AT90SMINIPB. This little board has tons of prototyping space. It will accommodate IC’s, passive components as well as all the other items a designer need to develop an application revolving around any 20 pin or 8 pin device from the AT90S Classical and ATtiny architectures (Refer to Figure 1).

The board worked awesomely! Thanks to the easy access to all ports I was able to develop applications to control steppers, DC motors, high power loads, sound recording chips, etc very, very fast!

In order to interconnect more than one board together so that they could share signals such as power and control lines, the board bottom side has an edge connector with extra pads to give a door for the microcontroller to the outer world.

For this concept to work we need the PBMB (Project Board Mother Board). This board has three edge card slots where the project boards can be plugged in. Each connector contains 62 signals which are totally shareable between the three cards. Thanks to a fourth set of pads, these signals can also be interconnected to the available prototyping area. To make it more universal, the PBMB already comes with its own RS-232 port. Extremely handy when wanting to use the UART on most of the AVR microcontrollers.

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Again life was good. But I had learned my lesson and remembered the concept of flexibility. What if I were to need more space? More holes to put extra components that the microcontroller needs to fully work as intended in the desired application. The ProtoXP (from Prototype Expander) gives new added flexibility as even more holes with the same architectural pattern can now be plugged into one of the PBMB slots.

What you get:
Each Project Board contains either one large microcontroller (AT90S15PB and AT90S35PB) or two small ones (AT90SMINIPB). To make the microcontroller work, the board includes all necessary circuitry such as voltage regulator, crystal based external oscillator and reset voltage manager (brownout detector).
To allow the board to be programmed, the MINIPB includes an ISP connector per chip, compatible with the ATAVRISP cable. AT90S15PB and AT90S35PB boards include the same ISP connector plus the JTAG connector that allows in circuit debugging, as well as programming, with the ATJTAGICE cable. The boards also include a good set of pins and pads that connect to the microcontroller ports. This is the place where the microcontroller is connected to the external peripherals localized on the huge prototyping area. The prototyping area is not a bunch of independent holes as in other prototyping boards. There are spaces where the holes are connected to other holes, but there are as well patches of independent holes and power planes holes.

Finally, but equally important, each board contains a female DB9 meant for RS-232 communications. The board does not include the RS-232 driver, but there is enough space to interface such device if needed.

These projects boards can be used as a stand alone unit, but in the case more than one are to be interconnected the PBMB offers such capability. The PBMB does contain the fully functional RS-232 standard driver and is ready to work. Just patch the RS-232 Rx and Tx to the microcontroller through the edge connector bus and the application has PC compliant serial communications. The PBMB also offers voltage regulation to generate 12V and 5V.

The last board is the ProtoX. Its middle name is expandability and it is nothing more than an extended prototyping area to add more and more components to the embedded system application. It has the same edge connector so that it can be connected on the PBMB along with other Project Boards.

Conclusion:
The ideas behind Avayan Electronics’ Project Boards are modularity, flexibility and general purpose design. Users will find that a project based on a motherboard is desirable as it allows for the different modules to be worked upon. Obviously this implies expandability as well. Because the boards are not set in stone and simply include all the necessary circuitry for the microcontroller to work, as well as a good amount of prototyping area, any application can be designed. Some designers may argue that the boards are too simple and that some important components are missing like LEDs, drivers, etc. Because not everybody needs the same features, the boards were designed as general purpose as possible. The huge prototyping area should be enough to accommodate such needed features. For more information visit www.avayanelectronics.com or contact Avyan@avayanelectronics.com.