SMART PUBLIC RESTROOM

Import RPi.GPIO as GPIO

# Configure GPIO pin for motion sensor

Motion\_sensor\_pin = 17

GPIO.setmode(GPIO.BCM)

GPIO.setup(motion\_sensor\_pin, GPIO.IN)

Def faucet\_on():

Print(“Faucet turned on”)

Def faucet\_off():

Print(“Faucet turned off”)

Try:

While True:

If GPIO.input(motion\_sensor\_pin):

Faucet\_on()

Else:

Faucet\_off()

Except KeyboardInterrupt:

GPIO.cleanup()

DESIGN FOR SMART PUBLIC RESTROOM:

Start

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|--- User Approaches Restroom

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| |--- Motion Detected?

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| | |--- Yes

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| | | |--- Open Door

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| | | |--- Activate Occupancy Sensors

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| | | |--- Display “Welcome” Message

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| |--- No

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|--- User Inside Restroom

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| |--- Use Toilet, Sink, etc.

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| |--- Sensors Triggered (e.g., touchless faucets)

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| |--- Real-Time Feedback (e.g., occupancy status)

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|--- User Leaves Restroom

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| |--- Sensors Detect Exit

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| | |--- Close Door

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| | |--- Deactivate Occupancy Sensors

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| | |--- Send Usage Data to Central System

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|--- Regular Maintenance and Restocking

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| |--- Monitor Supply Levels (e.g., soap, toilet paper)

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| | |--- Are Supplies Low?

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| | | |--- Send Alert for Restocking

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| |--- Monitor Hygiene and Cleanliness

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| | |--- Is Cleaning Required?

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| | | |--- Schedule Cleaning

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|--- Data Analytics and Optimization

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| |--- Collect Usage Data

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| | |--- Analyze Restroom Usage

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| | |--- Optimize Cleaning and Maintenance

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|--- Security and Privacy

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| |--- Ensure User Data Protection

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| |--- Protect the System from Unauthorized Access

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|--- End

DESIGN:

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| Smart Public Restroom |

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| User | | Sensors | | Control and |

| Interface | | (e.g., | | Automation |

| (e.g., App)| | motion, | | System |

| | | occupancy)| (e.g., PLCs, |

| | | sensors) | microcontrollers)|

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| Entry/Exit | | Fixtures | | Cleaning and|

| Systems | | (e.g., | | Maintenance |

| (Doors, | | faucets, | | Systems |

| Sensors) | | toilets, | | (e.g., |

| | | urinals) | | robotic |

| | | | | cleaners, |

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| Security | | Data | | Waste |

| Systems | | Collection| | Management |

| (e.g., | | and | | (e.g., waste|

| cameras, | | Analytics | | sorting, |

| alarms) | | Systems | | compactors) |

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| Sustainability| Privacy |

| Systems | and |

| (e.g., | Access |

| water-saving | Controls |

| fixtures) | | |

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