Project Design Phase-II
Technology Architecture

Date	30 October 2022
Team ID	PNT2022TMID22120
Project Name	SmartFarmer- IoT Enabled Smart Farming Application
Maximum Marks	4 Marks

Technical Architecture:-

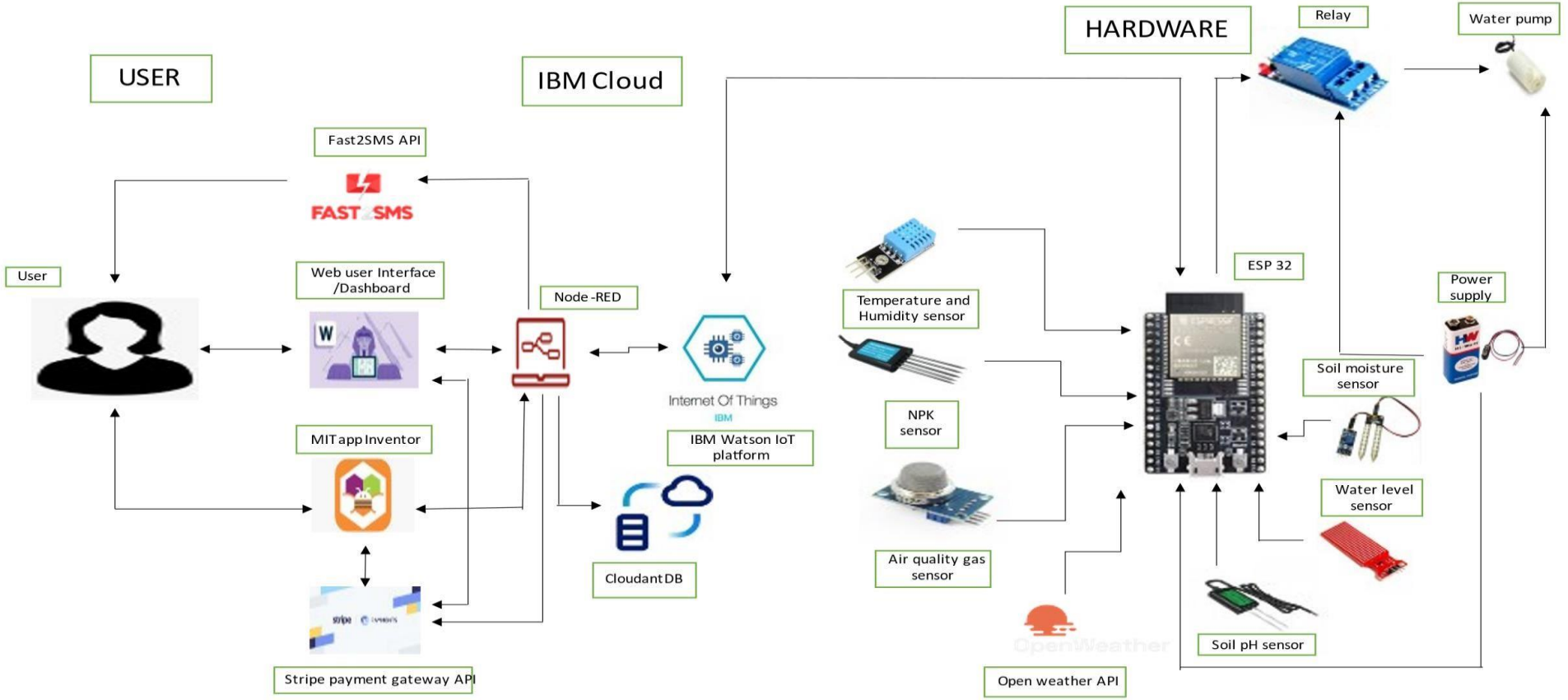

Table-1: Components & Technologies: -

S.No	Component	Technology	Description
1.	User Interface-1	NodeRED Dashboard	NodeRED dashboard is utilized to display values from the IBM Watson IoT Platform, from which the user can note sensor values and run motors.
2.	User Interface-2	MIT App Inventor	The user can note sensor values and operate a motor by applying a mobile application that shows values from the IBM Watson IoT platform.
3.	Hardware component-1	ESP32 board (ESP32 Devkit V1), C++	ESP32 board (ESP32 Devkit V1), C++ Sensor values are sent to the IBM Watson IoT Platform, and operations are performed via button clicks in the user interface.
4.	Hardware component -2	Water level Sensor (FS-37A)	used to measure the water level in a container where water is dispensed
5.	Hardware component-3	Soil pH sensor	Soil pH sensor used to determine soil acidity using the pH level of the soil
6.	Hardware component-4	Soil moisture sensor (AR 605)	Soil moisture sensor (AR 605) utilized to calculate the volumetric water content of soil
7.	Hardware component-5	Temperature and Humidity sensor (DHT 11)	used to measure the humidity and of the environment
8.	Hardware component-6	NPK sensor	used to estimate soil fertility by measuring nutrients in soil such as nitrogen, phosphorus, and potassium.
9.	Hardware component-7	Air quality gas sensor (MQ135)	used to identify airborne pollutants including smoke, CO2, and ammonia
10.	Hardware component-8	Relay	used to boost the output of an ESP32 with an external power supply in order to power a water pump.
11.	Hardware component-9	Water pump (EK1893)	used to release water from a container and hydrate soil
12.	Hardware component-10	Power supply (5V battery)	used to supply the ESP32 board and the Relay with electricity
13.	Application Logic-1	IBM Watson IoT Platform	The IBM Watson IoT platform collects data from the devices handles device connections, and aids in the development of software applications.
14.	Application Logic-2	Node RED Service, NodeJS	The NodeRED service offers a means to analyze data acquired, present information online, and use APIs to integrate external services and communicate with mobile applications.
15.	Cloud Database	IBM Cloudant DB	Sensor data is kept in a cloud database service.

16.	External API-1	Fast2SMS API	enables the farmer to receive warnings when a sensor parameter value threshold is reached

17.	External API-2	OpenWeather API	used to offer analysis with precise local weather information such as temperature, humidity, pressure, wind speed, etc.
18.	External API-3	Stripe Payment Gateway API	uses a single API to take a multitude of payment methods for subscription payments.

Table-2: Application Characteristics: -

S.No	Characteristics	Technology	Description
1.	Open-Source Frameworks	Fast2SMS API, OpenWeather API, Stripe Payment gateway API	Describe the utilized open-source frameworks.
2.	Security Implementations	Two step authentications (Password and OTP)	List every security and access control measure used, including firewalls.
3.	Scalable Architecture	3 tier architecture	User interface, cloud services, and hardware are all implemented using a three-layer design.
4.	Availability	IBM Watson IoT Platform, IBM load balancer	The IoT platform offers global application availability so that users can remotely access data from anywhere in the world. A load balancer balances the availability of information for several users at once.
5.	Performance	IBM Watson IoT Platform, MQTT, ESP32 Board	The usage of MQTT for data transfer aids in maximizing data transfer performance, and the use of the multi-core, fast-processing ESP32 processor aids in offering high performance.