MODAC Proof of Concept - Statement of Work, Acceptance Criteria and Payments
This Version Is For Discussion Of The Proposed Revisions
July 25, 2019 update/modification (aka MODAC SOW v4a)

MODAC = Morph Optic Data Acquisition And Control system

Ref docs:
a. MODAC SOW.pdf (dated april15 2019)
b. MODAC SOW v3a.rtf sent via email May 8 2019
    The two reference documents do not provide fully equivalent definition of system and milestones.
    This update serves to modify those to bring the SOW into agreement with each other and with reality of hardware development.

Reality of Hardware:
The original system intended to use a 16 channel 24Bit AD converter on i2c bus (LTC2499 chip based), with two 4 channel K-type thermocouple amplifier boards. Unfortunately, this board failed to respond properly to I2C commands.   Rather than spend time with logic analyzer etc to find out why, we did a quick pivot to keep progress moving.   Jerry/MIOAT acquired several alternate AD converters:

•   one in a PiHAT (daughter board) form factor based on the ADS1256 providing 8 channels24Bit AD and 2 channels24 bit DA)and using SPI bus for communications,

- the other as separate boards using the ADS1115 4 channel 16Bit A/D on i2c bus (expandable to many channels by adding boards to i2c bus with different chip addresses.)
  Both of these can utilize the same kType-amp boards.
  The ADS1256 board was selected as it kept the desired 24bit resolution.   We were able to demonstrate simple unit tests of the AD1115 board, and could, if desired add these to MODAC (subject to discussion)

  The descriptions given by the two reference documents for Phases and equipment do not match.
  Doc A specified hardware. As noted above, reality is a bit different.
  Doc B moved some Doc A Phase 1 items to later phases, and did not mention kiln integration
  Phase 1 as defined by Doc B provided Unit Testing of specified hardware.   It explicitly referenced 16 channels of A/D on i2c bus.   We were able to demonstrate 8 channels from ADS1256 board and that was deemed sufficient to meet Phase 1 acceptance criteria.

  Doc B moved two functionalities from P1 to P2, and called out a Phase 3 explicitly (which still doesn't match Doc A)

  Phase one was accepted and development in P2 has moved well.
  We now need to re-establish Phase 2 and 3 definition and acceptance criteria.
  Emphasis should be on meeting Proof Of Concept functionality on which future development can be based.

Phase 2: GUI and Basic Kiln Control

1. Integrate Leica Distance Sensor
2. Integrate one AD1115 i2c analog-digital converter
- adds 4 channels 16bit AD (total 12 in MODAC P2)
- more can be added as needed to support 16bit A/D sensors after PoC
3. Demonstrate GUI application running on Pi
- select and graph individual channels
- select and control (on/off) relays
- invokes python module that runs script of modac commands based on sensor
4. Demonstrate MODAC controlling 3 channels of Kiln heaters
- Turn individual heaters on/off in response to GUI commands
- turn all heaters on/off with one command
5. Demonstrate MODAC controlling one AC fan via GUI
- via relay controlled power strip
- Are there other fans/devices that are ready for integration?
6. Demonstrate Data Logging:
- logs all data settings to CSV file every N seconds
- logs commands and status to text file
- logs warning/error messages to text file
7. Document design modifications for Phase 3
- define channel - name assignments (eg. AD24 channel 3 is lower kType thermocouple)
- scripting commands desired (level of abstraction desired)
- define PID parameters and scripting (3 PID for 3 kiln areas vs 1 avg PID vs ?)
          (several dev/review cycles will happen between P2

and P3 deliveries)

Phase 3: PC GUI and Documentation
1. Provide basic housing/cabinet for MODAC Pi hardware
- power supplies may be external, should be easy to disconnect
- connectors for relays and thermocouples accessible
2. Demonstrate GUI running on PC controlling Pi
- using dedicated ethernet connection
- or (optionally) using serial-usb connection
3. Demonstrate Scripted Controller running PID schedule
4. Demonstrate other functionality agreed on for P3 modifications
5. Documentation
- User Guide for basic setup
- Scripting Guide for modifying/writing scripts
- Hardware/Software Reference Manual
- Project Repository location and basic use
- Possible development beyond Proof of Concept

Payment schedule:
Completion P1 : $1000
Completion P2 : $2000
Completion P3: $1500
Total Contract $4500