Project Design Phase-II
Technology Stack (Architecture & Stack)

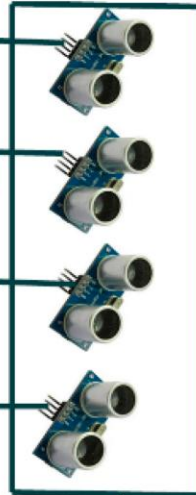| Date	15.5.2023
Team ID	NM2023TMID19394
Project Name	Smartcity waste management systems with connected trashcans

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2
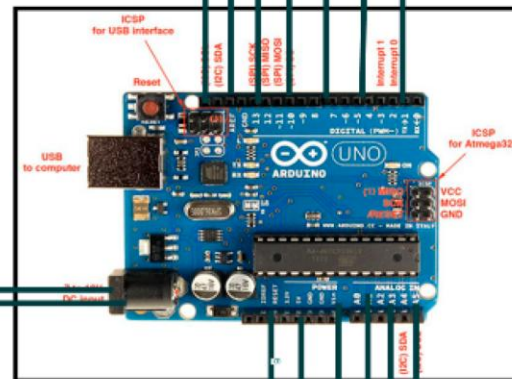
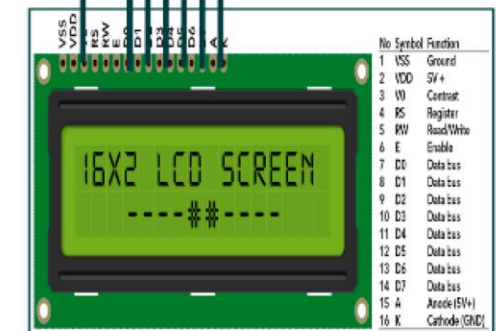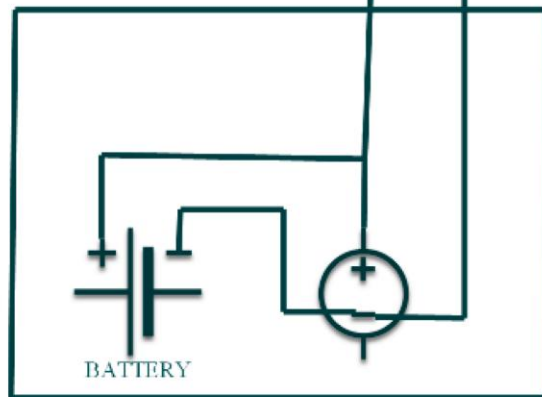WASTE BINS UNIT
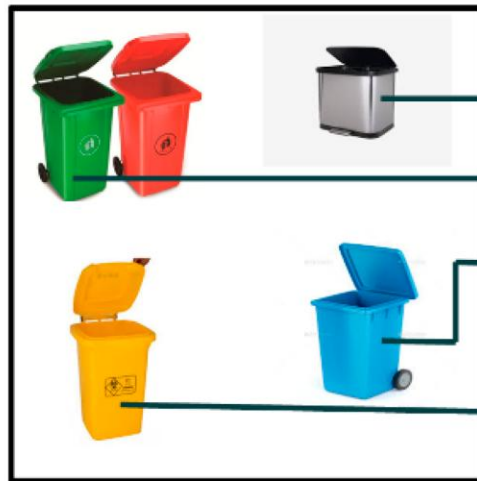
ULTRASONIC SENSORS UNIT

ICSP
for USB interface

Reset

USB
to computer

ICSP
for Atmega328

VCC
MOSI
GND

DC input

LIQUID CRYSTAL DISPLAY UNIT

No	Symbol	Function
1	VSS	Ground
2	VDD	5V +
3	V0	Contrast
4	RS	Register
5	RW	Read/Write
6	E	Enable
7	D0	Data bus
8	D1	Data bus
9	D2	Data bus
10	D3	Data bus
11	D4	Data bus
12	D5	Data bus
13	D6	Data bus
14	D7	Data bus
15	A	Anode (5V+)
16	K	Cathode (GND)

16X2 LCD SCREEN

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MONITORING AND
CONTROL UNIT

LIGHT EMITTING DIODS UNIT

BATTERY
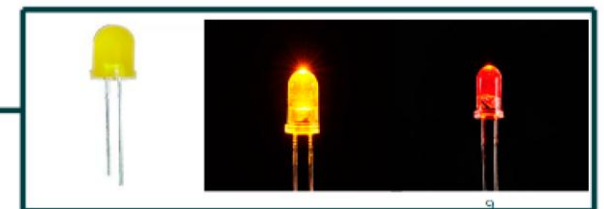
POWER SUPPLY UNIT
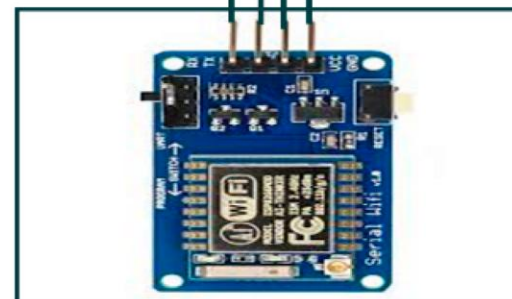
Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	Energy-efficient trash compactors	These devices can compress the waste, allowing more trash to fit into each trashcan and reducing the frequency of emptying.	Smart bin technology
2.	Recycling sorting technology	This technology can sort recyclable materials from non-recyclable materials, allowing for more efficient recycling.	Cloud computing
3.	Smart routing software	This software can optimize the routes of garbage trucks to reduce fuel consumption and carbon emissions.	Mobile applications
4.	Real-time monitoring	This allows for the city to be notified immediately of any issues with trash collection or disposal.	GPS tracking
5.	Smart bins with solar panels	These bins can be equipped with solar panels to power the IoT sensors and other connected devices, reducing the need for external power sources.	Internet of Things (IoT) sensors

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Eclipse IoT: Eclipse IoT is an open-source platform that provides tools and frameworks for building IoT applications. It includes the Eclipse Mosquitto MQTT broker, which can be used to connect IoT devices, as well as the Eclipse Kura gateway, which provides a platform for running IoT applications.	Eclipse IoT
2.	Security Implementations	Secure communication: All communication between the connected devices, such as the IoT sensors, and the central system should be encrypted using secure protocols like HTTPS or MQTT with SSL/TLS. This helps prevent eavesdropping and data tampering.	MQTT
3.	Scalable Architecture	API-based architecture: An API-based architecture can help improve scalability by allowing the system to easily integrate with other systems and services. This can help reduce the development time and cost of the system.	API third party integration
4.	Availability	Redundancy: Redundancy is an important factor in ensuring availability. Critical components of the system, such as the central server, should be deployed in a redundant configuration to ensure that if one component fails, another can take over seamlessly.	Geographical information systems
5.	**Performance**	**Smart city waste management systems with connected trash cans have the potential to**	**IoT sensors,mobile application**

S.No	Characteristics	Description	Technology
		improve waste collection efficiency, reduce costs, and minimize environmental impact. However, ensuring reliable connectivity, accurate data collection and interpretation, public participation, and system scalability are crucial for their optimal performance.,	