chipKIT Inventor’s Kit
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Abstract
Sponsored by Digilent Inc., this senior design project was tasked with adding new peripheral modules and functionality for their chipKIT development boards.
Specifically, we set out to create a Pmod that utilized an IR temperature sensor, a Pmod for battery charging/power control, and a prototyping shield for the chipKIT uC32.
In addition to these, our team also designed beginner projects that could be completed using Digilent products. These projects include detailed instructions and code to help students and hobbyists experiment with electronics.

Hardware Design

Prototyping Shield
- chipKIT shield form factor
- Additional routes for easy prototyping
- More usability than the current offering
- More affordable; will be offered directly from Digilent

PmodIRTemp
- SMBUS (I2C) Communication
- Reads surface temperatures without contact
- Pmod and I2C pin headers
- Complete MPIDE library allows simple programming

PmodAdapter
- Supplies a constant voltage of 5V to the board
- Uses external battery of a range of input voltages
- Provides mobility for chipKIT projects

Projects
- Presence Detection - Detects presence using an IR sensor. Designed by Thomas.
- Audio Visualization - Lights a strip of LEDs to match incoming sounds at a microphone. Designed by Connor.
- Remote Controller - Decode incoming IR bits and assign those bits to custom commands. Designed by Austin.
- System Hub - This central hub controls different projects. Designed by Eric.
- Alarm System - Sounds an alarm in response to sound detection. Designed by Sean.
- Plant Watering System - Based on the temperature of a plant’s leaves, the system will notify the user to water the plants or automatically water them. Designed by William.

Impact Analysis
- Generate enthusiasm in the “Maker” culture
- Teach people how to use electronics to solve a variety of tasks
- Will attract more interest to the growing field of electronics
- Promote engineering education within our society and around the globe
- Close the gap between engineering education and the advancing rate of technology

Future Work
- Minor revisions to the PmodIRTemp and Prototyping Shield
- Revise the PmodAdapter; Add charging capability
- Post code for projects to public Git repository
- Standardize projects for a single chipKIT board
- Create final parts list for Inventor’s Kit
- Prepare product presentation for Digilent

Glossary
- Pmod - Peripheral Module
- IR - Infrared
- Shield - An add-on board that adds functionality to a microcontroller/development board
- LED - Light Emitting Diode

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Team Galinstan