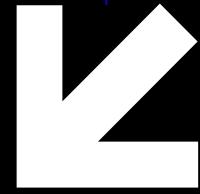


**GROUP 3**

# **HOME AUTOMATION AND SECURITY SYSTEMS**

**MEMBERS: WEI HENG, JUN YU, AHMED**

# what is it?



## HOME AUTOMATION AND SECURITY SYSTEMS

Home automation systems integrate advanced technology to enhance convenience, security, and energy efficiency within residential environments. Incorporating sensors and digital components, customized and scalable smart home solutions can be developed to meet modern living needs.



PROBLEM

**Think about your  
grandparents living alone,  
How do you feel ?**

**Anxious ?**

# PROBLEM STATEMENT

## Injuries

Hidden hazard in everyday homes

## Living Alone

Constant source of anxiety for close ones, especially those who lives far away.

## Fallen & Helpless

Delayed assistance, worsened outcomes

PROBLEM

# Fall is a huge concern

Falls among adults 65 and older caused over 38,000 deaths in 2021, making it the leading cause of injury death for that group.



## PROBLEM

# More than just falls

Falls are the leading cause of injury death among older adults, with over 36 million falls and 38,000 deaths each year in the U.S. Staircases are a major risk, involved in 14% of falls and 12,000 deaths annually. Most fatal falls—84%—happen at home, often while going down stairs. With costs exceeding \$80 billion, fall prevention is essential for elderly safety.

**25%**

OF SENIOR ADULT  
FALL EACH YEAR

---

**84%**

OF FALLS OCCURS  
AT HOME

---

**3.5**

MILLION HOSPITAL  
VISITS FOR OLDER  
ADULT FALLS

# *staircase falls contribute to **25.6%** of Home Accidents*

ELDERLY INDIVIDUALS ARE AT GREATEST RISK  
STAIRCASE RELATED ACCIDENTS DUE TO  
DECLINING BALANCE, VISION AND MOBILITY



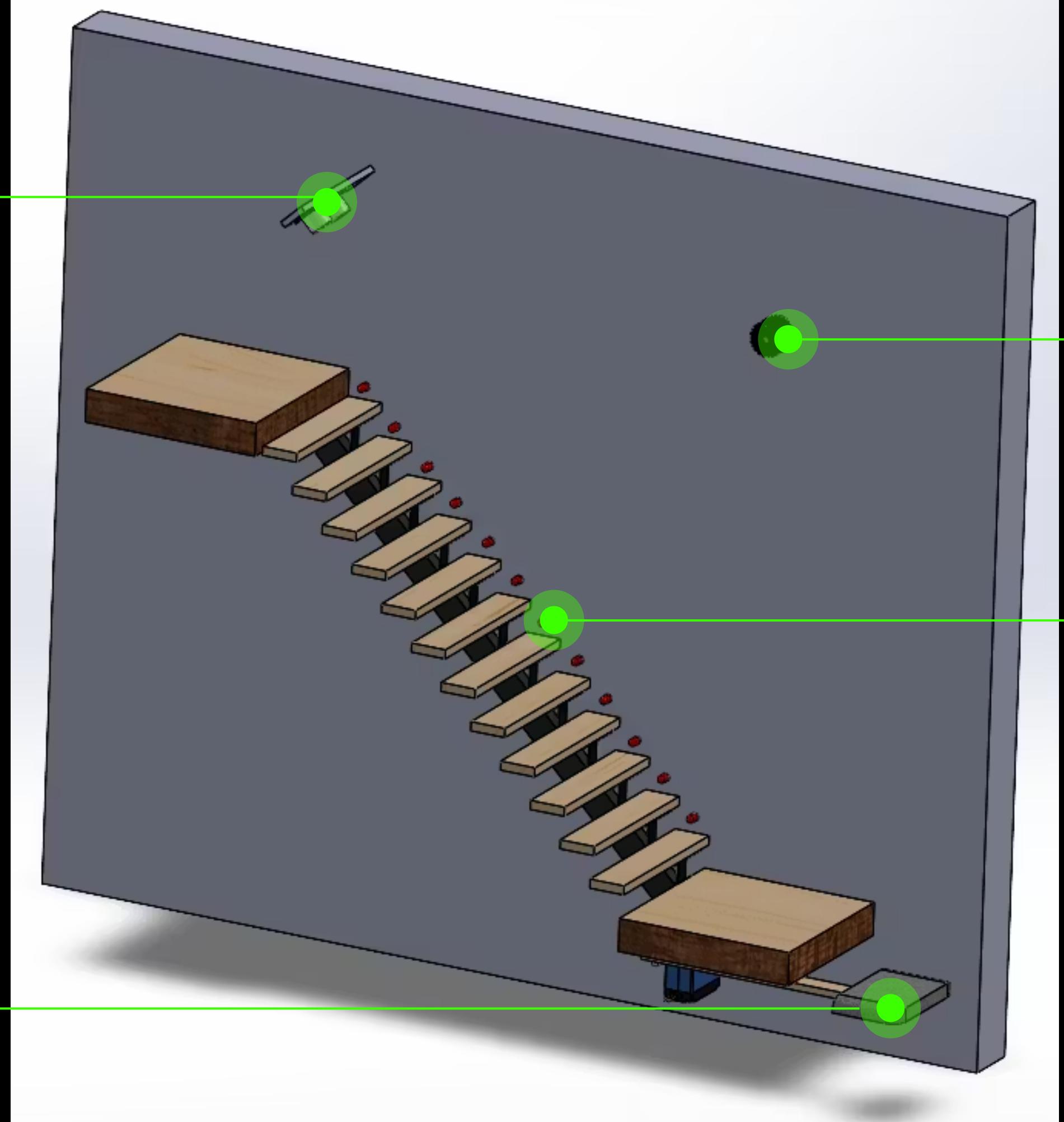
Introducing...

# ELDERLY FALL PROTECTION SYSTEM



**ANGLED ULTRASONIC  
SENSOR  
TO DETECT THE  
CLIMBING/FALLING  
SPEED**

**SERVO MOTOR THAT  
EXTENDS A CUSHION  
TO REDUCE FALLING  
DAMAGE**



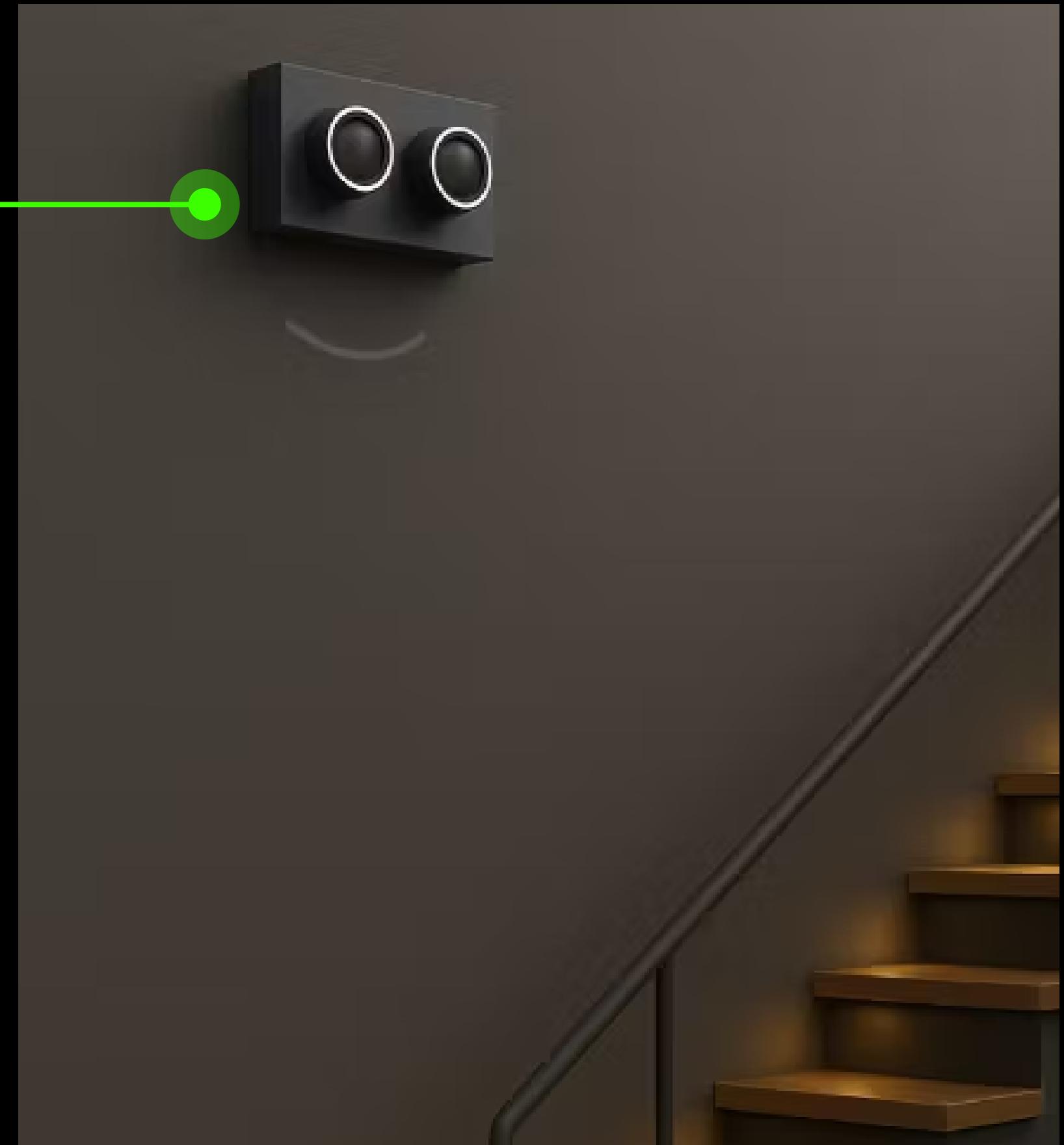
**BUZZER TO  
ALERT  
CAREGIVERS/HOME  
OWNERS OF FALLS**

**LED LIGHTS  
THAT  
ILLUMINATES  
TO INCREASE  
USER  
VISIBILITY**

HOW IT WORKS

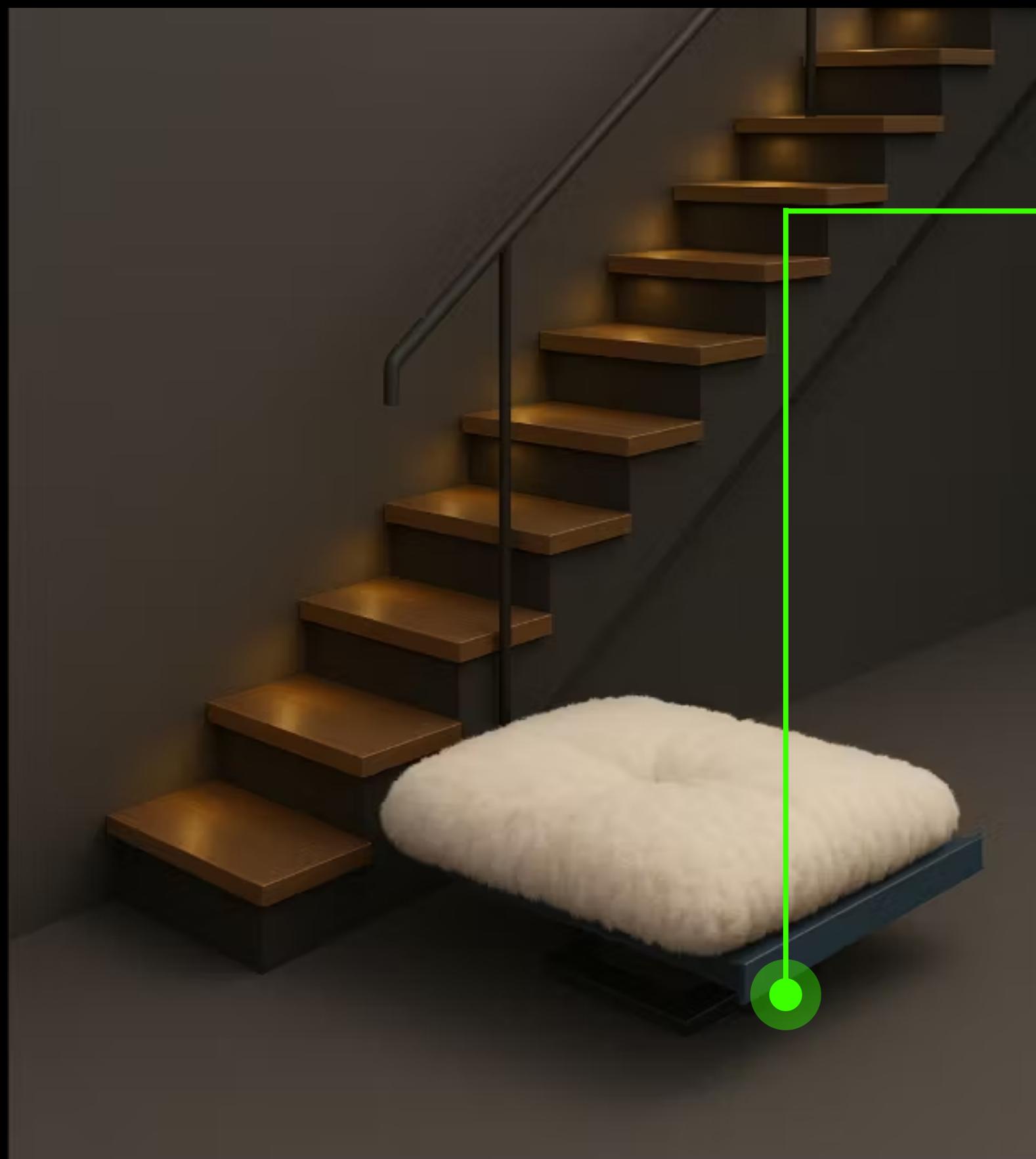
# Ultrasonic Sensor

AN ULTRASOUND SENSOR IS ANGLED AT THE TOP OF THE STAIRCASE DIRECTING DOWNWARDS. NEW DATA WILL CONSTANTLY BE UPDATED INTO THE CODE. WHEN AN INDIVIDUAL MOVES DOWN THE STAIRS IT WILL DETERMINE THE SPEED AT WHICH IT DOES SO. ANY SUDDEN CHANGE IN SPEED RECORDED CAN BE ASSUMED THAT THE INDIVIDUAL IS FALLING



HOW IT WORKS

# Servo Motor

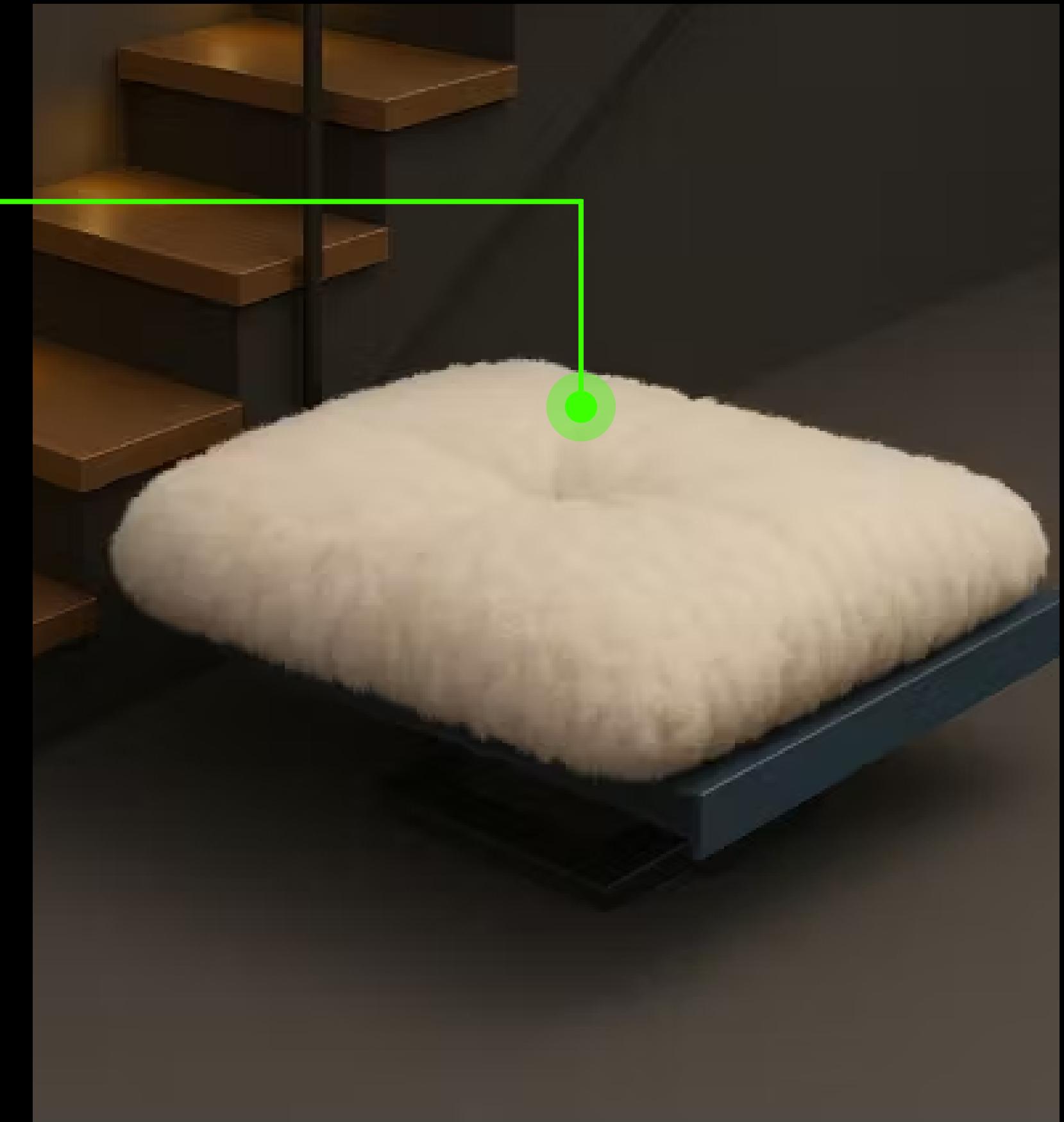


WITH THE HELP OF SERVO MOTORS ATTACHED TO CUSTOMIZED ARMS, A SAFETY CUSHION CONTRAPTION WOULD BE EXTENDED IF A SUDDEN CHANGE IN SPEED OF THE INDIVIDUAL IS DETECTED.

## HOW IT WORKS

# Padding

THE PADDING HELPS TO ABSORB IMPACT FORCE WHEN A USER FALLS DIRECTLY ONTO THE FIRST STEP OF THE STAIRCASE. BY CUSHIONING THE FALL, IT MINIMIZES THE RISK OF SEVERE INJURIES TO CRITICAL BODY PARTS SUCH AS THE HEAD, CHEST, AND PELVIS—ESPECIALLY WHEN THE FALL IS LONG AND REACHES THE HARD FLOOR BELOW.

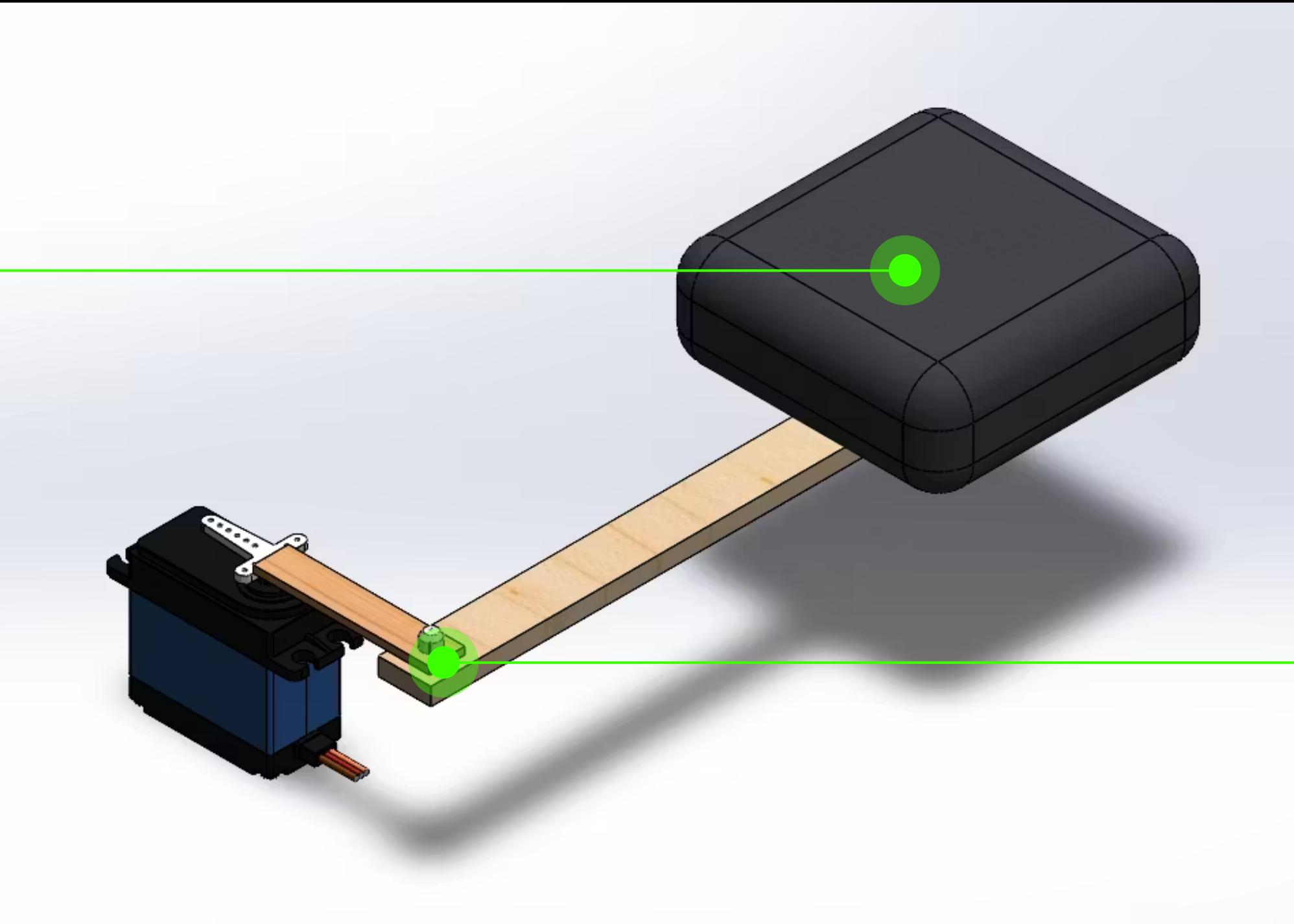


# MECHANISM

HOW IT WORKS - PART 2

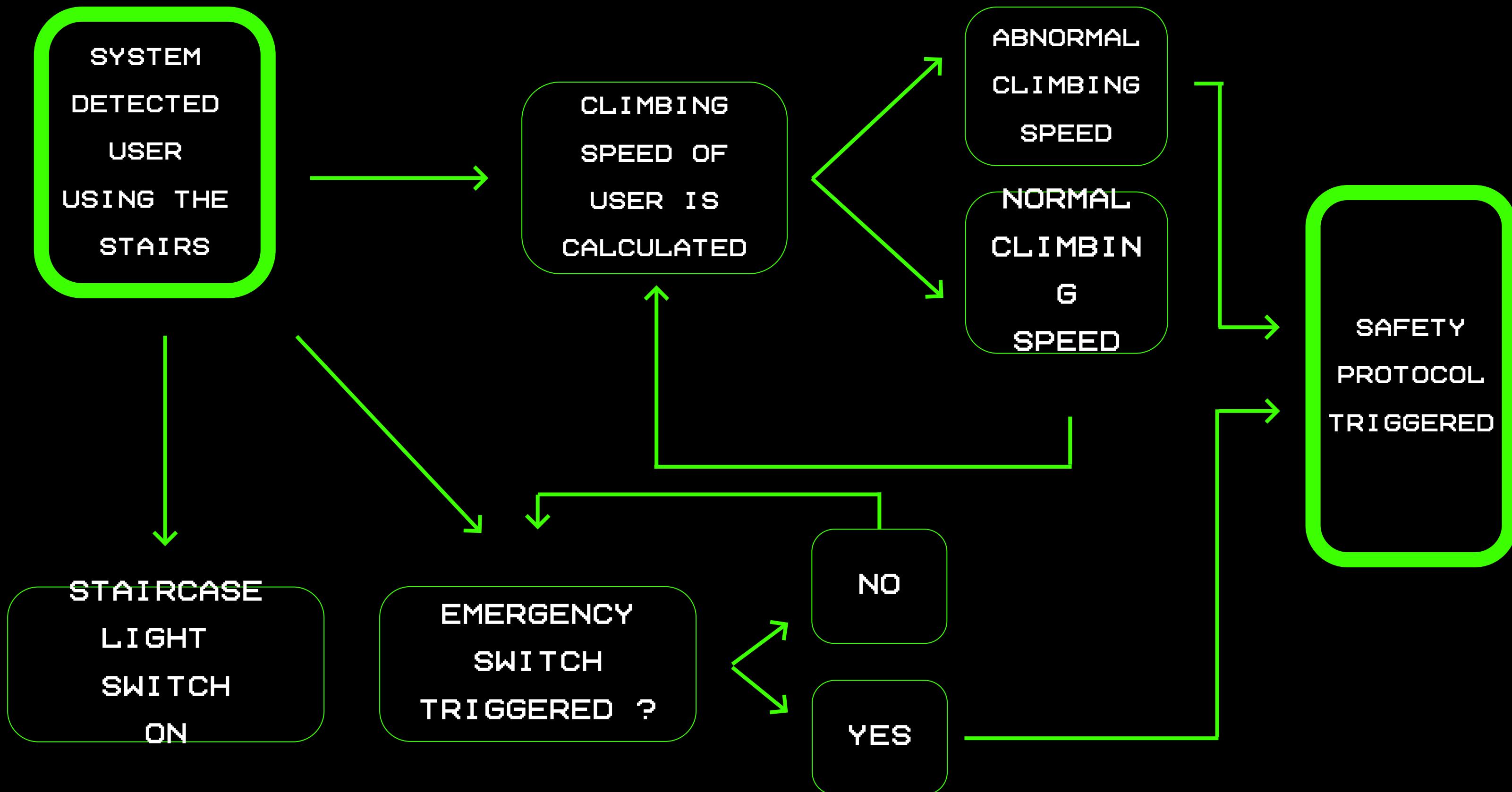
# SAFETY NET MECHANISM

CUSHION FOR  
FALL  
PROTECTION



HINGE TO ALLOW  
FOR ROTATION  
AND EXTENSION  
WHEN SERVO AXE  
ROTATED 120  
DEGREES

# FLOWCHART



A QUOTE

**“Everyone deserve to use the stairs without the fear of falling, even the elders.”**

- GROUP 3 -

# **BENEFITS**

**HOW OUR DEVICE IS CHANGING THE WORLD**

SOLUTION - BENEFIT #1

# Self Independence



NO ATTACHMENT TO  
ANTI-FALL DEVICES  
WHICH REQUIRE  
INCESSANT  
CHARGING AND  
ATTACHMENT

# SOS

SOLUTION - BENEFIT #2

## Immediate Response

DETECTS REAL TIME FALLS AND ALERT CAREGIVERS TO PROVIDE FIRST AID ASAP.

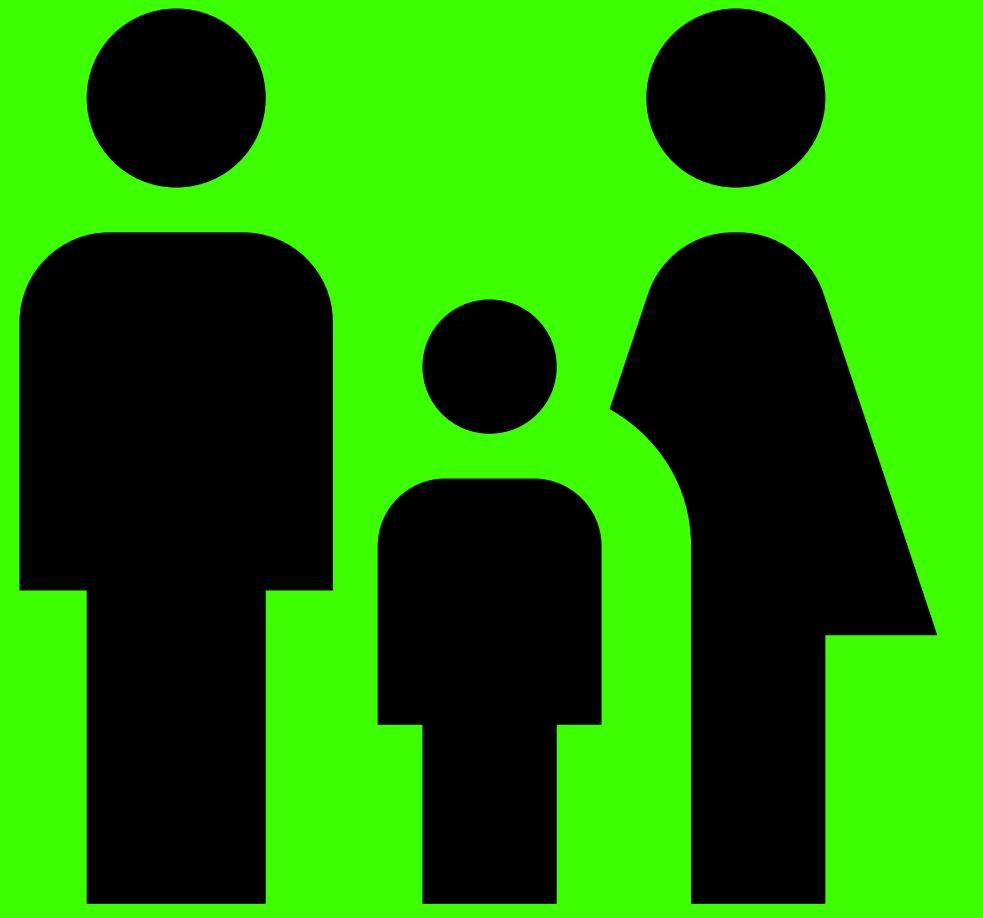


SOLUTION - BENEFIT #3

# Safety & Security

ELDERLY INDIVIDUALS CAN LIVE WITH GREATER EASE ALL THE WHILE BEING MONITORED FOR SAFETY

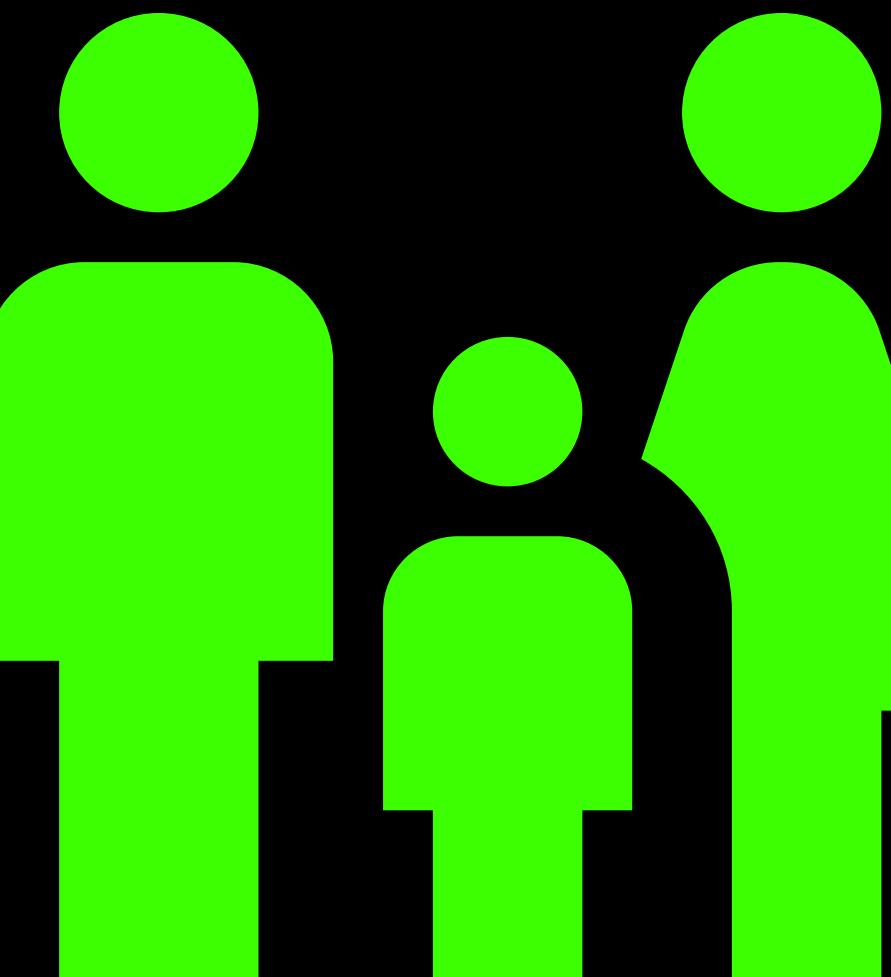


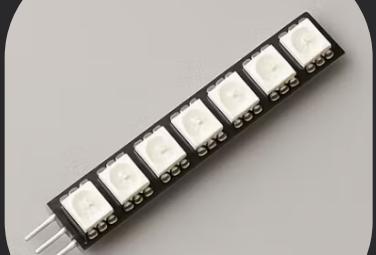


SOLUTION - BENEFIT #4

# Peace of Mind for Families

FAMILY  
REASSURANCE  
KNOWING THEIR  
LOVED ONES ARE  
SAFE AND PROTECTED





## LIGHTING SYSTEM

Power saving adaptive lighting system to prevent injuries

### ALGORITHM TO DETECT FALL

Analyze the climbing speed of the user or sudden speed drop to ensure system deploy on time.

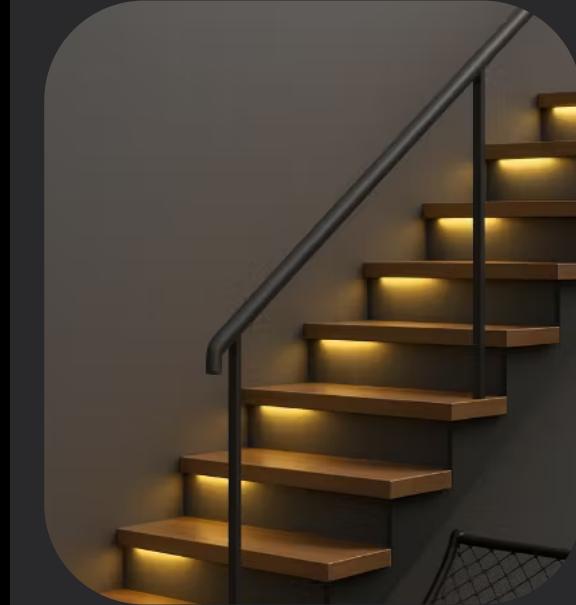
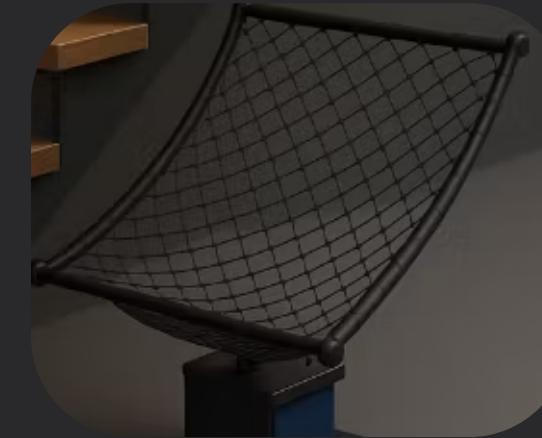


### FALL PROTECTION SYSTEM



### PADDING

To reduce fall damage



## SOS

Detects real time falls and alert caregivers to provide first Aid ASAP.



Elderly individuals can live at ease while being monitored for safety



Family reassurance knowing their loved ones are safe and protected



Freedom from other anti-fall devices which require incessant charging and attachment

# **FUTURE IMPROVEMENTS**

**THINGS CAN BE DONE BETTER**

# ACCURATE

180 DEGREE MOTION  
TRACKING TO  
BETTER DETECT  
FALLS  
(FASTER)



# Fast

AIR BAG DEPLOYS  
AT THE EDGE OF  
THE STAIRS  
(MORE PROTECTION)

# Efficient

---

USE OF AI SYSTEMS  
AND SMART CAMERA  
ENSURE QUICKER AND  
MORE ACCURATE FALL  
DETECTION



# Software

---

ALERT  
CLOSE ONES THROUGH  
TEXT MESSAGES AND  
NOTIFICATIONS

“

**LUCKS RUN OUT BUT  
SAFETY IS GOOD FOR LIFE.**

— UNKNOWN AUTHOR

ELDERLY FALL PROTECTION SYSTEM

# THANK YOU



# Want to make a presentation like this one?

Start with a fully customizable template, create a beautiful deck in minutes, then easily share it with anyone.

[Create a presentation \(It's free\)](#)