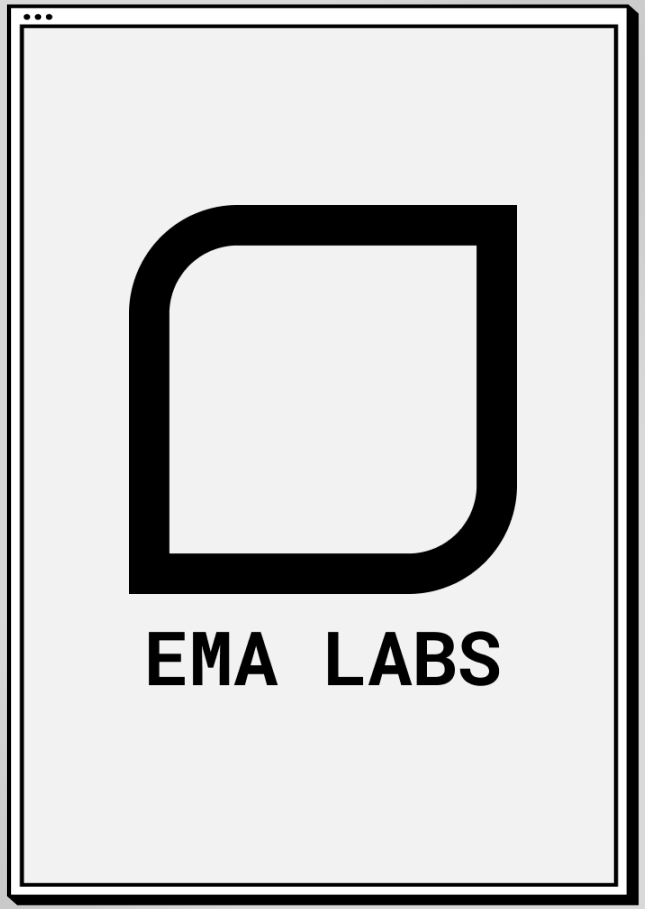
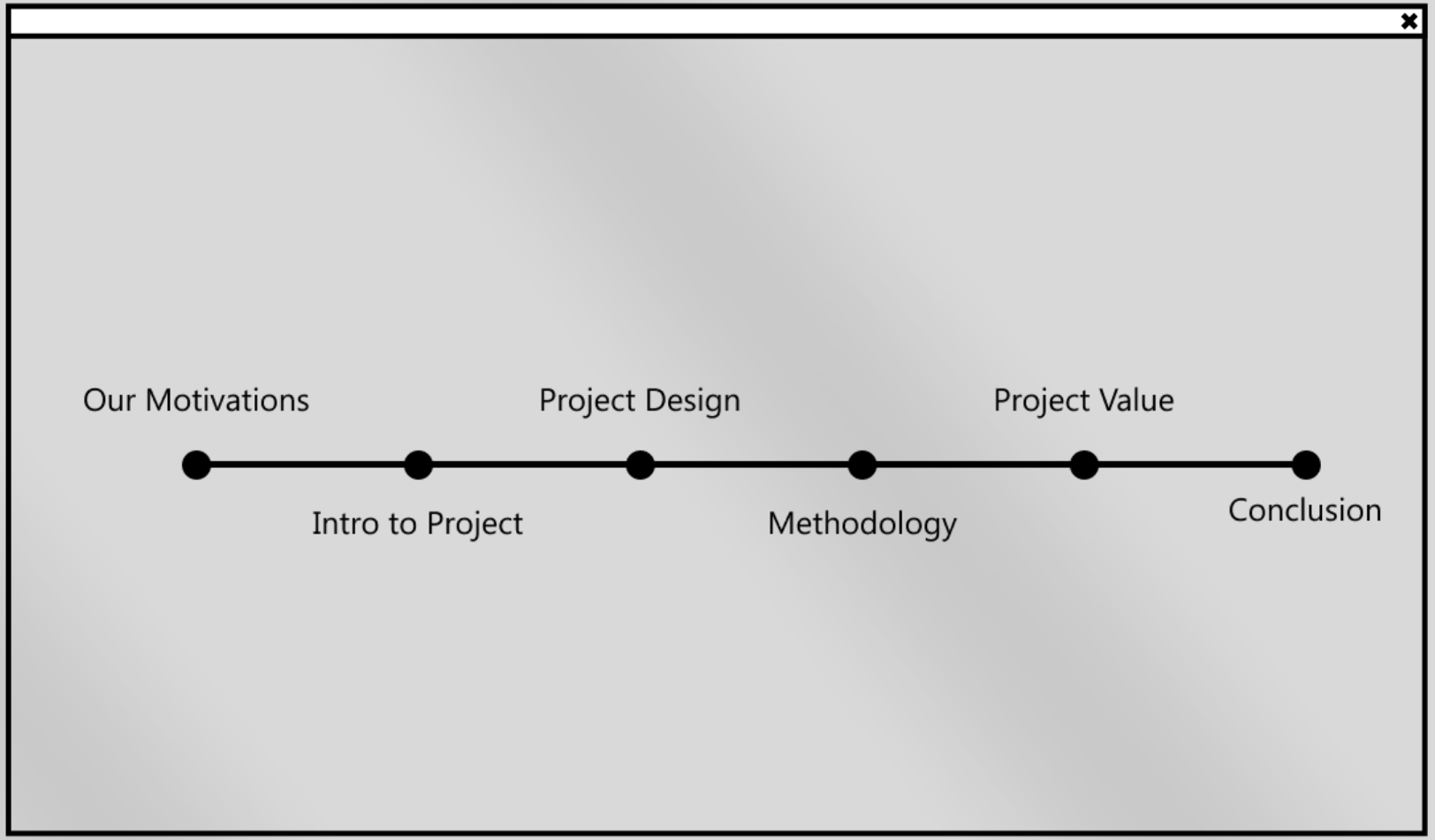
EMA SMART HOME SYSTEM



Smarter Living, Greener Future

Presented By: Braven Chiam, Ong Zheng Xian, Tan Yong Rui, Joycelyn Wong, Benjamin Lee

INTRODUCTION 2/4



OUR
MOTIVATION

How can we **develop a connected system** for a **green, liveable and sustainable environment** for a better future?

Rising household utility costs and the push for Singapore's net-zero carbon target by 2050.
We also wanted to add some unique functions that would as well as resolve common issues that household users face

Forgets to turn off appliances

65%

Lack of tools or time to monitor

85%

Lack of visuals or alert reminders

74%

Criteria:

- Helps owners save energy
- Different boards should be able to work together as a connected system
- Empowers users to make a decision on their own
- Monitor energy usage levels across the different boards

Constraints:

- Lack stimulation of the actual energy usage of appliance and therefore relies on substitution
- System performance depends on stable network connections across all nodes
- All click boards consumes energy which contributes to the overall energy usage
- Lack of variety of click boards to emulate a industrial-standard smart home system

Main Features of our Project

- Automatic Climate and Appliance Control System
- Shower System
- Kitchen System
- Security System
- Lighting system

Automatic Climate and Appliance Control System

To promote effortless energy saving without sacrificing comfort

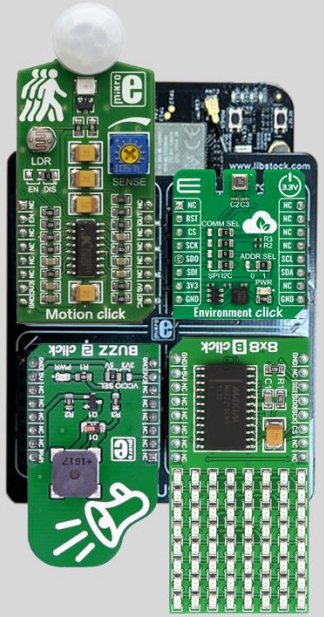
Why this node?:

- People often forget to turn off electronics, causing energy wastage
- Inconvenient to retrace steps to switch appliance off
- Provide an easy, automated way to manage appliances

Features:

- Monitors energy use, temperature and humidity
- Auto toggles appliances based on user's settings
- Detect human presence via motion sensing
- Buzzer integrated with smart home system

Climate Node



Shower Monitoring Node

Encourage energy saving of the heater and water without reducing comfort

Why this node?:

- Water heaters are high energy consumers
- Few effective solutions exist without affecting comfort
- Custom shower settings promote natural, energy-conscious habits
- Empowers users to manage own consumption

Features:

- Multiple shower configuration options
- Detect presence via motion sensing
- Buzzer integrated with smart home system
- Displays statistics

Bathroom Node

Kitchen Monitoring Node

To keep track and control any energy waste for a more sustainable and greener kitchen

Why this node?:

- Kitchen appliances (fridge, kettle, etc.) run daily, often for long periods
- Inefficient use can waste large amounts of energy
- Reduce unnecessary consumption & protects a vulnerable area of the home

Features:

- Displays fridge energy usage
- Fire detection for kitchen safety
- Buzzer integrated with smart home system

Kitchen Node

Intrusion Monitoring Node (Extra Feature)

To keep monitor door activity

Features:

- Senses if door is opened or closed
- Buzzer send alerts if door is open after a certain time
- Senses for door knock events through vibrations

Intrusion Node

Project Design & Methodology (Unique Part of our Development)

High-level Overview of Design Process:

- Target Audience: HDB households with $100+ monthly bills
- Data Management: User needs analysis & empathy tools
- Idea Generation: Listed, evaluated & selected key features
- Decision: Chose EMA system & required tools
- Prototype: Designed & integrated BBBW with sensors
- Testing: Verified performance & refined system

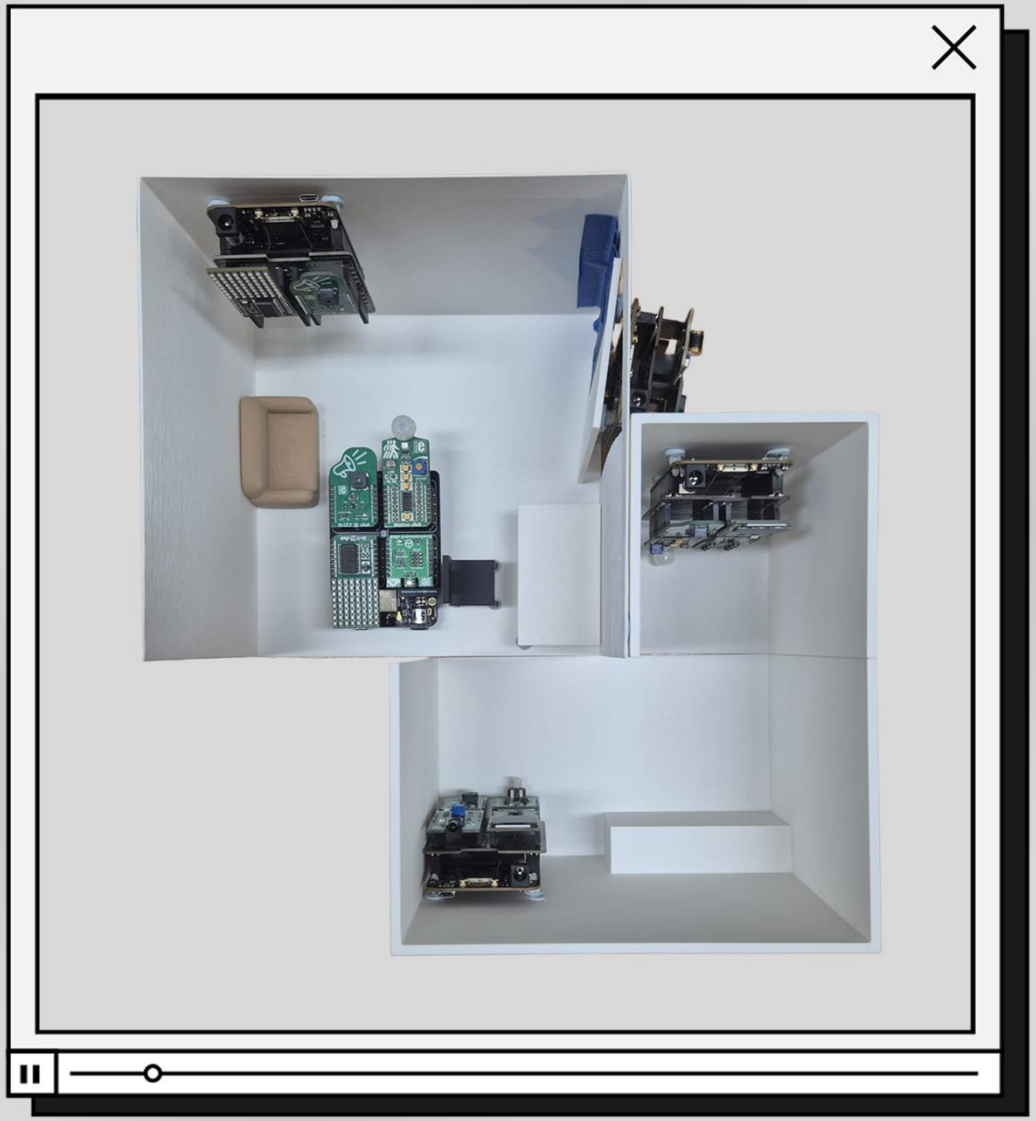
	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	
CRITERIA DESCRIPTION	Realistic	Ease of Implementation	Relevant to target user	Affordable	Scalability	
	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	WEIGHTED SCORE
WEIGHT	4	4	5	4	3	20
PREFFERED USER GROUPS	Criteria 1 SCORES	Criteria 2 SCORES	Criteria 3 SCORES	Criteria 4 SCORES	Criteria 5 SCORES	
Team member 1: Zheng Xian A smart system that automates indoor climate control while simultaneously monitoring and optimizing energy usage based on real-time conditions and user preferences.	5	5	5	3	5	92
Team member 2: Yong Rui A lighting system that uses ambient light sensors to detect the level of natural sunlight entering the room and automatically adjusts the brightness of indoor lights accordingly	5	4	4	4	2	78
Team member 3: Braven A mobile app that sends scheduled push notifications to remind users to turn off lights, unplug chargers, or switch off appliances.	5	4	5	4	4	89
Team member 4: Joycelyn A basic wall-mounted device or mobile app that allows users to set timers for appliance of choice, choosing start and end times, and duration of use then displays usage data on a simple dashboard for management	5	5	3	4	3	80
Team member 5: Benjamin Intruder detection system to tackle security issues and Fire detection sytem for safety around the house	5	4	3	3	2	69

Project Design & Methodology (Unique Part of our Development)

Unique part of the process:

- Used empathy tools (e.g., user persona) to understand users' needs, frustrations & motivations
- Incorporated elements from multiple ideas, not just the top-voted one
- Enhanced concept with energy-saving, convenience & safety features

Project Design 3/3



Project Value Proposition

What separates us:

- More customisable actions & alerts
- User-controlled decisions
- Integrated: energy, automation & safety
- Modular & upgradable
- Simple, visual, accessible dashboard

Competitors analysis:

- Existing Smart Home Hubs (Google Nest Hub, Amazon Echo)
  - Large device ecosystem
  - Voice control & 3rd-party app integration
  - No built-in energy usage breakdown
  - Limited local customization for HDB lifestyle
- Smart Home Apps (Samsung SmartThings, Xiaomi Aqara)
  - Strong security & automation focus
  - Well-developed mobile apps
  - Not optimized for energy saving
  - May require multiple hubs (higher cost)
- Other Existing Smart Devices (Smart doorbell, Smart Plug)
  - Auto decision-making for users
  - Single-function focus

Project Value Proposition

How project solves customers problem:

- Reduces electricity bills via real-time tracking and automated control.
- Enhances safety with flame, intrusion, and vibration alerts.
- Provides convenience through remote control and scheduling.
- Encourages the user to take action through the EMA system.

Why choose us?:

- Tailored for Singapore HDB (based on survey data)
- Multi-function, affordable, compact system
- Scalable & easy to maintain
- Combines automation with human control
- Sustainability-focused, supports SG Net-Zero 2050 goal

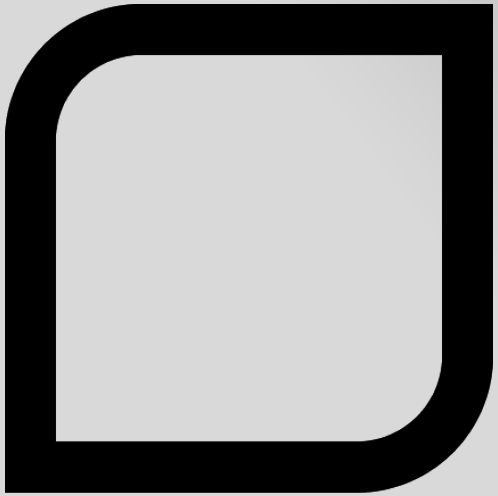
Conclusion 1/2

Potential Buyers:

- Eco-conscious homeowners aiming to reduce utility costs.
- Tech-savvy families seeking convenience and safety in daily living.
- Property developers integrating smart features into new builds.

Improvements:

- Customisable sensor combinations and web interface
- AI driven energy saving coaching assistant (Personalised savings tips)
- Add voice assistant compatibility for hands-free control.
- More information on shower node to be displayed on the website



EMA LABS

THANK YOU