

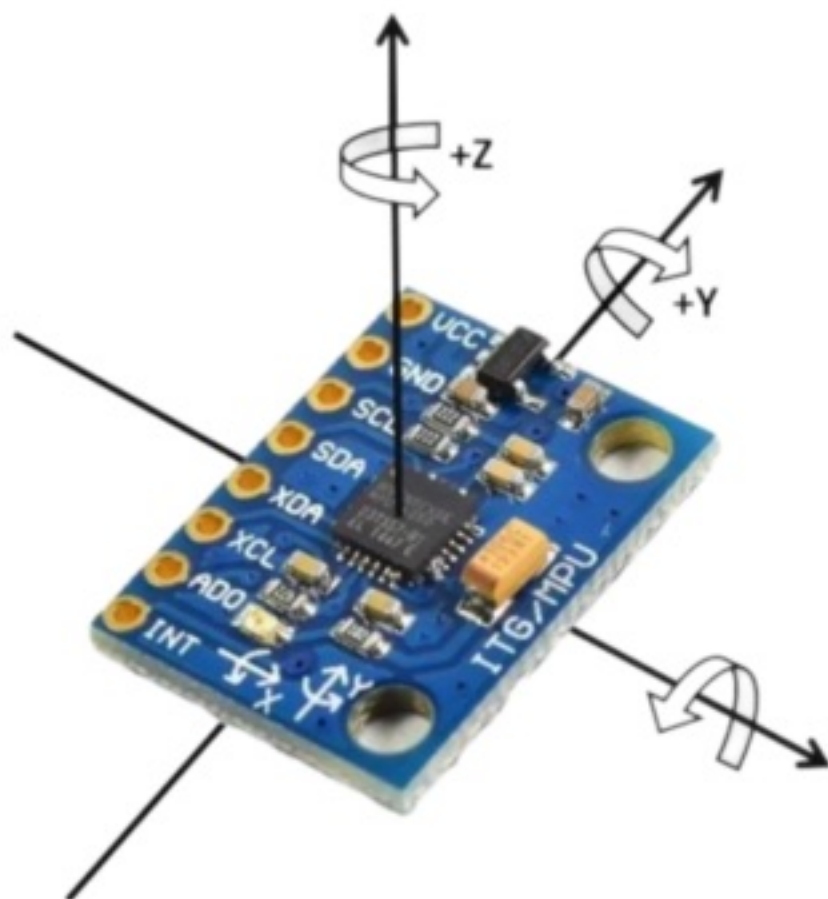
## SYSTEM INTRODUCTION

The purpose of this project is to design a monitoring system for ski-lifts that will automatically detect when danger occurs.

This is accomplished by constantly monitoring the tilt angle of each chair individually, and when it exceeds a certain amount, a signal will be sent to the base control system

## TILT ANGLE MEASUREMENT

This system uses an accelerometer + gyroscope combo that can track motion in 6 axes combined.

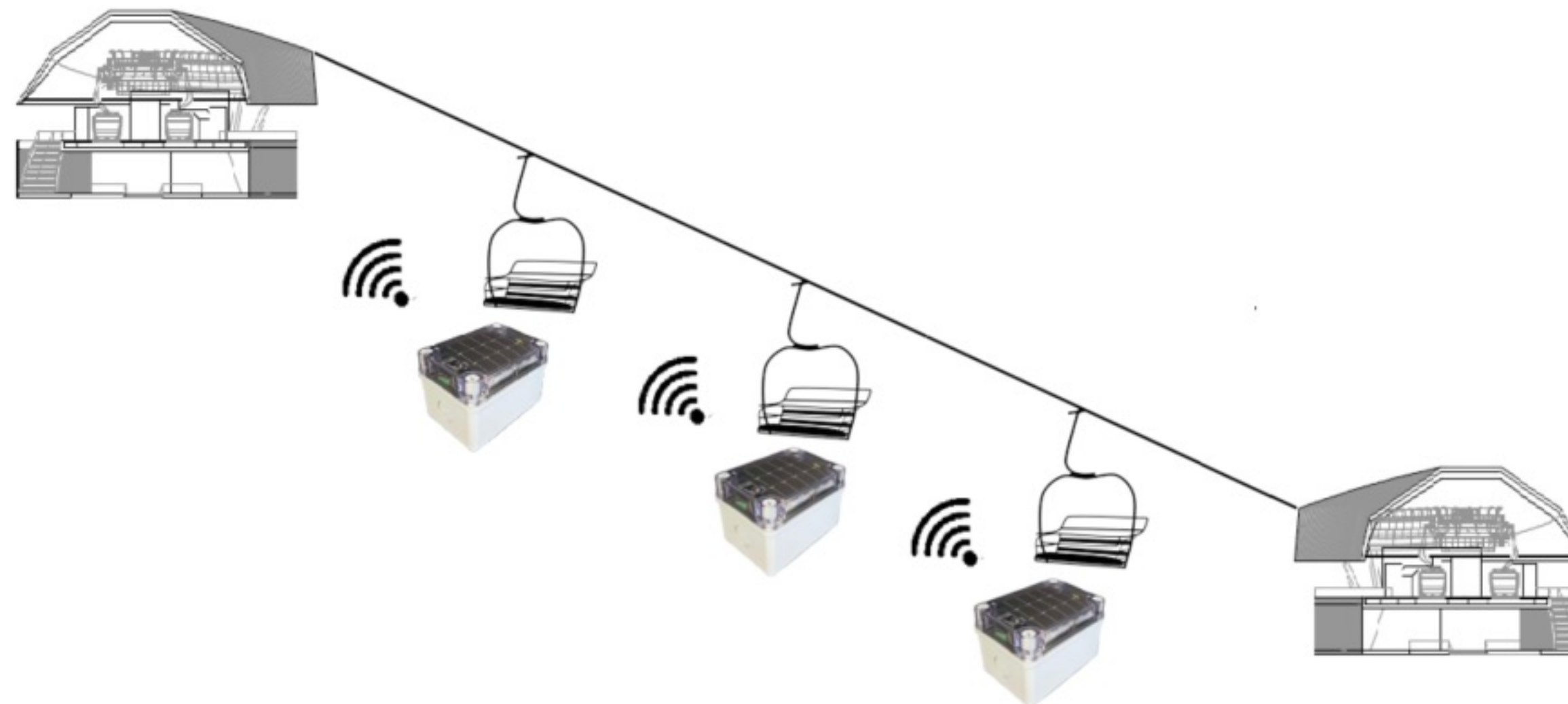


The collected data is sent to the MCU which will convert these measurements into tilt angles for each axis:

- Pitch (x-axis)
- Roll (y-axis)
- Yaw (z-axis)

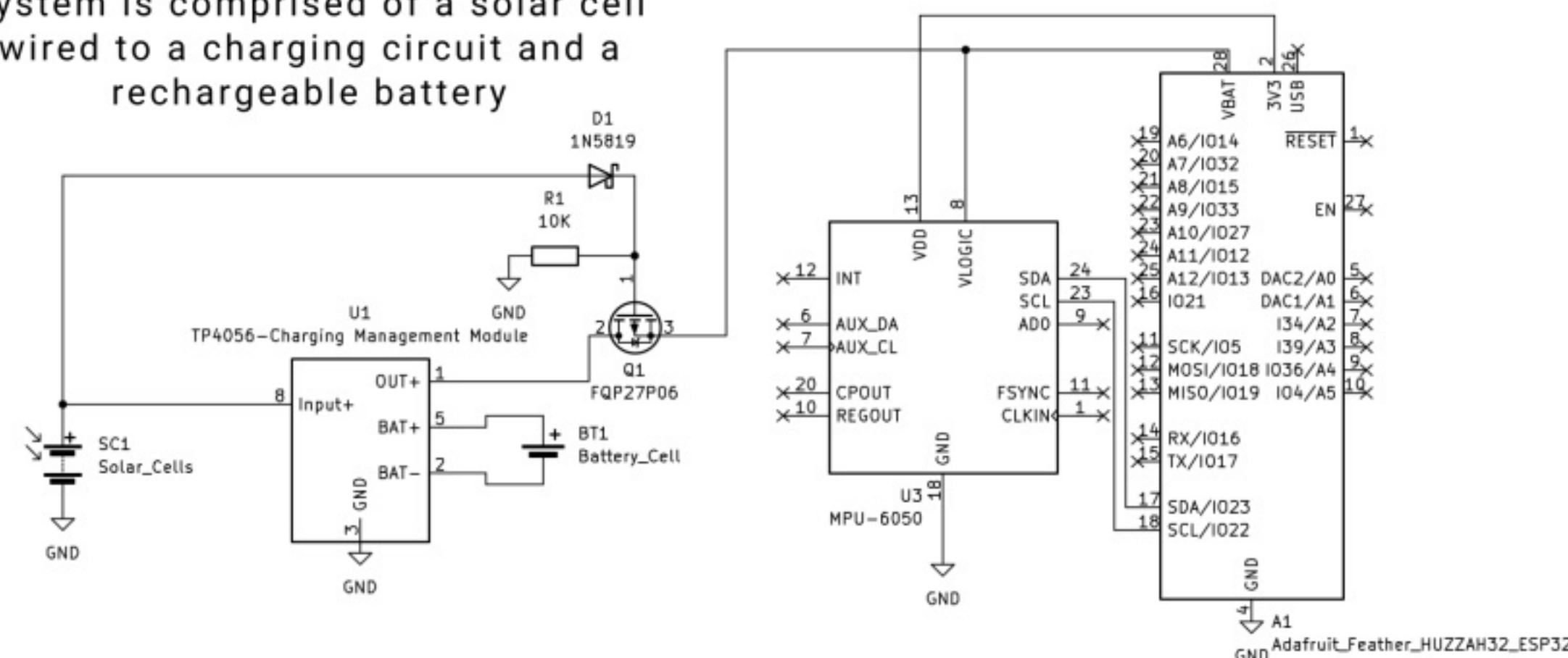
## MAIN SYSTEM OPERATION

Each chair on the lift will have a functional system attached. The data read by each accelerometer is transmitted via a wireless mesh network, that will eventually reach the main controlling system for the entire chair lift.



## CHARGING MODULE

The charging module for each system is comprised of a solar cell wired to a charging circuit and a rechargeable battery



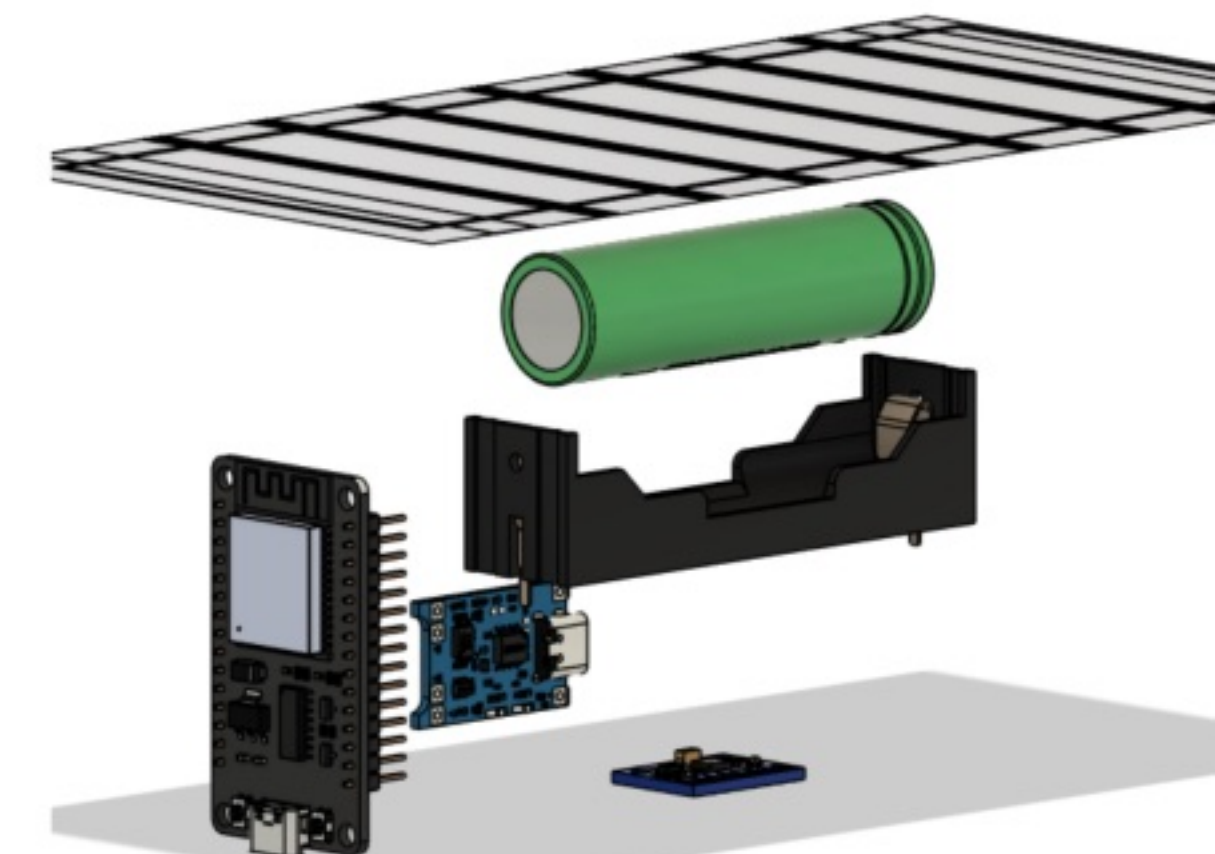
## DATA PROCESSING

Data is processed by the ESP32, the microcontroller (MCU) used for this system. After converting the data received from the accelerometer, it will determine if the angle exceeds the limit.

If so, then the data will be sent out through its wireless protocol (ESP-NOW) onto the mesh network.



## COMPONENT OVERVIEW



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# ELECTRONIC TQUE-VECTURING CLUTCH

BLOCK DIAGRAM

SOFTWARE



# BCIT

## SKI-LIFT MONITORING

<<BITWISE>>

ENZE XU | DAMON PARK | JUSTIN TAN

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This is accomplished by constantly monitoring the tilt angle of each chair individually, and when it exceeds a certain amount, a signal will be sent to the base control system.

### TILT ANGLE MEASUREMENT

This system uses an accelerometer + gyroscope combo that can track motion in a 3-axis coordinate.

The collected data is sent to the MCU which will convert these measurements into tilt angles for each axis: Pitch (x-axis), Roll (y-axis), Yaw (z-axis).

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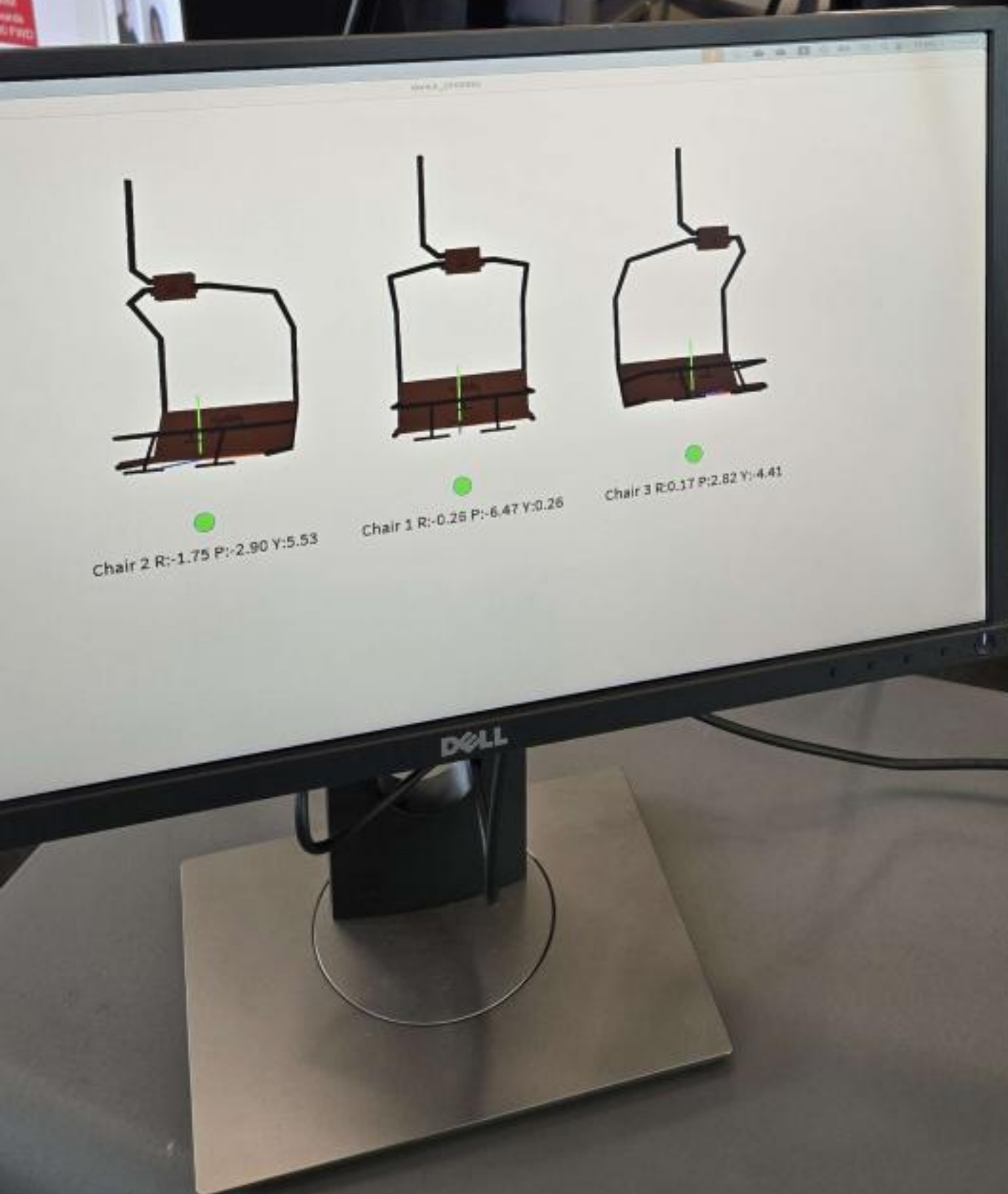
### COMPONENT OVERVIEW

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# PEX ENGINEERING







Chair 2 R:-1.75 P:-2.90 Y:5.53

Chair 1 R:-0.26 P:-6.47 Y:0.26

Chair 3 R:0.17 P:2.82 Y:-4.41