BY WISH SW GROUP 3

EXTENDED LIGHTING

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EMPATHIZE

STREET VENDING IN INDIA : POPULATION INVOLVEMENT: ~ 10 million vendors, ~ 2% of urban people

- Sample of **1000 vendors** from Patna, Hajipur
- Sample of **150 vendors** from Dehradun

- Each vendor uses 1 device; 2.5 hrs/day in summer, 3.7 hrs/day in winter.
- Average daily cost > Rs. 10.
- High costs, unreliable grid access, pollution, inadequate lighting.

- 80% prioritize better lighting to enhance business.
- Avoid poorly lit carts due to safety and product visibility concerns.

- Increased customer attraction, reduced operational costs, and lower emissions

POTENTIAL SOLUTION BENEFITS

WILLINGNESS

PRORITIES AND CHALLENGES

ENVIRONMENTAL SOLUTION

CURRENT LIGHTING SCENARIO

- 87% of vendors ready to pay for better lighting solutions.

- Fossil fuel lighting contributes to 244 million tons of CO_2 annually in developing countries.

DEFINE

Problems Faced due to Lack of Electricity

PROBLEM IDENTIFICATION

- Lack of electricity is a common issue faced by vendors.
- Inability to operate during darker hours

SCOPE

- Targets street vendor
- Adequate lighting for 1 or 2 LED.
- Adaptable for small business

CHALLENGES

- Solution is budget friendly
- Solution is readily available to vendors.
- Solution is effective.

TRADE-OFFS

- A solution might have to trade off between cost and effectiveness.
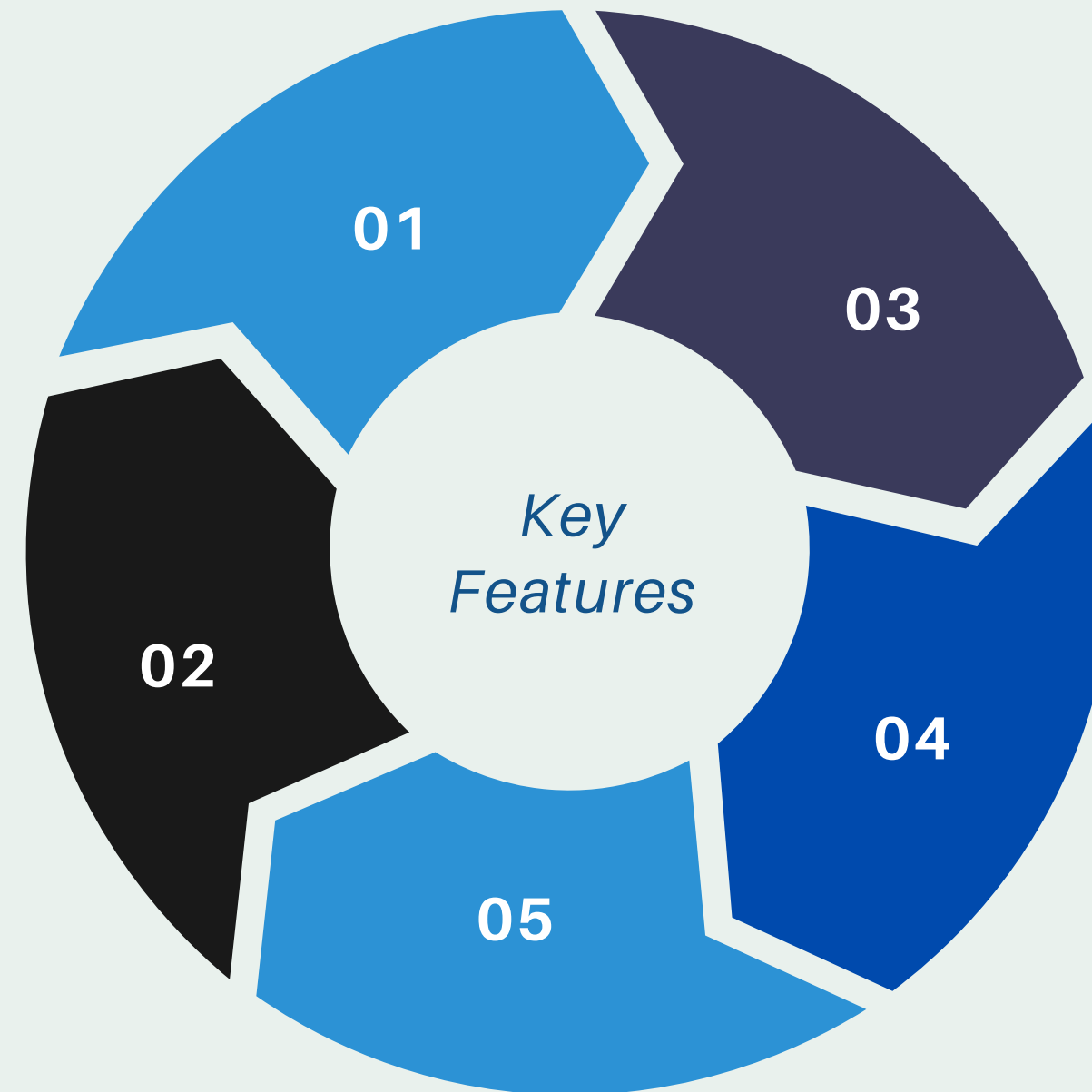- The task is to minimize cost ensuring effectiveness

IDEATION

1. SOLAR PANELS FOR SUSTAINABLE ENERGY
- Highly efficient, environment friendly
- Reduces reliance on conventional power sources

2. LED LIGHTS
- Energy efficient and long lifespan
- Various types like tubelight, lamp, bulbs.

3. LDR SENSORS FOR REAL-TIME CONTROL
- Real time adjustments of lighting
- Automatically detect ambient light levels and adjust the brightness accordingly.

4. RECHARGEABLE BATTERIES
- Ensures operation during non sunny period.
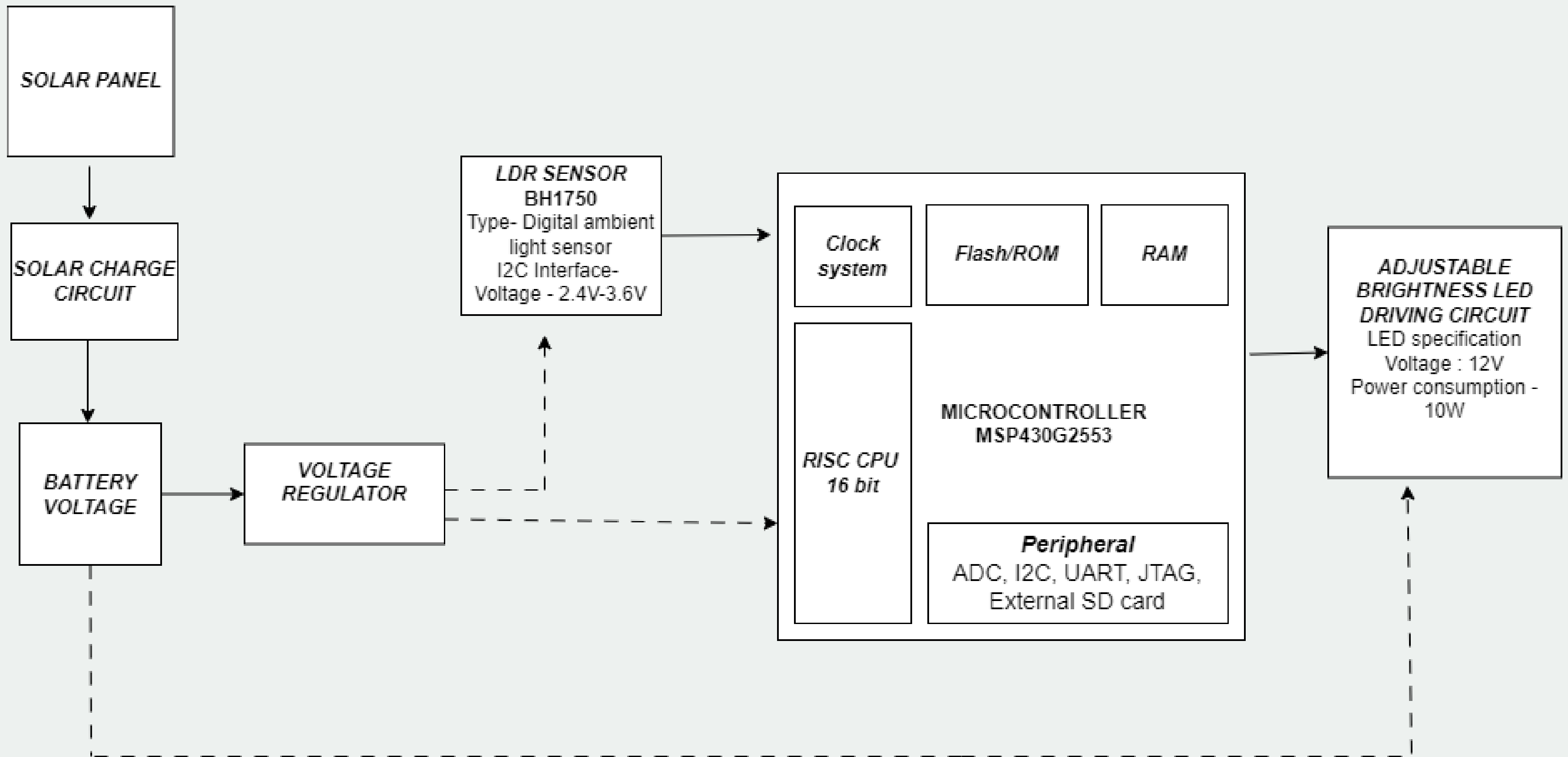- Powers the entire system
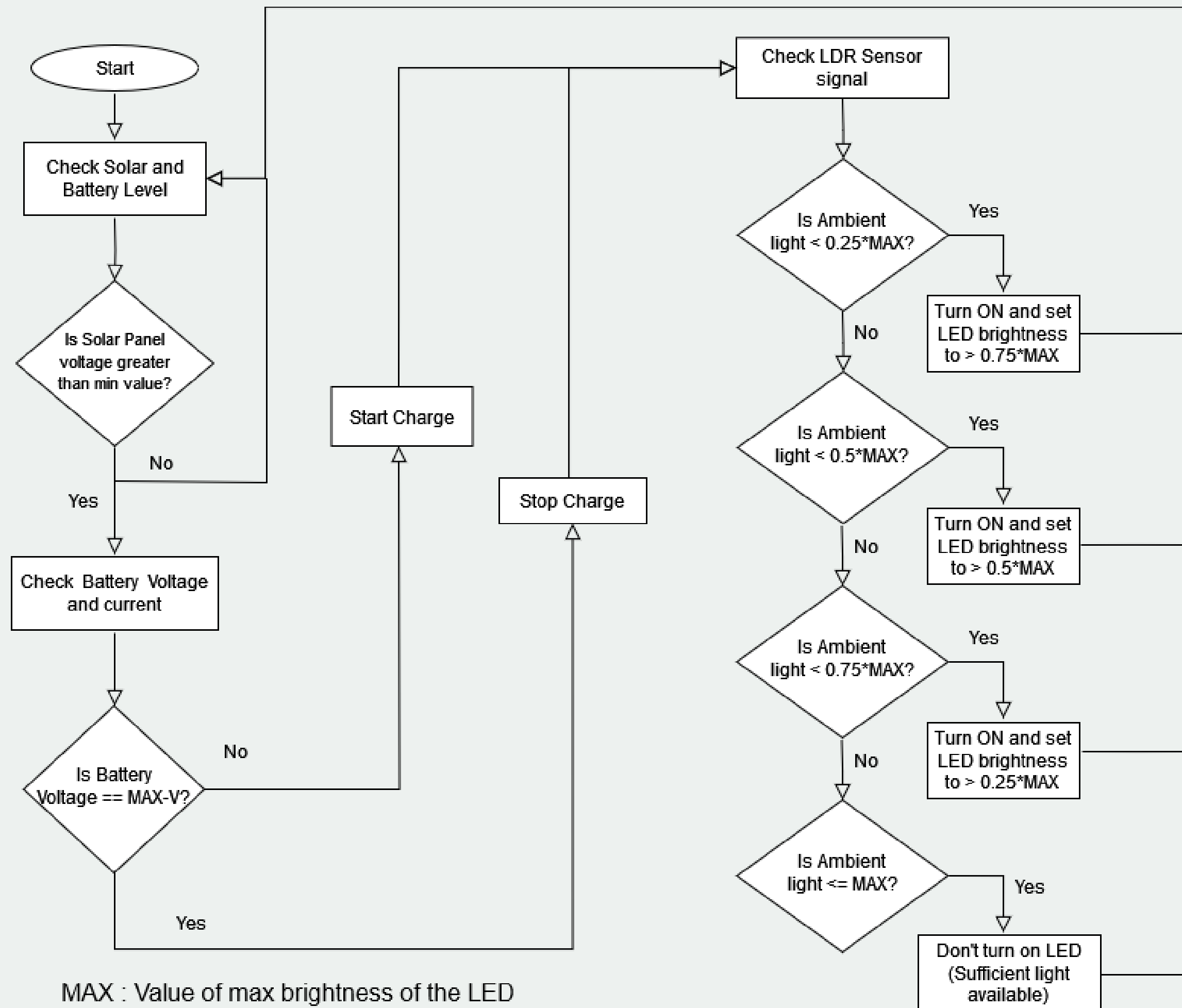
5. MICROCONTROLLER FOR INTELLIGENT MANAGEMENT
- Brain of the system
- Manipulate input from sensor and controls LED brightness

Key Features

01
02
03
04
05

PROTOTYPE

- System Architecture
- Functionality Flow Diagram

Start

Check Solar and Battery Level

Is Solar Panel voltage greater than min value?

No

Yes

Check Battery Voltage and current

Is Battery Voltage == MAX-V?

No

Yes

Start Charge

Stop Charge

Check LDR Sensor signal

Is Ambient light < 0.25*MAX?
Yes → Turn ON and set LED brightness to > 0.75*MAX
No

Is Ambient light < 0.5*MAX?
Yes → Turn ON and set LED brightness to > 0.5*MAX
No

Is Ambient light < 0.75*MAX?
Yes → Turn ON and set LED brightness to > 0.25*MAX
No

Is Ambient light <= MAX?
Yes → Don't turn on LED (Sufficient light available)

MAX : Value of max brightness of the LED

MAX-V : Max Battery Voltage in order to prevent Overcharging

TESTING

Step	Condition	Action
Check Battery Level	Battery Level < MAX (90%) ?	Yes: "Store Energy" & solar panels starts generating energy No: and solar panel stops charging
Initialize System	N/A	Battery Storage: Initialize to current level Microcontroller: Power on I2C Communication: Enable LDR Sensor (2.4v-3.6v) Read LDR Sensor Values
Check Light Intensity	Ambient Light Intensity < 0.25*MAX (LOW LIGHT)	Yes: "Adjust LED Brightness (High)"
	Ambient Light Intensity > 0.75* (High Light)?	Yes: "Adjust LED Brightness (low)"

	Condition	Action
	Ambient Light Intensity > 0.5* (High Light)?	Yes: "Adjust LED Brightness (Medium)"
Check for Flicker Condition	Light Intensity changed rapidly?	Wait for a set time (e.g., 1 second) and re-read sensor value
Output to Led	N/A	Send the appropriate PWM signal to the 12V LED to control brightness 1. (Duty Cycle > 70%) to 12V 2. (Duty Cycle ~ 50%) to 12V 3. (Duty Cycle = 0%) to 12V
Loop Back	N/A	Go to "Read LDR Sensor Value"

FUTURE SCOPE

Scalability and Customization

- Only microcontroller and LDR needed for homeowners.
- customizable for public needs

Cost Reduction

- Bulk purchases reduce costs.
- Affordable for vendors with limited funds.

Extended Use-Case

- Add weighing scales for extra functionality.
- Improves vendor efficiency

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Thank you very much!