PIC32 and Raspberry Pi Interface

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Project Description

The goal of the project was to develop a cross-platform system with high-level abstraction and capable of real-time tasks. It is a continued work of the PIC32 and raspberry Pi Interface Project in the 2018-2019 Academic year.

The project was divided into 3 phases

- Designed architecture, developed communication protocols and libraries.
- Developed an end application to prove the interface
- Addressed issues and fix issues with interface

PIC32

✅ Pro: real-time, fast processing speed, abundant libraries, low-cost, many peripherals

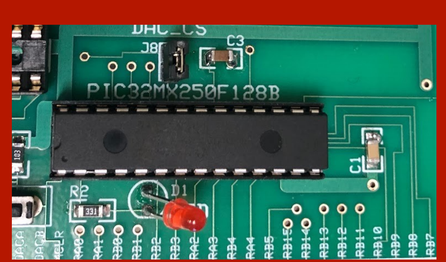
❌ Con: no communication protocols, no high-level abstractions, limited storage

Raspberry Pi 3

✅ Pro: provides high-level abstractions, powerful, low-cost, supports ethernet, plenty of storage

❌ Con: can not do fast-deadline realtime very well, not many peripherals

Best of two worlds



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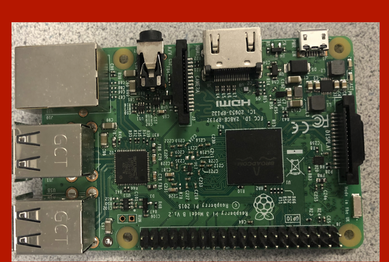

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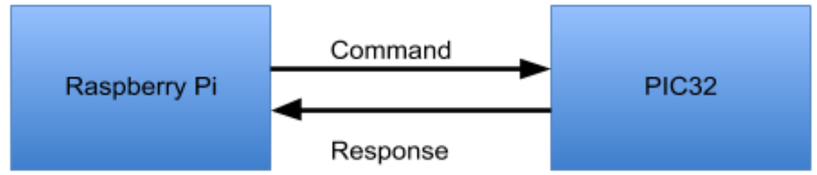
Cross-platform Real-time Embedded System



Supported Peripheral Functions

1. Read input
2. Write output
3. Set Value for CHA
4. Set Value for CHB
5. Check Buffer Status
6. Set Sample Frequency
7. Start ADC
8. Set Period
9. Generate PWM
10. Generate PWM
11. Read Buffer
12. Write Buffer

Issues Found and Corrected with Previous Design

1. Incorrect buffer type of data parsing
2. Incomplete implementation of the check_buf function
3. Interface architecture only sends 1 byte at a time

End Application - Digital Oscilloscope