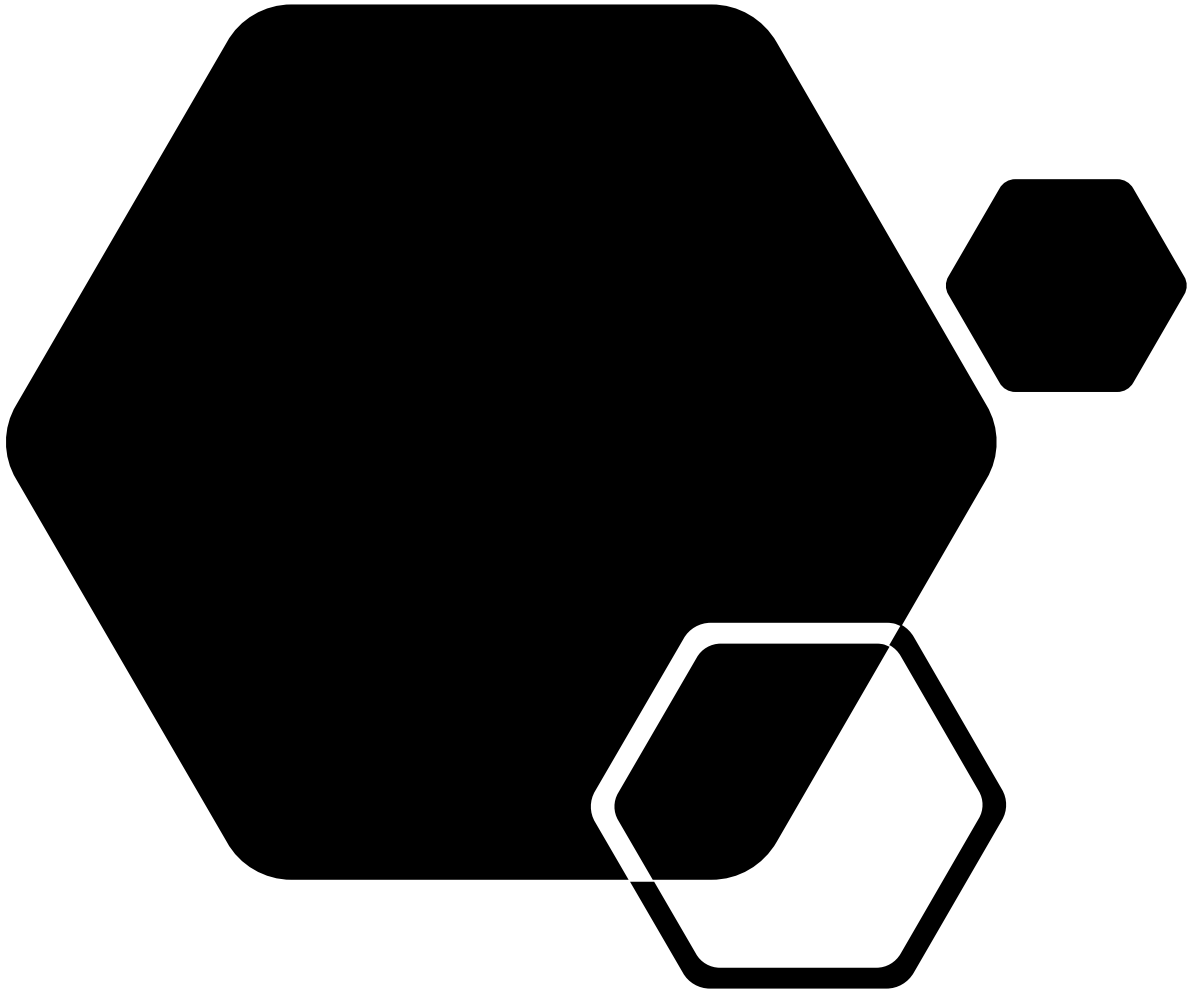
Internship Presentation



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Field Advisors: Dr. Mohammad Naouss

Date of Presentation: 04/18/2021

Outline

1. Internship Task
   - Communication Type
   - Code Architecture
   - Prototype 1 (CLI)
   - Prototype 2 (GUI)
   - Testing
2. Contributions
3. Conclusion

Internship Task

- **Main Task:**
  - Develop an OBC Simulator
    - Generate Commands
    - Receive & Process Data
- Programming Languages used:
  - Python (Main)
  - Arduino
    - Sending TM Messages
    - Communication Testing

Communication Type: UART

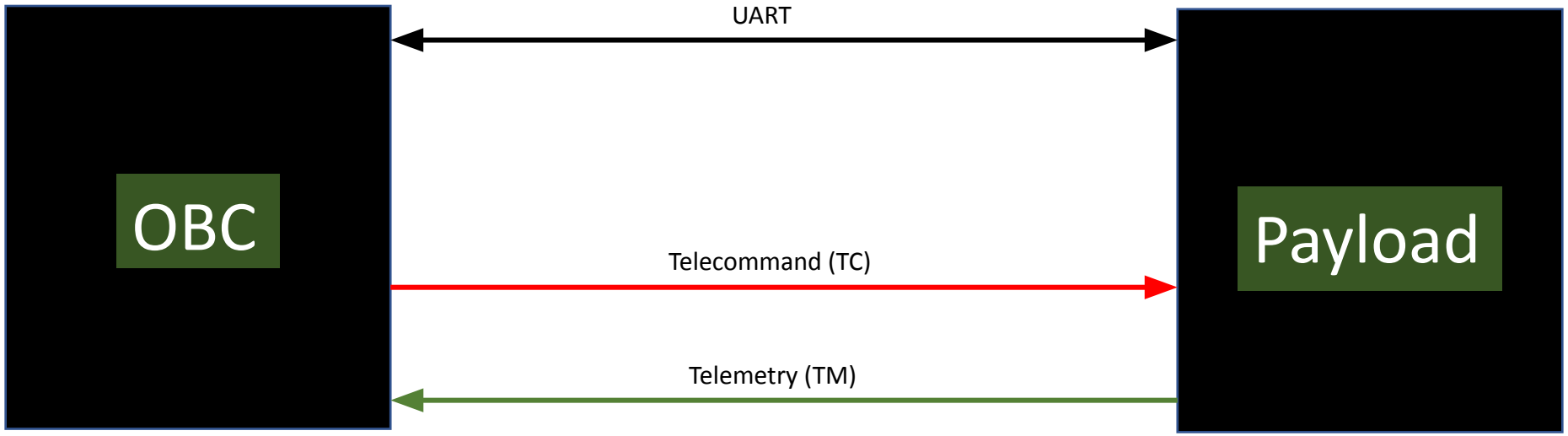


Figure 1: Overview Diagram of Serial Communication Between OBC and Payload

Code Architecture

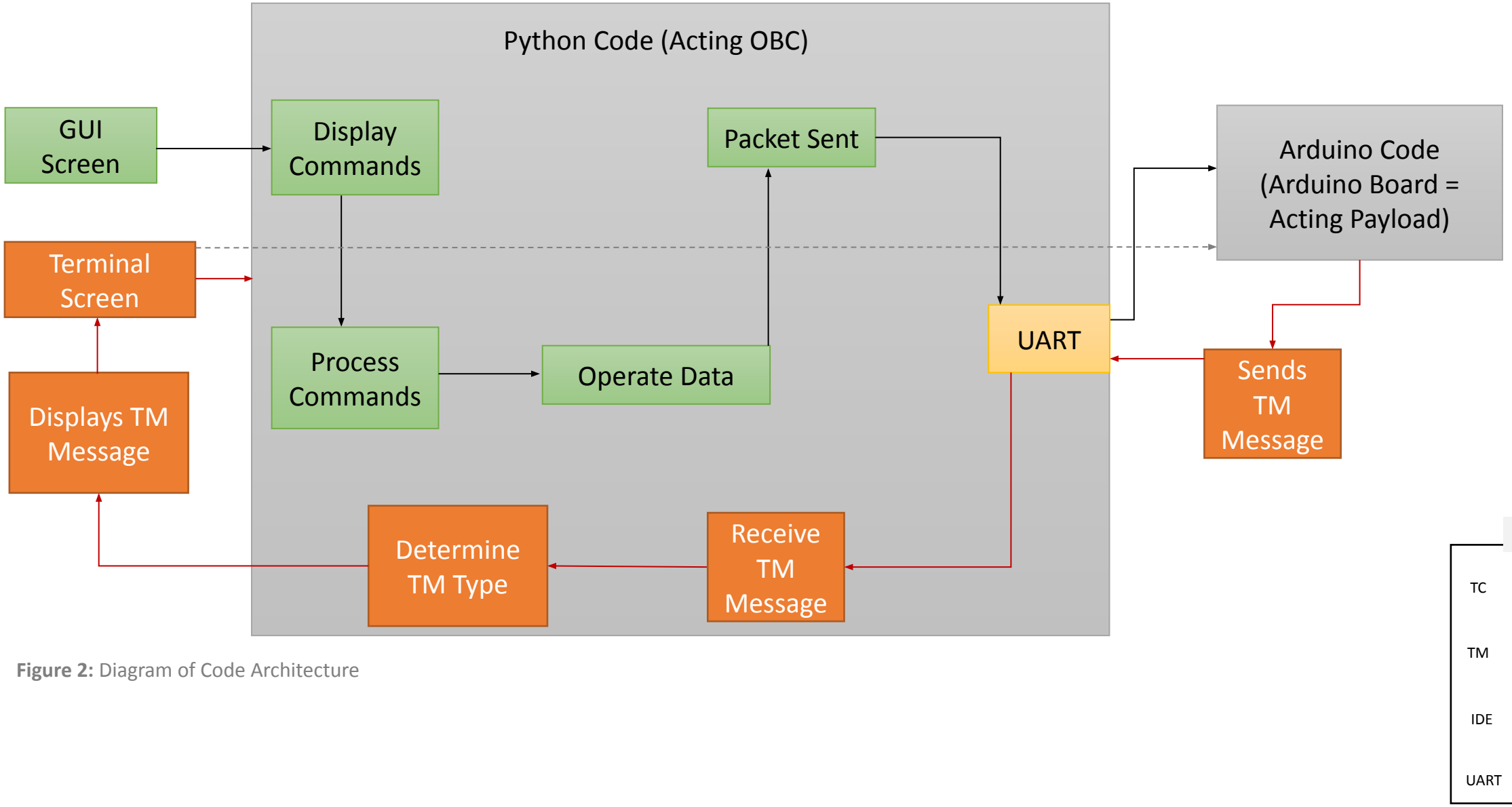


Figure 2: Diagram of Code Architecture

Prototype 1: CLI Simulation

- 1st Version
- Does the work

- Downside:
  - Difficult user interaction & feedback
  - Long to adapt for the user

```
(venv) hamadalsheraifi@Hamads-Air-3 pythonProject2 % ./mark1.py

Choose command:

1. TC_TIME
2. TC_SOFT_RST
3. TC_CONFIG_SU
4. TC_CONFIG_SPU
5. TC_REQUEST_TMHK

Choose by entering the command number or end the program (end): 1
Send the TC_TIME packet or change command? (y/c) y
--------------------------------------------------------------------------------
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
--------------------------------------------------------------------------------

new CRC:  0x3085
New packet:  b'1c00c001000c11098018000000000000553085'

Full Packet Transmission Status: SUCCESS.

Received Packet from Arduino:  b'0c00c00100111001010018000000000000001c00c001e9b3'
Arduino Packet Length Received (bytes):  24
self message:  b'0c00c00100111001010018000000000000001c00c001'

Both paylod CRC and OBC CRC are equal!
      APID =  10000000000
      Service type & sub-type =  0101
      APID/Service Type/Servie Sub-type matches table of TM_ACK:
          Hence --> <TM_ACK>
--------------------------------------------------------------------------------
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
--------------------------------------------------------------------------------

Send the TC_TIME packet or change command? (y/c)
```

Figure 3: CLI Sample Screenshot

Prototype 2: GUI Simulation

- 2nd Version
- Better User Interaction & Feedback
- Two tasks displayed Explicitly
  - TC Commands Transmission
  - TM Message Reception

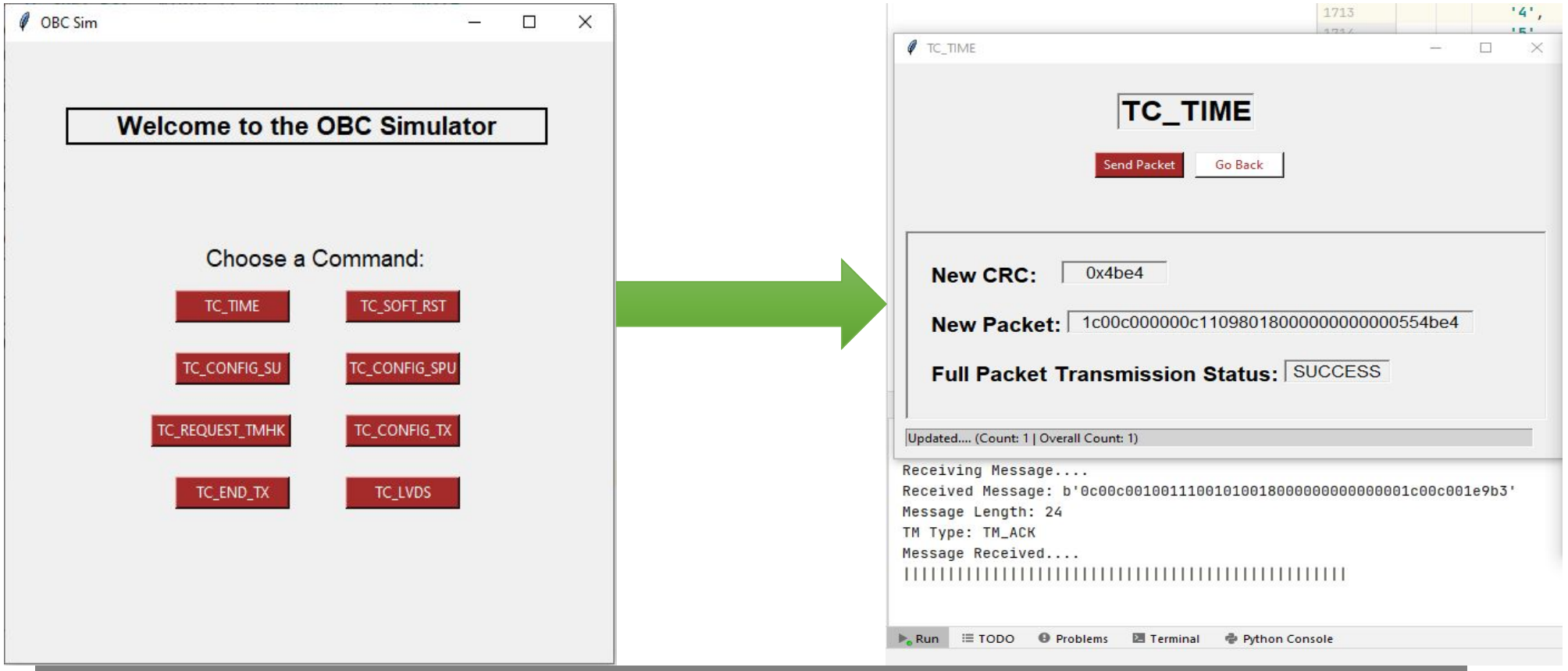
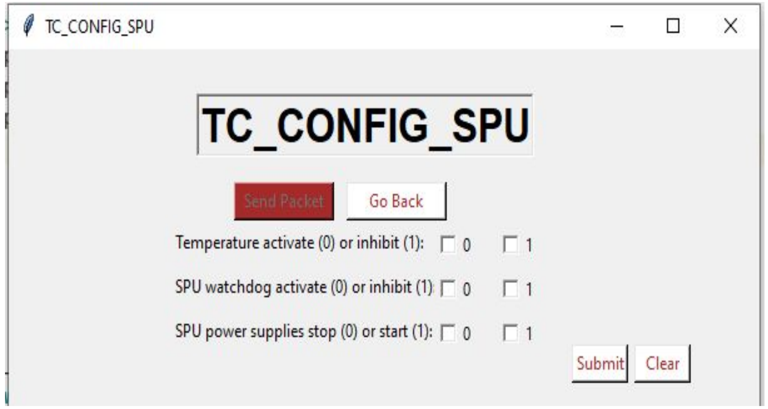
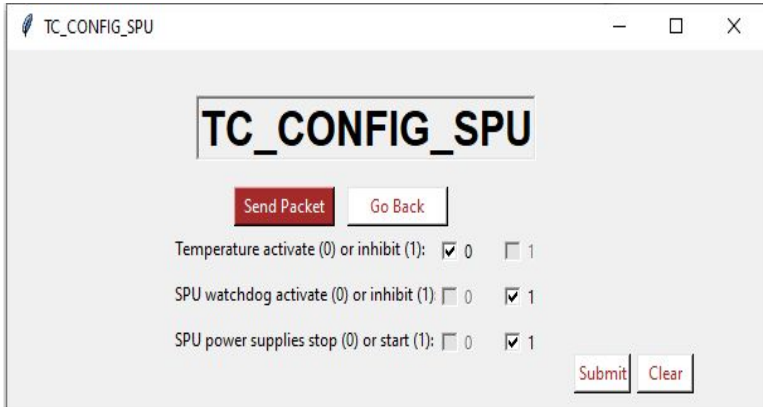
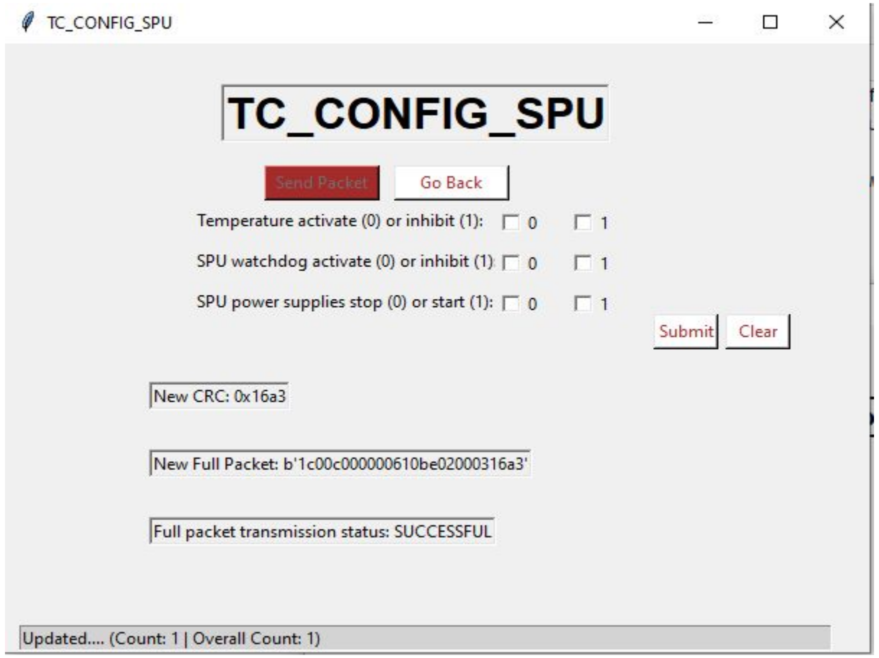


Figure 4: GUI Sample Screenshot. (Very left: Main Screen. Very Right: Command Window & TM Message below on terminal)

TC Command with Inputs Example







User Interaction/Feedback Error Examples

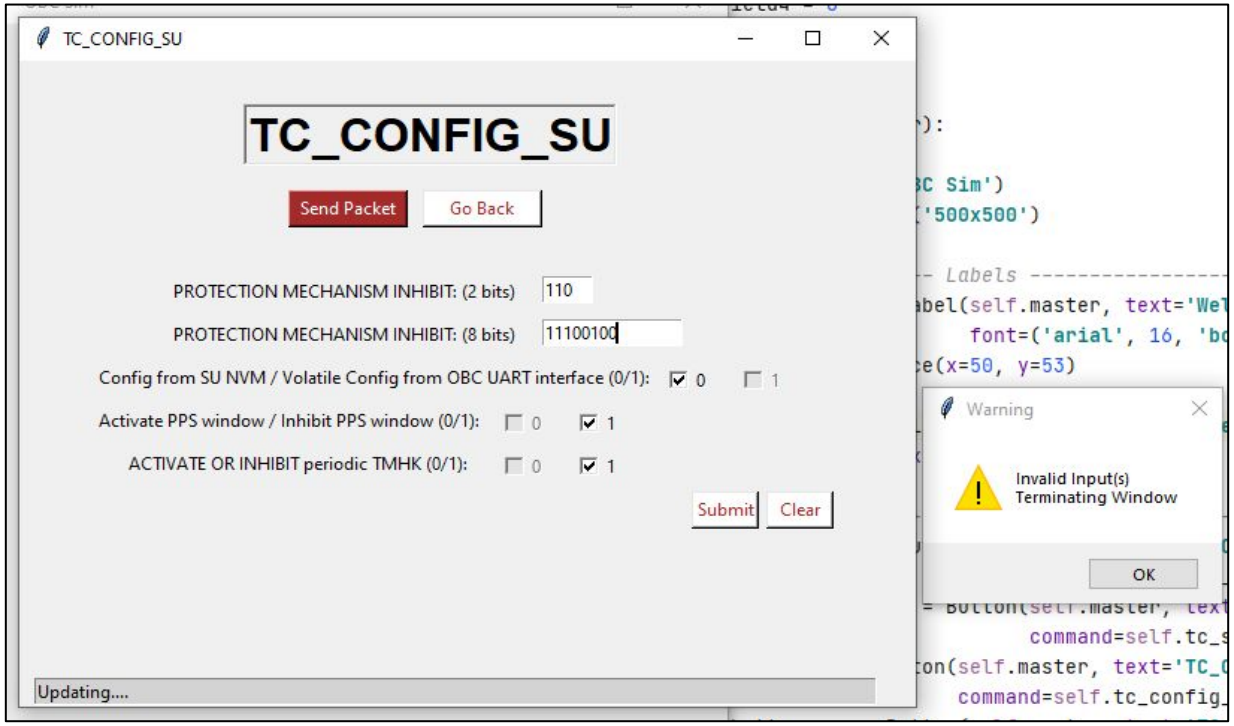


Figure 5: Entering more/less bits than required number of bits

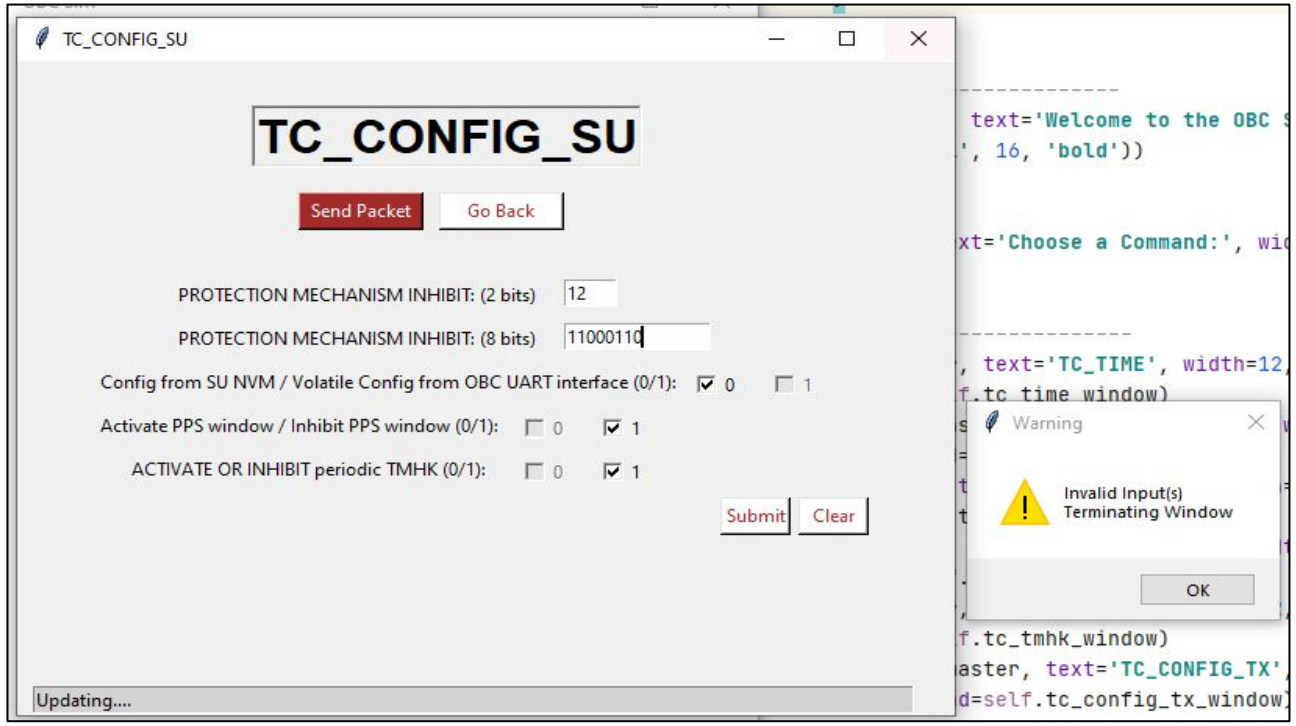


Figure 6: Entering non-binary number

Testing

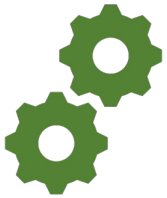
Factors to consider:

- TC packet values
- TC packet length
- CRC value updates
- TM message types
- Terminate communication if there’s user input error

Arduino

- Transmission/Reception Communication
- TC packet sent successfully
- TM message received successfully

Contributions



Developed OBC Simulator for Payload Team

CLI as 1st Prototype

GUI as 2nd and as the Go-To Prototype

GNSSaS Weekly Project Meeting

Gave updates on the OBC Simulation development progress status

Contributed with the Payload Team on their tasks in the lab

Conclusion

- Empirical Experience
- Learned New Skills
- Communication =

Thanks For Your Time