

ADVANCED CONTROL SYSTEM DESIGNED TO ENABLE A CONNECTIVITY UPGRADE FOR THE SYSTEM



At a Glance

One of the client design team had determined that the central microcontroller (MCU) would need the processing power of a 16-bit core. Implementation of Microchip PIC24FJ256GA705 MCU was the ideal product to provide the main control and interface functions of their design.

The Situation

Business paradigms for restaurants are continually being challenged. Their profit margins are typically narrow, and the compensation and benefits packages they provide to their employees are coming under growing strain. Competition can take many different shapes and appear to come from all directions, with many entrepreneurs fostering the development of delivery and takeaway choices. For instance, commercial dishwashers have been in the midst of an upgrade cycle that has been hastened by the emergence of IoT and software systems that leverage data from restaurant equipment. While dishwashers and glass washing systems can remain in place for one or two decades, the new and notable features of modern machines can influence purchasing decisions. Smart, connected dishwashers with large touchscreens and software-driven reporting capabilities can add business value in areas such as code compliance, sanitization, operational efficiency, safety, uptime, quality control, and employee satisfaction.

The Challenges Faced by the Client

Development of New Products to Compete in the Market

For several years, Client Engineering worked with a client to provide engineering services for already-existing appliance designs. In 2019, the client asked Client Engineering to increase their participation by working together on a fresh design for several under-counter dishwashers to incorporate to keep up with market trends and new user interface updates. The new product line would include a LCD for Human-Machine Interface (HMI), production testing built into the firmware and hardware design, and a configuration text file that could be loaded by SD card. The system design, including firmware design, development, and testing, was the responsibility of Client Engineering.

As per the design team, to handle all of the interfaces, the MCU would need a parallel bus, two SPI ports, one UART, analog pins, and digital Input/ Output (I/O). They would need power management devices to support the specific voltage rails and current requirements of the design and an SPI-to-WiFi network controller. In addition to this, on the development side, the Client wanted advanced tools that would facilitate their development and enable them to complete their design quickly and efficiently.

Approach

DBMR Suggested to Survey the Existing Product in the Market

When Client Engineering compared their specifications to the products that were on the market, they found that the Microchip PIC24FJ256GA705 MCU was the best option for supplying the design's primary control and interface capabilities. At 32 MHz, the core produces up to 16 MIPS. The MCU integrated the necessary peripherals, including two SPI ports, UART, analog pins, and digital I/O, as well as enough Flash and RAM for the program and temporary memory.

Two Microchip products were chosen by the client to handle power in the design. The 600 mA non-synchronous buck regulator (MCP16301) maintains a 2 percent precision in output voltage regulation while delivering 600 mA of current. The device achieves exceptional power efficiency thanks to an integrated low-resistance N-channel MOSFET and related drive circuitry. A high-side switch, peak current mode control, internal compensation, peak current limit, and over-temperature protection are integrated to reduce the number of necessary external components, simplify the board design, and boost overall dependability. The 3.3 V rail on the board is supplied by the TC1055 LDO linear regulator that supplies 100 mA with low drop-out voltage and low noise. Finally, Client Engineering decided to improve the system's connectivity and chose the Microchip ATWINC1510 Wi-Fi module. A fully integrated power amplifier, LNA, switch, and power management are also included in the module in addition to network control for IEEE 802.11 b/g/n Wi-Fi, which simplifies the design and integration process for the entire system.

Outcome and Business Impact

DBMR's involvement led to significant business growth for the client:



Market Expansion and Competitive Advantage: By developing new solutions catering to specific micro-controller, the client experienced an expansion of their market presence. Their unique value propositions and differentiation strategies allowed them to gain a competitive advantage over other players in the industry



Upgradation of Product: The client's emphasis is on continuous upgradation of the product. It is important to have a product launch to attract customers and gain momentum in the market. With a product launch, the company grabs the customers' attention. They will not only discover the new product but also learn about your company and possibly other products. Product launch serves as a better opportunity for the company to turn interested individuals into loyal customers

Conclusion:

The customer of Client Engineering commercialized their design, which was used in a line of updated under-counter dishwashers. The system control board made it possible to incorporate new HMI and diagnostics, which enhanced both the equipment's use and dependability while also making it easier to maintain.

