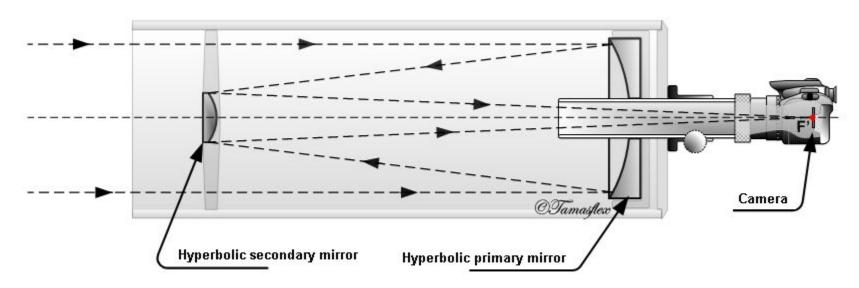
Final Presentation: Telescope Interface Module

By: Team 17
Elena Chong, Harlan DuPree
Toba Faseru, Panpan Yuan

Description of Project

- Telescope Interface Module (T.I.M.)
- Dr. Ditteon, Oakley Observatory
- Connects computer application to physical device
- Prone to failure / no longer manufactured
- Create a replacement system / documentation

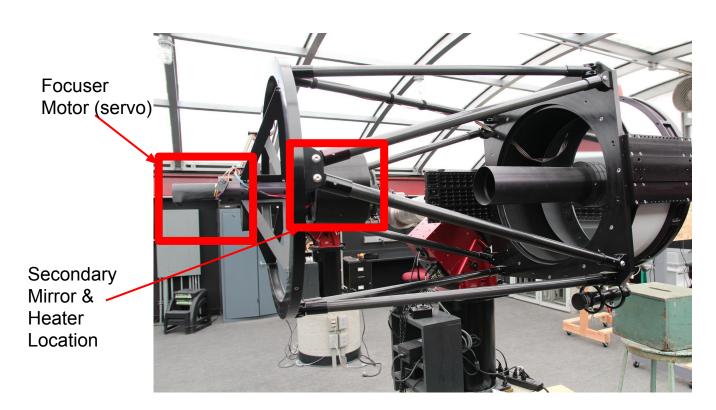




Ritchey - Chrétien (RCT)

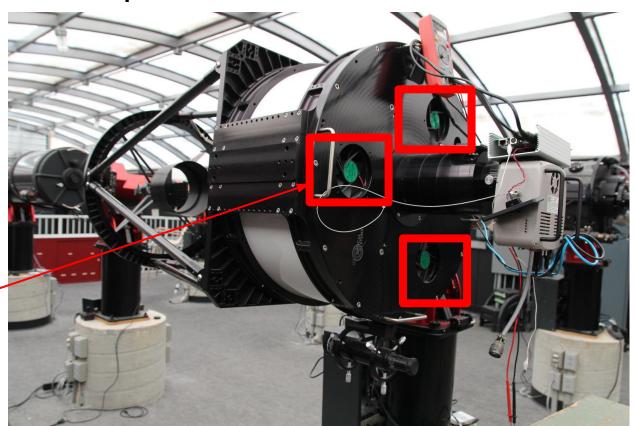




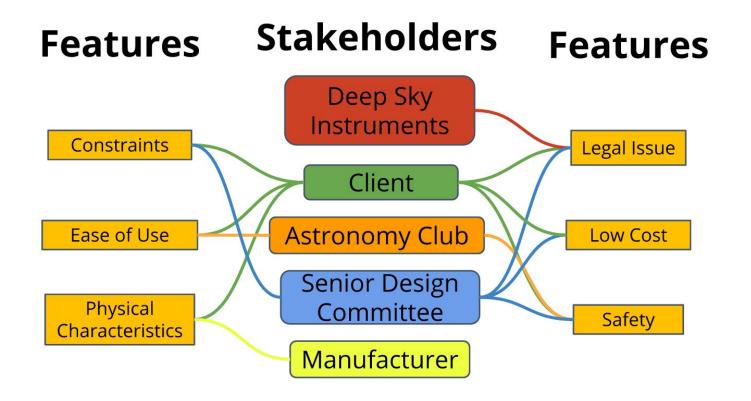




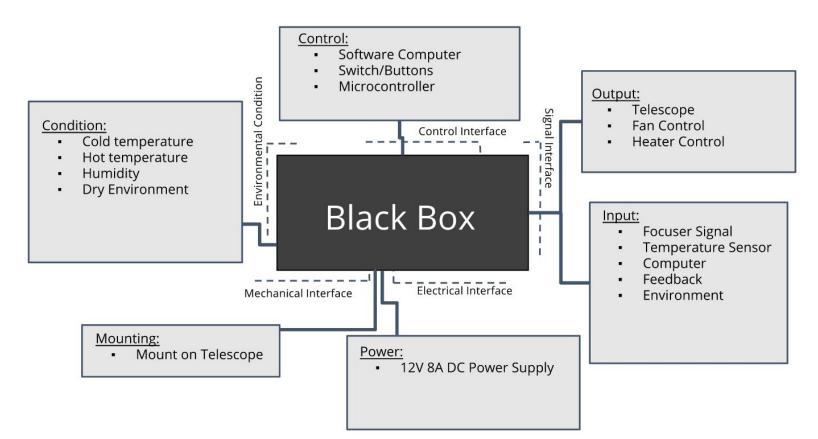
Fans



Stakeholder Diagram



Black Box Diagram



System Architecture

Artificial Intelligence/Control **Outputs Inputs** Software Control Box Temperature Environmental fan Temperature Sensor Focuser Position Servo Processor/Controller Motor Telescope Encoder Fans on/off Servo Mirror Motor Power To all Temperature Power subsystems Conditioning Power

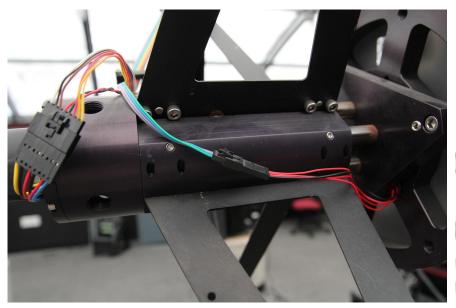
Timeline

V6.	search							Reverse	Engineer									
												Create	Telescope	e Load		Future Tasks		
Stal	keholder [)iagram			1 System	Proposal										Design PCB		
				10 to									Test	t Created L	.oad	Order parts		
Bl	ack Box Di	agram		Poster											100000	Get PCB prin	ted	
																Get PCB pop	ulated	
		White Box Diag	gram													Test PCB		
	0.5 System Proposal																	
		Elevator Spee	ech															
Week 2		Winter Break										Week 1		Week 3	Week 4			
		Black Box Di	0.5 System Pro	Black Box Diagram White Box Diagram	Black Box Diagram Poster White Box Diagram 0.5 System Proposal	Black Box Diagram Poster White Box Diagram 0.5 System Proposal	Black Box Diagram White Box Diagram 0.5 System Proposal	Black Box Diagram White Box Diagram 0.5 System Proposal	Black Box Diagram White Box Diagram 0.5 System Proposal	Black Box Diagram White Box Diagram 0.5 System Proposal	Black Box Diagram White Box Diagram 0.5 System Proposal	Black Box Diagram White Box Diagram 0.5 System Proposal	Stakeholder Diagram 1 System Proposal Black Box Diagram Poster White Box Diagram 0.5 System Proposal	Stakeholder Diagram 1 System Proposal Test Black Box Diagram Poster White Box Diagram 0.5 System Proposal	Black Box Diagram Poster White Box Diagram 0.5 System Proposal	Stakeholder Diagram 1 System Proposal Test Created Load Black Box Diagram White Box Diagram 0.5 System Proposal	Stakeholder Diagram 1 System Proposal Design PCB Test Created Load Order parts Get PCB print Get PCB popu White Box Diagram O.5 System Proposal O.5 System Proposal	

The Process of Reverse Engineering

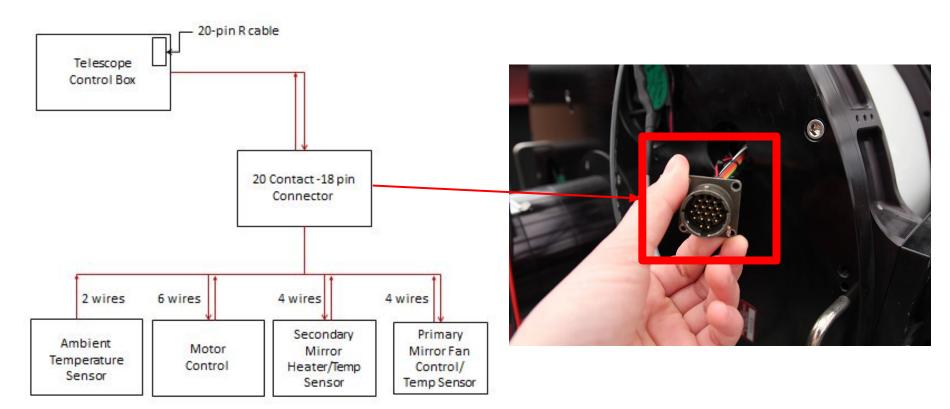
- If info is not visible, we do not have access
- Steps of Reverse Engineering:
 - → Map wires to their associated part
 - Probe control box pins under different conditions
 - Disconnected
 - On (standby)
 - Working
 - Probe with oscilloscope
 - Check load resistances on telescope







What We Discovered



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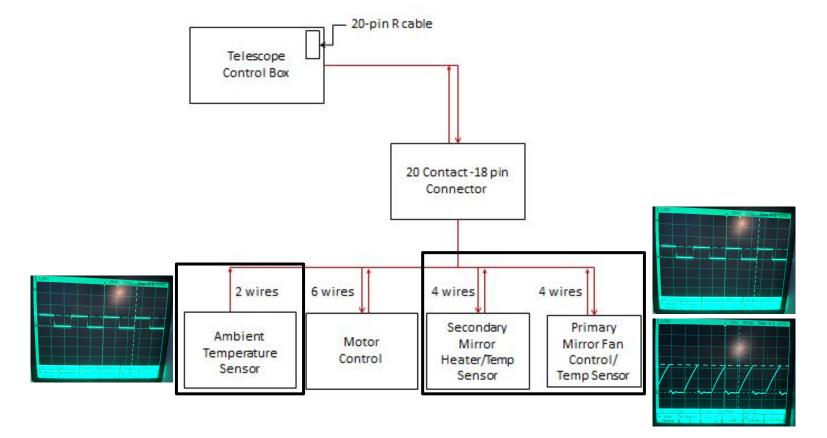
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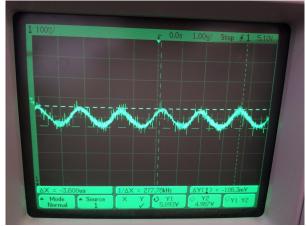
Function	Signal
Motor	?
Ambient Temperature	-Send Square -Return ohmage
Heater w/ Temp Sensor	-PWM saw-tooth -Send Square -Return ohmage
Fan Control w/ Temp Sensor	-PWM saw-tooth -Send Square -Return ohmage

What We Discovered



The Motor



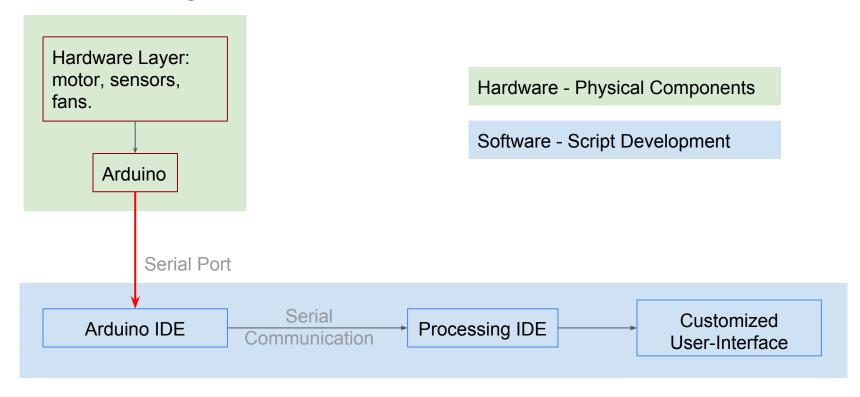


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Software Integration with Hardware



Questions?