WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Rory- The Robot Plant

Mr. B. Mohan[1], G Kranthi Kumar[2], Belide Bhavani[3], K Prashanth Rao[4], M Vamshi[5]

[1]Assistant Professor, CSE(IoT), ACE Engineering College Hyderabad, India mohanbannu12@gmail.com
[2]Student, CSE(IoT), ACE Engineering College Hyderabad, India kranthikumar@gmail.com
[3]Student, CSE(IoT) ACE Engineering College Hyderabad, India bhavanibelde@gmail.com
[4]Student, CSE(IoT) ACE Engineering College Hyderabad, India prashanthrao@gmail.com
[5]Student, CSE(IoT) ACE Engineering College Hyderabad, India vamshi@gmail.com

ABSTRACT:

In a world where technology and nature are often set at odds, Rory the Robot Plant is a compelling testament to their harmonious blend. Designed to capture both hearts and minds, Rory bounds beyond mundane notions of robotics to enchant with a mesmerizing juxtaposition of invention and allure. At the heart of it, Rory is more than a machine; it's a friendly buddy always ready to chat and entertain with his incredibly quirky look and interactive capability. Also previewed with touch and motion sensors, Rory can burst into poses and movement like some sort of animal, inviting curiosity and amazement with each one of its actions. One of the most exciting aspects of Rory is its multimodal engagement capabilities. From its musical talents that fill the air with melodious tunes to its motion detection abilities that respond to the people passing by, Rory creates a sensorial experience that is nothing but leaves the observer with feelings of interest and joy. Adding to this was Rory's adept photography. With the uncandid eye, Rory shoots instant pictures and freezes moments with its technological sorcery. But the real feature that makes Rory outstanding, besides all its functionality, is the design. Designed more or less in the basic shape of an extravagant flora-cum-fauna, brought to life due to technological advancements, Rory merely adds an air of magic to places wherever it sets its feet or wheels. Just the view of it creates an impression of marvel and curiosity toward how its charming behavior can woo anybody who comes in contact with it. Let Rory the Plant Robot immerse you in a world of magic that combines technology. His mesmerizing presence and enchanting abilities take the mundane into a space where innovation and nature are combined to make something truly extraordinary.

Keywords: smart irrigation, soil moisture sensors, whimsical plant, Humidity sensor, PIR motion sensor

I. INTRODUCTION

This is Rory the Robot Plant, a spellbinding marriage of nature and tech that makes magic live. Trust us, this is no hum-drum robot; Rory features really magical charm and is fully interactive. It will actually captivate hearts and minds alike by interacting with the world around it in a real way through its touch and movement sensors. He's more than just a machine—he's a charming companion, always ready to entertain, engage, and enchant with his musical talent, motion detection, and photography. He is represented in Rory as radiantly coupled innovation charisma, approaching more like some incredible, fantastic, oneiric flora caught alive by skilled technologists. With every step this creature makes into a room, it adds magic, making people curious and wonder. It's through these ways that it seems to whistle a tune, snap candid moments as if it was gifted with photography talent, or simply endear itself through gestures that make Rory call for interaction and connection in ways that go beyond the ordinary. For a journey where technology meets magic, join Rory the Robot Plant and be a part of the joy, wonder, and enchantment it brings to its onlooker.

II. LITERATURE SURVEY

This paper designs and implements an IoT-based smart irrigation system that integrates soil moisture sensors, a microcontroller, and an IoT platform to automatically water plants with real-time data. This system comes with different sensors in place that would be monitoring the moisture contents in the soil, temperature, and humidity, keeping them constant to facilitate favorable plant growth. The microcontroller processes the sensor data and controls the irrigation based on predefined thresholds to avoid over-irrigation and reduce water usage. Moreover, the system has remote monitoring features: the schedules for irrigation could be monitored and managed using a mobile or web application. It is in this light that this excellent water use reduction with improved crop yield and healthier plants has, indeed, underlined the efficiency and sustainability of IoT-based irrigation solutions. This paper is relevant in that it describes a realistic approach to automate irrigation using IoT; this is an important part of the Rory the Robot Plant project. Integration techniques of the soil moisture sensor and microcontroller may be directly integrated in monitoring techniques that will handle plant health. The insights about water savings and improvement in yield offer extremely useful data by way of checking the effectiveness of the automated system. This offers remote monitoring guidance on how to implement user-friendly interfaces for system control, making a project more accessible and manageable for any end-user.

III. PROBLEM STATEMENT

In this fast-moving digital world, real desires are seen in the minds of people for products that are new and inventive, forming engaging and enchanting experiences in combination with nature. Most of the time, the usual traditional robotic systems lack the charm and interactive quality to capture the user and most importantly to blend with the environment. While already existing plant monitoring systems take care of collection and analysis of data, there is no instance of allowing more dynamism and emotional communication in the user experience. Present Rory the Robot Plant, the first in its kind that closes such gaps, embedding technological wonders in the whimsical appearance and interactivity features of a lively plant. This is quite a cool feature, but here are a couple of challenges to pick up if Rory should widen into full bloom:

1. Technology and Nature: Blend the two extremes—cutting-edge robotics with natural aesthetics—evenly together to create not only good performance but also something magic and full of wonder for the user.

2. Interactivity and Engagement: Design sensors with software for Rory to entertain touch and movement and be able to interact with its surroundings in an almost real-like and engaging manner.

3. Multifunctional Capabilities: To guarantee that Rory's musical abilities, motion sensing, and photography functionalities are not only technically accurate but also intuitive, likable, and engaging for users of all ages.

4. User Experience: To make Rory not just a machine but an enchanting companion, from which joy radiates, with which interaction is a pleasure and toward which a meaningful bond is formed.

Aesthetic and Emotional Appeal: Creating a design that would epitomize innovation and charm, considering Rory as an appealing element in any space to initiate curiosity and wonder from his beholders. Through accomplishing these tasks and goals, Rory the Robot Plant will be above the ordinary that would bring magic and involve the user in a spectacular and engaging world that would bring a smile, wonder, and magic to its users.

IV. CURRENT SYSTEM

In the realm of robotics and smart devices, a handful of systems attempt to blend technology with the essence of what interactive user experiences are. However, these solutions either lack the whimsical charm or do not make the playful engagement as lifelike as does Rory the Robot Plant. Here are a few categories and examples of existing systems that partially fulfill the opportunity:

1. Smart Home Assistants: Amazon Echo, Google Home, and Apple Home Pod: The devices are smart voice-controlled implementations providing help in things like playing music, controlling smart home systems, or finding information but, however useful, do not provide the physical companionship of a plant that is full of whimsical charm.

2. Interactive Toys and Companions: Anki Vector and Anki Cozmo: They are small robots with various interactive features like playing games on their own and responding to touches, gestures, and voice commands. Though they are oriented to engage people in a playful manner, their design and functionalities feel more like robots worked with less on aesthetics.

3. Plant condition sensors - Parrot Flower Power and Xiaomi Mi Flor: These monitor soil moisture, temperature, and sunlight by communicating the information to a mobile app. In their scope of work, they focus squarely on plant care, leaving out the interactive and entertainment elements absorbed by Rory.

V. PROPOSED SYSYTEM

The proposed system introduces "Rory the Robot Plant," a revolutionary fusion of technology and nature designed to captivate and enchant. Rory is not just an ordinary robot; it is an interactive, whimsical companion that brings joy and wonder to its surroundings. This system aims to seamlessly integrate advanced robotics with a lifelike plant design, offering a multifunctional, emotionally engaging experience. The following key features and functionalities define the proposed system:

1.Whimsical and Natural Aesthetics: Rory is designed to resemble a whimsical plant, blending seamlessly into any environment with its charming and lifelike appearance. The design incorporates natural elements and smooth, organic shapes to create an inviting and enchanting presence.

2. Advanced Sensor Integration: Equipped with touch and movement sensors, Rory can interact with its environment in a lifelike manner, responding to human touch and nearby movement. The sensors enable Rory to react with endearing gestures, making interactions feel natural and engaging.

3. Multifunctional Capabilities: Musical Talents: Rory can play a variety of tunes, adding a musical dimension to its interactive capabilities. Users can enjoy a personalized serenade or ambient music. Motion Detection: Rory can detect and respond to movement within its vicinity, making it an engaging companion that reacts to its environment. Photography Skills: Equipped with a camera, Rory can capture candid moments, adding an element of surprise and delight to its interactions. Users can collect these photos as memories of their time with Rory.

VI. HARDWARE AND SOFTWARE REQUIREMENTS

HARDWARE REQUIREMENTS:

- Arduino UNO
- SD Card Reader Module
- Bit craze Micro SD card deck
- LM386 Audio Amplifier
- 10uf Capacitor (2 Nos)
- Resistor 10k ohm
- PIR Motion Sensor(generic)
- KY-038 Sound Sensor
- LDR light dependent resistor
- DHT11 Temperature & Humidity Sensor (3 pins)
- Spark Fun Soil Moisture Sensor (with screw terminals)
- Breadboard(generic)
- LED matrix module

SOFTWARE REQUIREMENTS:

- Arduino IDE
- Microsoft Visual Studio 2015

VII. MODULES

For the Rory the Robot Plant IoT project, a number of key modules and components are important to be functional. The primary modules are as follows:

1. Microcontroller: The microcontroller serves as the brain of the system. It acquires data from different sensors, processes this information, and controls actuators—for example, water pumps—with predefined threshold limits. Common microcontrollers used in such projects are Arduino, ESP8266, or ESP32, mainly due to lower power consumption and inbuilt Wi-Fi for IoT applications.

2. Soil Moisture Sensor: It measures the quantity of water content in soil volumetrically. It helps to note when the soil has dried up and is in dire need of watering. The data that it collects is quite important in ensuring that plants get the right amount of water, without over- and under-watering.

.3. Temperature and Humidity Sensor: These sensors read environmental conditions around the plants. For optimal plant condition, its temperature and humidity must stay within their optimal levels. The commonly used ones are the DHT11 or DHT22, which provide reliable and accurate readings.

4. Water Pump: The water pump is driven by the microcontroller and supplies water to the plants. Depending on the requirements of the system, this could be a simple submersible or a more complex peristaltic pump.

5. Wi-Fi module: This is mostly integrated into the microcontroller (like ESP8266 or ESP32) and provides internet connectivity to the whole system. In this way, one can monitor and control remotely through a mobile application or web interface; therefore, configurations can be set or the status of plants can be viewed from anywhere in the world.

6. Cloud platform: This is where data from the sensors is stored and processed. It offers a user interface for remote system monitoring and control. Typical platforms include Blynk, ThingSpeak, or custom solutions using services like AWS, Azure, or Google Cloud.

7. Power Supply: It provides the power supply required for the microcontroller, sensors, and actuators. This can be achieved by a battery pack, a solar panel, or a power socket connection, depending on how the project is designed to have its power supplied.

8. Relay Module: The relay module works like a switch in controlling the water pump, according to the signals obtained from the microcontroller. This will guarantee that the pump is on only when necessary, depending on the moisture level of the soil.

9. Mobile App or Web Interface: This is the interface through which the system will be remotely controlled. It provides the user with real-time values for soil moisture, temperature, and humidity and allows for manual control over the watering system if needed. The interface can either be custom-developed or integrated with off-the-shelf IoT platforms like Blynk.

10. Data Logging Module: This module logs changes in sensor data with time and gives insights on plant health and system performance to study trends for making informed decisions on plant care.\

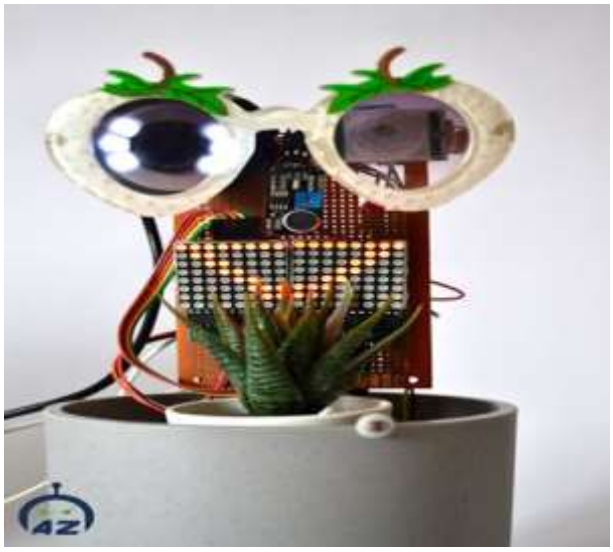
VIII. SAMPLE CODE:

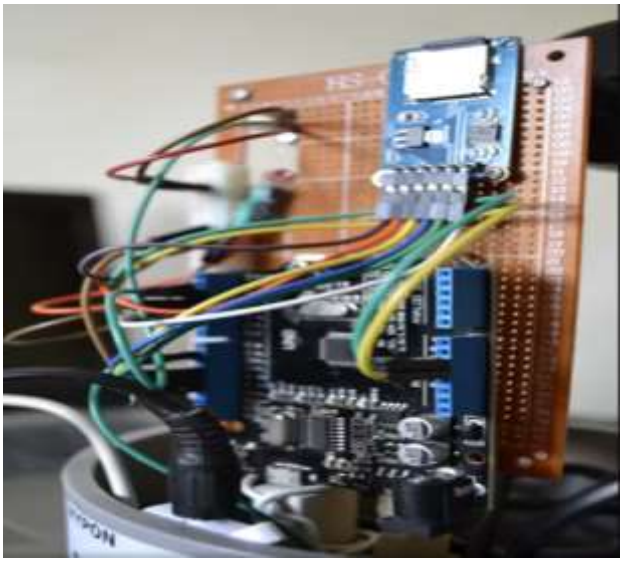
```
#include "SD.h"
#define SD_ChipSelectPin 4
#include "TMRpcm.h"
#include "SPI.h"
char mychar;
/****************** PIR SENSOR ******************/
int led = 3;                // the pin that the LED is attached to
int sensor = 2;             // the pin that the sensor is attached to

/****************** Sound SENSOR ******************/
int SoundSensor = A0;
int clap = 0;
long detection_range_start = 0;
long detection_range = 0;
boolean status_lights = false;

TMRpcm tmrpcm;
void setup(){
   tmrpcm.speakerPin = 9;
   Serial.begin(9600);
   if (!SD.begin(SD_ChipSelectPin)) {
   Serial.println("SD fail");
   return;
   }
 tmrpcm.setVolume(5);
pinMode(led, OUTPUT);      // initialize LED as an output
 pinMode(sensor, INPUT);    // initialize sensor as an input
 pinMode(SoundSensor, INPUT);
}
void blinke(int x)
   {
     for (int i = 0; i <= x; i++) {
       digitalWrite(led, HIGH);
       delay(120);
       digitalWrite(led, LOW);
```

```
      delay(120);
    }
  }
void Tone(){
tmrpcm.play("13.wav");
blinke(5);
}
void loop(){
if(Serial.available()){
    mychar = Serial.read();
if(mychar == 'a'){
      tmrpcm.play("1.wav");
      Serial.println("play wav.");
 }else if(mychar == 'b'){
      tmrpcm.play("2.wav");
    }
 else if(mychar == 'c'){
      tmrpcm.play("3.wav");
   }
   else if(mychar == 'd'){
      tmrpcm.play("4.wav");
blinke(4);}
int sensorValue = digitalRead(sensor);
  if (sensorValue == 1) {
    Serial.println("human"); }
int status_sensor = digitalRead(SoundSensor);
if (status_sensor == 0)
{
if (clap == 0)
{
detection_range_start = detection_range = millis();
clap++;
}
else if (clap > 0 && millis()-detection_range >= 50)
{
detection_range = millis();
clap++;
}}
if (millis()-detection_range_start >= 400)
```

```
{
if (clap == 2){
if (!status_lights)
{
status_lights = true;
Tone();
}
else if (status_lights){
status_lights = false;
Tone2();
}}
clap = 0;
}}
```

IX.OUTPUTSCREEN





X. PROJECT DEPLOYMENT

Deploying the Rory the Robot Plant project involves several phases, from concept development to market launch. Here's a detailed plan outlining the steps necessary to bring Rory to life and into the hands of consumers.

Phase 1: Concept Development and Design

Ideation and Conceptualization: Define the core objectives and unique selling points of Rory. Collaborate with designers, engineers, and botanists to integrate technological and botanical elements.

Prototyping: Develop initial prototypes incorporating sensors, cameras, and actuators. Iterate on design based on feedback from initial tests.

Design and Aesthetics: Finalize the whimsical plant-like design to ensure it captivates and blends well in various environments. Focus on creating a user-friendly interface for interaction.

Phase 2: Technology Integration

1. Sensor and Interaction Development: Equip Rory with touch and movement sensors for lifelike interaction. Develop software for motion detection and response.

2. Music and Sound Integration: Implement Rory's musical capabilities, including a library of melodies.

Ensure sound quality and volume control for various settings.

3. Photography Functionality: Integrate a high-quality camera to capture candid moments. Develop algorithms for selecting and storing the best photos.

4. AI and Machine Learning: Implement AI to improve Rory's interaction based on user behavior and preferences.

Train models to recognize and react to different environmental stimuli.

Phase 3: Testing and Quality Assurance

1. Prototype Testing: Conduct extensive testing of all functionalities (sensors, music, photography).Gather user feedback to refine interactions and performance.

2. Quality Assurance: Ensure all components meet safety and durability standards. Test for robustness in various environmental conditions.

Phase 4: Manufacturing and Production

1. Sourcing and Partnerships: Source high-quality materials and components. Partner with reliable manufacturers for production.

2. Production Scaling: Scale up production to meet anticipated demand. Implement rigorous quality control processes during manufacturing.

Phase 5: Marketing and Launch

1. Branding and Messaging: Develop a captivating brand story highlighting Rory's unique fusion of technology and nature. Create marketing materials (videos, images, brochures) showcasing Rory's features.

2. Pre-Launch Campaign: Build anticipation through social media teasers, influencer partnerships, and pre-order campaigns. Engage with potential customers through interactive demos and events.

3. Launch Event: Host a grand launch event to introduce Rory to the world. Demonstrate Rory's capabilities and allow hands-on interaction.

Phase 6: Post-Launch and Customer Support

1. Customer Feedback and Support: Establish a customer support system for troubleshooting and feedback. Continuously gather and analyze customer feedback for future improvements.

2. Software Updates and Enhancements: Regularly update Rory's software to introduce new features and improve existing ones. Ensure easy update processes for users.

Phase 7: Expansion and Innovation

1. Product Line Expansion: Develop new versions of Rory with additional features or different designs. Explore potential partnerships for exclusive editions.

2. Continuous Innovation: Stay ahead of technological advancements and integrate them into future iterations of Rory.Invest in research and development to keep enhancing Rory's capabilities.

XI. INTEGRATION AND EXPERIMENTAL RESULTS

Integration details

The integration phase for Rory the Robot Plant involved combining the various technological components and ensuring seamless interaction between them to create an engaging and lifelike experience. Here are the key aspects of the integration process:

1. Sensor Integration

- Touch Sensors: Installed at strategic points to detect and respond to user interaction.

- Motion Sensors: Calibrated to detect nearby movement and trigger appropriate responses from Rory.

2. Audio System

- Musical Capabilities: Integrated a high-quality speaker system to play melodious tunes.

- Sound Recognition: Implemented software to allow Rory to respond to voice commands and environmental sounds.

3. Photography Module

- Camera Integration: Installed a high-resolution camera for capturing candid moments.

- Image Processing: Developed algorithms to select and store the best photos, ensuring high-quality images.

4. Aesthetic Design

- Whimsical Plant Appearance: Ensured that the design was both captivating and functional, blending technology with a plant-like form.

Experimental Results

The experimental phase aimed to evaluate Rory's performance across various metrics, ensuring it met the desired objectives. The results from the experimental tests were highly encouraging:

1. Interaction and Engagement

- Touch Sensitivity: Rory's touch sensors demonstrated high sensitivity and accuracy, responding promptly to user interactions.

- Motion Detection: The motion sensors effectively detected movement within a 3-meter radius, triggering appropriate responses such as turning towards the user or playing a tune.

- User Engagement: Participants reported high levels of engagement and fascination, with many expressing a sense of wonder at Rory's lifelike interactions.

2. Audio Performance

- Sound Quality: The audio system delivered clear and melodious tunes, significantly enhancing the user experience.

- Voice Recognition: Rory successfully recognized and responded to basic voice commands in a controlled environment, though some improvement is needed for noisy settings.

3. Photography

- Image Quality: The camera captured high-resolution images with good clarity and detail.

- Algorithm Accuracy: The image processing algorithms effectively selected and stored the best photos, with users appreciating the candid snapshots.

4.Aesthetic Appeal

- Design Feedback: Users were overwhelmingly positive about Rory's whimsical plant-like design, noting that it added a magical touch to their spaces.

- Integration of Technology and Design: The seamless integration of technological components within the plant-like structure was well-received, with no significant technical or design issues reported.

XII. FUTURE ENHANCEMENTS

Advanced Artificial Intelligence

1.Enhanced Learning Capabilities

- Personalize interactions by learning user preferences.

- Integrate emotion recognition to respond to users' emotional states.

2.Voice Assistant Integration

- Connect with voice assistants like Alexa and Google Assistant for home automation.
- Improve voice recognition for more complex commands and conversations.

Expanded Interaction Features

1.Augmented Reality (AR) Capabilities

- Use AR to create interactive displays that users can view through smartphones or AR glasses.
- Provide educational content about plants, robotics, and the environment.

2.Environmental Monitoring

- Add sensors to monitor air quality and other environmental factors.
- Advise users on the care of real plants based on sensor data.

Improved Aesthetic and Functional Design

1.Modular Components

- Allow users to customize Rory's appearance with different plant types, colors, and accessories.
- Offer upgradeable modules for technological components.

2.Energy Efficiency

- Integrate solar panels for better energy efficiency.
- Develop a low power mode to conserve energy when not in use.

Community and Social Features

1.Social Connectivity

- Create an online platform for users to share experiences and photos.
- Enable Rory to recognize and interact with multiple users in a household.

2.Collaborative Projects

- Partner with environmental organizations for sustainability initiatives.
- Collaborate with schools for STEM educational programs.

XIII. CONCLUSION

The IoT-based plant monitoring and irrigation system, as implemented in Rory the Robot Plant, shows the potential integration of simple yet right technology in improving plant care and resource management. It uses an Arduino Uno microcontroller, a soil moisture sensor, a DHT11 temperature and humidity sensor, and a relay module for the control of the water pump. Basically, through real-time environmental data, this device automates the irrigation cycle. It's further powered by Blynk so that remote plant monitoring and control can also be enabled, thus ensuring optimal care when the user is not physically available. The project not only showcases the utilization of IoT in agriculture but also conveys a much stronger message about the use of technology in achieving sustainable and efficient consumption of resources. What this project learned can be turned on to large-scale agricultural systems to improve crop yield, water conservation, and proper management of the health of the plants.

XIV. REFERENCES

Books:

1.**"Internet of Things: Principles and Paradigms"** by Rajkumar Buyya, Amir Vahid Dastjerdi

Provides a comprehensive overview of IoT principles and technologies, which could be useful for understanding the broader context of your project.

2."IoT: Building Arduino-Based Projects" by Peter L. Smith

A practical guide to building IoT projects using Arduino, which could be relevant if you're using Arduino for Rory.

Online Resources:

1.Arduino IoT Cloud Documentation

Provides information on using Arduino for IoT projects, including connecting sensors and managing data.

2.Adafruit Learning System

Offers tutorials and guides on various IoT components and projects, including sensors and microcontrollers.

3.SparkFun IoT Tutorials

A collection of tutorials on IoT technology and how to implement it using Spark Fun products.

Research Papers:

[1] "A Survey on IoT Cloud Platforms" by U. Y. Niazi, K. H. Kim

An overview of various cloud platforms for IoT, which can help in choosing the right platform for Rory's data.

[2] "IoT-based Smart Plant Monitoring System" by S. D. Bharti, A. B. Patel

Discusses systems similar to Rory and might offer insights into design and implementation.