

# Final Report Responses to Reviewers

Group 21 -- AutoSight: Vision-driven Automatic Posture-Following Phone Stand

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## Response to Reviewer 1 Comments

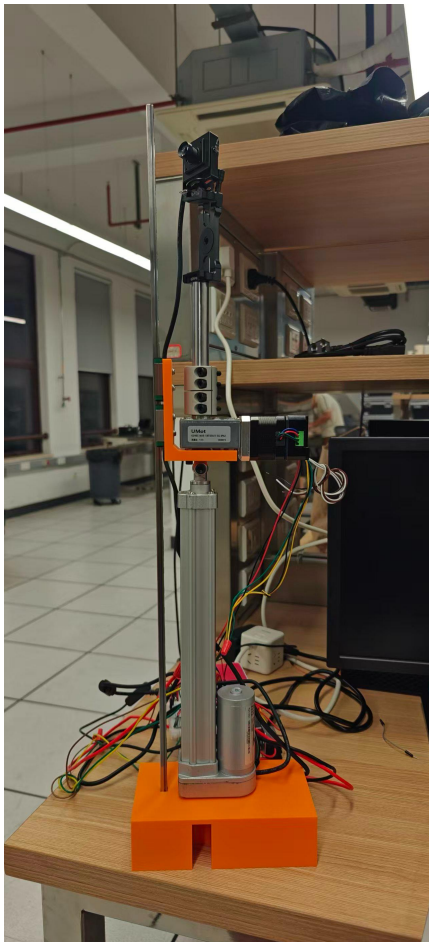
### 1. Summary:

We sincerely appreciate the reviewer's comments about our final report. Below is our response.

### 2. Point-by-point response to Comments and Suggestions for Authors

Comments 1: Add the final prototype photo and description of each component.

Response 1: We sincerely thank the reviewer for this detailed assessment. Here's our final prototype photo:



Subsystem 1 -- Power System:



Main Supply Input: powered by 220V AC. 12V DC source to power high-torque actuators directly.

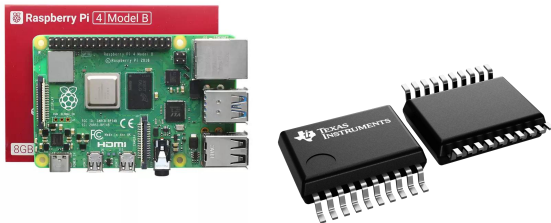
Voltage Regulation: DC-DC buck converter steps down 12V to stable 5V.

Power Distribution:

12V Rail: Dedicated to the stepper motor and linear actuator.

5V Rail: Powers the logic signal of Raspberry Pi 4B, H-bridge module and 74HCT244 level shifter.

### Subsystem 2 -- Computer Vision & Signal Generation



- ① Camera generates video stream
- ② Raspberry Pi 4B chip accepts video stream via USB port
- ③ The chip classifies human face with Haar-Cascade classifier, generates a tuple(dx,dy)
- ④ The chip generates a PWM/Dr/En signal
- ⑤ GPIO output to motors

### Subsystem 3 -- Sensor



- 1) Vision Input: 1080P CMOS camera capturing real-time streams at 30 FPS.
- 2) Pivoted to USB serial control for highly reliable actuation.
- 3) Debugging commands: lsusb
- 4) Device name: /dev/video0  
Well-Established device
- 5) Causing troubles frequently due weak pin connection on board

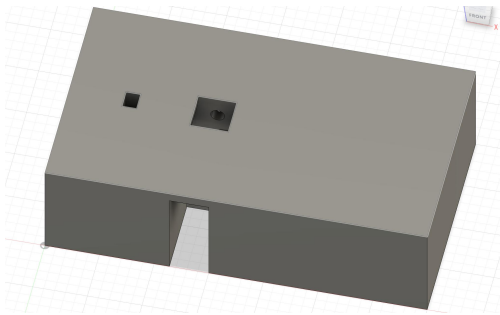
### Subsystem 4 -- Actuation



- 1) Azimuth angle: 42mm stepper motor paired with worm-gear reduction.
- 2) Height: 12V Linear Actuator driven by BTS7960 H-Bridge.
- 3) Engineering Trade-off:
- 4) Primitive Design: High-sensitive azimuth angle control caused severe vibration, while in real world filming and streaming, the camera should keep moving smoothly.

### **Subsystem 5 -- Mechanical Structure**

#### **Main Structural Base :**

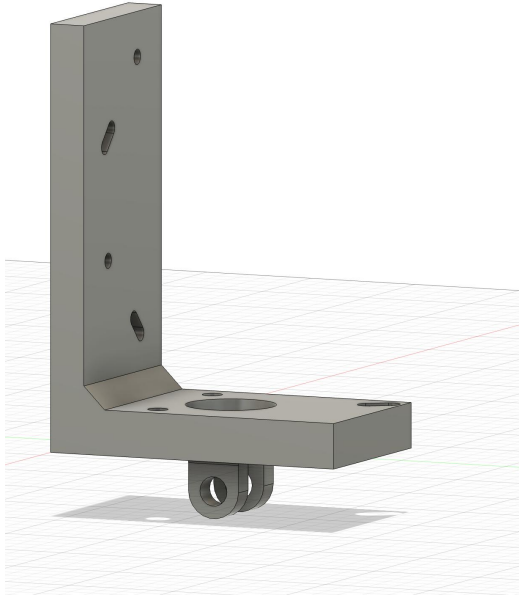


**Foundational Anchor:** Supports the entire mechatronic assembly and withstands up to a 5.0 kg cantilevered payload.

**H-Section Profile for Weight Optimization:** Hollowed side wings reduce material weight, while a solid 28mm center spine ensures maximum torsional rigidity.

**Internal Channeling:** Features an integrated 18mm center slot to discreetly house the linear actuator linkage, ensuring a compact and organized mechanical layout.

#### **L-Shaped Motor Connector**



**Core Gimbal Interface:** Bridges the horizontal pan stepper motor and the vertical pitch mechanism.

**Structural Reinforcement:** Incorporates a 90 ° corner gusset and 2.0mm filleted mounting ears to dissipate stress and prevent fatigue-induced cracking under high torque.

**Precision & Assembly Tolerance:** Features a dedicated motor recess for perfect shaft alignment, along with elongated slotted holes to accommodate manufacturing tolerances and allow fine-tuned adjustments during assembly.

## Response to Reviewer 2 Comments

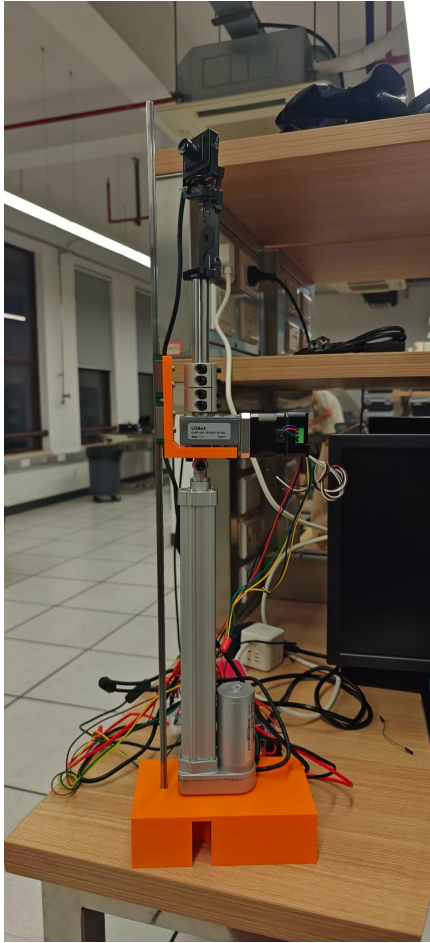
### 1. Summary

We sincerely appreciate reviewer's comments about our final report. Below is our response.

### 2. Point-by-point response to Comments and Suggestions for Authors

Comment 1 : Add picture of the whole system

Response 1: We sincerely thank the reviewer for this detailed assessment, below is our picture of whole system:



We believe this picture provides a complete and clear picture of our whole system.