WALL-E

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Abstract: In the world of Robotics, everyone likes to create Robots. Wall-E is an IoT-based Robot. It can be controlled through Voice and Wall-E Bluetooth Controller Application. Not just the controls, Wall-E can speak, it displays date and time, and light up when the room light is low. It can perform Obstacle avoidance, when any obstacle comes near to it, it moves away from the obstacle and it also provides its location of itself in a single SMS which helps the person to find where Wall-E is.

Index Terms: Robot, IoT, Wall-E, Arduino, MIT App Inventor, User friendly.

I. INTRODUCTION

From the day of Inventing the first robot "Unimate" by George Devol in the year 1954, people who are interested in IoT and Robotics loved to create robots which are small or big. There are several robotic kits like Elegoo, Hummer-Bot, Cligo, My Robo Box, Wit Blox, etc, but they are costly. 'Wall-E' is an IoT-based robot that is easy to build, user-friendly, interactive, helpful, and cost-effective.

II. METHODOLOGIES

ΙоТ

The Internet of things (IoT) describes physical objects with sensors, processing ability, software, and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks. Internet of things has been considered a misnomer because devices do not need to be connected to the public internet, they only need to be connected to a network and be individually addressable.

Arduino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, or publishing something online.

MIT app inventor

MIT app inventor is an online platform designed to teach computational thinking concepts through the development of mobile applications. Students create applications by dragging and dropping components into a design view and using a visual blocks language to program application behavior.

III. COMPONENTS USED

The components used in Wall-E are:

- Arduino Mega
- L293D Driver Shield
- HC-SR04 Ultrasonic Sensor
- HC-05 Bluetooth Module
- APR33A3 Module
- SIM808 GPS-GSM Module
- RTC DS3231 Module
- LDR Sensor
- 16x2 LCD Display
- PAM8403 Audio Amplifier
- Dot Board
- Switch
- Led's
- Speaker
- Jumper Wires
- Robot Chassis
- 12V Power Supply

IV. WALL-E THREE-LAYER ARCHITECTURE

Wall-E has 3 layers in it, they are: 1) bottom layer, 2) Mid layer and 3) Top layer

1. Bottom layer

The bottom layer consists of a robot chassis, Arduino microcontroller, L293D Driver Shield, HC-SR04 Ultrasonic Sensor, HC-05 Bluetooth module, RTC DS3231 module, and 16x2 LCD display. This layer performs directional controls, Bluetooth connectivity, displaying date & time, and obstacle avoidance.

2. Mid layer

The mid layer consists of an Arduino microcontroller, HC-05 Bluetooth module, APR33A3 module, PAM8403 audio amplifier, and speaker. This layer majorly performs voice controls, where the users can interact with the robot.

3. Top layer

The top layer consists of an Arduino microcontroller and SIM808 GPS-GSM module. This layer is used to provide the location of the robot using GPS and GSM, where the users can find the robot if they lost it.

Fig. 1 is the block diagram of Wall-E, which consists of the components inside Wall-E, and Fig. 2 is the flow diagram of Wall-E, this gives a brief idea of how Wall-E works.



Fig. 1 Block diagram of Wall-E



Fig. 2 Flow diagram of Wall-E

V. WALL-E BLUETOOTH CONTROLLER APPLICATION

Wall-E Bluetooth controller is created using MIT app inventor. It is easy to create applications using the MIT app inventor. There are numerous sections like user interface, layout, media, maps, charts, sensors, social, animation, storage, connectivity, and extensions. By dragging and dropping these sections, we can create a user interface for the application. Many numbers of screens can be created. After completing it, we can install our application using a QR code. Fig. 3, Fig. 4, and Fig. 5 represent the Block schematic diagram of the Wall-E Bluetooth controller application.



Fig. 3 Block schematic diagram for front page

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Fig. 4 Block schematic diagram for Joystick control page

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Fig. 5 Block schematic diagram for voice control page



Fig. 6 Flow diagram for Wall-E Bluetooth controller application

Fig. 6 represents the Flow diagram for the Wall-E Bluetooth controller application, this gives a brief idea of how the Wall-E Bluetooth controller works.

VI. RESULT

Wall-E images



Fig. 6 Wall-E frontFig. 7 Wall-E right.Fig. 8 Wall-E left.Fig. 6, Fig. 7, Fig. 8, and Fig. 9 are the real images of the robot Wall-E.Displaying date & time

Fig. 9 Wall-E back



Fig. 10 16x2 LCD interfacing

Fig. 10 is the picture of Wall-E displaying date and time **Location detection**



Fig. 12 location in google maps

Fig. 11 location MSG. Fig. 11 and Fig. 12 are the screenshots of Wall-E providing its location **Wall-E bluetooth controller application**



Fig. 13, Fig. 14, Fig. 15, and Fig. 16 represent the final working design implementation of the Wall-E Bluetooth controller application.

VII. COMPARISON OF WALL-E AND OTHER ROBOTS

There are several robotic kits like Elegoo, Hummer-Bot, Cligo, My Robo Box, Wit Blox, etc, but they are costly and complex to build. Wall-E is easy to build, user-friendly, interactive, helpful, and cost-effective. Some of the features of Wall-E include 1) Control Wall-E through voice and Wall-E bluetooth controller 2) Wall-E can speak 3) It can display date & time 4) It performs obstacle avoidance 5) It lights up itself when the room light is low 6) It gives its location in a single SMS 7) Wall-E has 3 layers in

it, so users can easily customize Wall-E with their own creativity. From the graph we can clearly understand the difference between Wall-E and other robots in the marketplace.



Graph comparison of Wall-E and other robots

Fig. 17 price comparison



Fig. 18 build complexity comparison



Fig. 19 Feature comparison

VIII. CONCLUSION

Everyone loves to create Robots. Wall-E is a cost-effective and user-friendly robot. It is built using three-layer architecture. It will be helpful for students who need to learn and build robots. The main goal of this paper is to demonstrate a cost-effective, user-friendly, and useful working robot.

Wall-E can be enhanced according to the user's needs. At present Wall-E can be controlled through voice, and joystick control, it speaks to the owner, displays the date & time, and sends the location in a single SMS. In the future, Wall-E can be used as a receptionist robot at functions, and a Serving robot at restaurants, by just adding a camera module into it Wall-E a be used as an explorer. Wall-E can be used in the military, to watch the opposition's move, and with some armed weapons, it can be used as a self-destructing robot also. Wall-E can also be used in Hospitals to deliver medicines, food and to take care of patients. **REFERENCES**

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