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Smart Farm System - Hardware Budget Plan

Hardware Component Costs Analysis

Exchange Rate: 1 USD = 1,451.78 RWF (November 7, 2025)

Individual Component Pricing

Cow Node Hardware (Per Unit)

Component	Model/Specification	Qty	Unit Price (USD)	Unit Price (RWF)
Microcontroller	ESP32-WROOM-32 DevKit	1	\$8.70	12,230
GPS Module	NEO-6M/8M with antenna	1	\$14.50	21,051
Temperature Sensor	DS18B20 Waterproof	1	\$7.25	10,525
Accelerometer	MPU6050 6-axis IMU	1	\$4.35	6,315
LoRa Module	SX1276 Ra-02 915MHz	1	\$14.50	21,051
Heart Rate Sensor	MAX30102 PPG sensor	1	\$15.00	21,777
RFID Reader	RC522 13.56MHz	1	\$4.50	6,533
Status LEDs	RGB LED indicators (3x)	1	\$3.00	4,355
Battery	3.7V 2500mAh Li-Po	1	\$12.00	17,421
Solar Panel	6V 1W monocrystalline	1	\$15.00	21,777
Charging Circuit	TP4056 with protection	1	\$2.50	3,629
Waterproof Enclosure	IP65 rated housing	1	\$18.00	26,132
Collar/Mount Kit	Adjustable cow collar	1	\$8.00	11,614
Cow Node Total			\$127.30	184,810 RWF

Milk Station Node Hardware (Per Unit)

Component	Model/Specification	Qty	Unit Price (USD)	Unit Price (RWF)
Microcontroller	ESP32-WROOM-32 DevKit	1	\$8.70	12,630
LoRa Module	SX1276 Ra-02 915MHz	1	\$14.50	21,051
LCD Display	16x2 with I2C backpack	1	\$12.00	17,421
pH Sensor	Analog pH meter probe	1	\$45.00	65,330
Conductivity Sensor	EC probe with circuit	1	\$65.00	94,366
Temperature Probe	DS18B20 stainless steel	1	\$15.00	21,777
Input Keypad	4-button membrane	1	\$8.00	11,614
Status LEDs	LED indicators (3x)	1	\$2.50	3,629
SD Card	32GB Class 10	1	\$15.00	21,777
Power Supply	12V 3A adapter	1	\$18.00	26,132
Junction Box	IP65 waterproof enclosure	1	\$35.00	50,812
Cables & Connectors	Waterproof connections	1	\$25.00	36,295
Mounting Hardware	Stainless steel brackets	1	\$15.00	21,777
Milk Station Total			\$278.70	404,611 RWF

Gateway Node Hardware (Per Unit)

Component	Model/Specification	Qty	Unit Price (USD)	Unit Price (RWF)
Microcontroller	ESP32-WROOM-32 DevKit	1	\$8.70	12,630
WiFi Module	Built-in ESP32 WiFi	1	\$0.00	0
LoRa Module	SX1276 Ra-02 915MHz	1	\$14.50	21,051
TFT Display	3.5" ILI9341 320x240	1	\$25.00	36,295
Ethernet Module	W5500 with RJ45	1	\$15.00	21,777
SD Card	64GB Class 10	1	\$25.00	36,295
Power Supply	12V 2A adapter	1	\$15.00	21,777
Status LEDs	RGB LED indicators (3x)	1	\$3.00	4,355
Waterproof Enclosure	IP65 embedded housing	1	\$28.00	40,650
Antenna Kit	LoRa + WiFi antennas	1	\$18.00	26,132
Backup Battery	UPS 12V 7Ah	1	\$38.00	55,168
Gateway Total			\$190.20	276,130 RWF

Contact Information

Direct Contact: 0781008164

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