BLYNK INTEGRATED IOT SMART FARM

GROUP ANAS

IOT PROJECT PROPSAL

SMART FARM IOT WITH BLYNK INTEGRATION

INTRODUCTION

The SmartFarm IoT Ecosystem aims to develop a comprehensive farm management system utilizing Internet of Things (IoT) technology, centralized through the Blynk platform. This innovative system integrates various components for enhanced farm operations, including a sophisticated swimming pool monitoring system, a smart pet feeder, an automatic plant waterer, water tank level monitoring, solar energy production prediction, automated farm lighting control, and water pumps for various applications.

OBJECTIVE

- **Swimming Pool Monitoring System:** Monitor the pH level of the pool water and control the pool's filtration system with an automated timer and water pump.
- **Smart Pet Feeder and Water Monitor:** Manage feeding schedules and monitor water levels for pets, including automated water dispensing in the dog's house.
- **Automatic Plant Waterer :** Automate watering based on pre-defined schedules tailored to each plant and tree species' specific needs, utilizing strategically located water pumps for efficient irrigation.
- **Water Tank Level Monitoring:** Implement sensors to monitor water levels in storage tanks.
- **Solar Energy Energy Prediction:** Use data analytics for predicting solar energy output.
- **Smart Lighting Control:** Automate and control farm lighting based on time or environmental factors.

SCOPE

- **Design and Development:** Construct hardware and software for each IoT device, including the integration of water pumps and level monitoring systems.
- **Integration with Blynk:** Link all devices to Blynk for seamless monitoring and control.
- **Data Analysis:** Implement analytics for solar energy production prediction
- **Testing and Validation:** Rigorously test the system to ensure reliability and accuracy.
- **Deployment:** Implement the system and train users on Blynk app usage.

METHODOLOGY

- **Hardware Setup:** Utilize microcontrollers with appropriate sensors (pH, temperature, weight, water level, solar irradiance) and actuators (servo motors, water pumps, relay modules for lighting).
- **Software and Analytics:** Develop software for sensor data processing and integrate with Blynk. Use data analytics for solar output prediction.
- **Water Pump Placement and Control :** install water pumps at key locations for pool filtration , plant watering, and pet water dispensing, Integrate these pumps into thee Iot system for automated control and monitoring
- **Blynk Interface:** Develop custom dashboards for each component in the Blynk app.

TECHNOLOGY STACK

- Microcontrollers: Arduino, ESP32
- Sensors: pH, temperature, weight, water level
- Actuators: Servo motors, water pumps, relay modules for lighting
- Data Analytics: Tools for solar energy prediction (e.g., Python with ML libraries)
- IoT Platform: Blynk
- Connectivity: Wi-Fi modules
- Programming: Arduino IDE, C/C++ for Arduino, Python, Blynk libraries

EXPECTED OUTCOMES

- A fully integrated IoT solution for comprehensive farm management.
- Efficient water management for pool maintenance, plant irrigation, and pet care.
- Real-time monitoring and control over various farm aspects through the Blynk app.
- Data-driven insights for optimizing solar energy production.
- Enhanced operational efficiency and resource management on the farm.

The SmartFarm IoT Ecosystem, enhanced with the Blynk platform and strategic integration of water pumps and sensors, represents a state-of-the-art approach to modern farm management. This project combines IoT technology with practical applications, offering detailed control and insights over critical aspects of farm management, ensuring sustainable and efficient operations.

BUDGET ESTIMATE COMPONENTS AND PRICES

Component Function	Component Name	Component Price	Quantity	Resistor Needed	
Microcontroller	Arduino Mega or ESP32	~16 JOD	1	N/A	LINK
pH Sensor for Pool Monitoring	pH Sensor Module for Arduino	~20 JOD	1	N/A	LINK
Temperature Monitoring	DS18B20 Temperature Sensor for Arduino	~4 JOD	1	4.7kΩ each	LINK LINK
Water Level Monitoring	Water Level Sensor for Arduino	~2 JOD	3	N/A	LINK
Lighting Control	Light Sensor for Arduino	~2 JOD	1	N/A	LINK
Water Pumping	12V Water Pump	~21 JOD	1	N/A	LINK
Pet Feeder Mechanism	Servo Motor for Arduino	~8 JOD	1	N/A	LINK
Wi-Fi Connectivity (if using Arduino Uno)	ESP8266 Wi-Fi Module	~12 JOD	1	N/A	LINK
Circuit Prototyping	Breadboard for Arduino	~2 JOD	1	N/A	LINK
Circuit Connections	Jumper Wires (Assorted)	~3 JOD for a set	3	N/A	LINK
Status Indicators	Standard LEDs	~1 JOD	As needed	220Ω - 330Ω each	LINK
Relay for Pumps and Lights	Relay Module for Arduino	~6 JOD	Multiple	N/A	LINK
Load Sensing for Pet Feeder	Load Cell Weight Sensor	~2 JOD	1	N/A	LINK
Miscellaneous Supplies	Miscellaneous (screws, mounting hardware)	~5 JOD	As needed	N/A	

CONNECTIVITY GUIDE

Microcontroller (Arduino Mega or ESP32):
- Power via a 5V USB power supply or through the DC-DC converter connected to your solar power setup.
- Ground (GND) to a common ground bus on your breadboard or distribution board.

Wi-Fi Module (ESP8266, if using Arduino Uno):
- VCC to 3.3V on the Arduino.
- Ground (GND) to common ground.
- TX to RX and RX to TX for serial communication with the Arduino.

pH Sensor Module for Arduino:
- VCC to 5V on the Arduino.
- Ground (GND) to common ground.
- Analog signal output to an analog input pin on the Arduino (e.g., A0).

DS18B20 Temperature Sensor for Arduino:
- VCC to 5V on the Arduino.
- Ground (GND) to common ground.
- Data line to a digital pin on the Arduino (e.g., D2).
- A 4.7kΩ pull-up resistor between VCC and the data line.

Water Level Sensor for Arduino:
- VCC to 5V on the Arduino.
- Ground (GND) to common ground.
- Analog signal output to another analog input pin on the Arduino (e.g., A1).

Light Sensor for Arduino:
- VCC to 5V on the Arduino.
- Ground (GND) to common ground.
- Analog signal output to an analog input pin (e.g., A3).

Standard LEDs (for status indicators):
- Anode (longer leg) to a digital pin on the Arduino through a current-limiting resistor (220Ω - 330Ω).
- Cathode (shorter leg) to common ground.

12V Water Pump:
- Power directly from the 12V solar power supply or battery through a relay.
- Relay module's control pin connected to a digital pin on the Arduino (e.g., D4).
- Ground of the relay module to common ground.

Servo Motor for Arduino (for pet feeder mechanism):
- VCC to 5V on the Arduino or an external power supply if higher current is needed.
- Ground (GND) to common ground.
- Control wire to a digital pin capable of PWM on the Arduino (e.g., D3).

Load Cell Weight Sensor (for pet feeder):

- Typically connected to a load cell amplifier like the HX711, which is then connected to the Arduino:
- VCC to 5V on the Arduino.
- Ground (GND) to common ground.
- Data and Clock pins to digital pins on the Arduino (e.g., D5 and D6).

Relay Module for Arduino (for pumps and lights control):

- VCC to 5V on the Arduino.
- Ground (GND) to common ground.
- Control pin(s) to digital pin(s) on the Arduino (e.g., D7 for lights, D8 for additional devices).

Breadboard:

- Used for prototyping the circuit, allowing for easy adjustments and testing.

Jumper Wires (Assorted):

- Used to make all the connections on the breadboard and between the components and the microcontroller.

Prototype structure
Figure