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Design of Monument Demonstration Robot for Museums

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Abstract
Trending technologies combined with the latest ideas leads to creative innovations. This paper describes a robot that is designed to demonstrate the monuments that are placed in a museum. This robot can also be used as a local guide in specific areas. The reason behind the development of this kind of robot is to reduce the manpower in performing the repeated tasks for multiple times. In this project, three modules were implemented to perform the task. The robot movement is based on the counter-flows on the ground. The monument is identified based on the unique RFID code for an individual monument and the robot demonstrates the monument using a Public Address System.

Keywords: *unique RFID code, manpower in performing*

1. Introduction

Automation had become a major part of every field in emerging technologies. Robots have become more vital usage elements in many of the manufacturing industries. Thus the invention of these types of robots has a larger scope in this existing world.

Explaining about the monuments that are present in the museum day by day is a routine process. Thus we know that automation can be provided to the routine process. In this project, a robot is designed to help the pilgrims who visit the museums to demonstrate about the monuments that are present in the local place to the tourists visiting.

In this project, the movement of the robot from the starting point to the end of the museum can be done using counter-flows.[1] The information about the monument is given to the tourists with the integration of two technologies, RFID and a Public Address system. In this methodology, an RFID card is attached to each of the monuments with unique code. The robot consists of an RFID scanner that is used to scan the corresponding RFID card. An audio clip of each monument is recorded according to the unique number which has been provided. Hence based on the scanned code the robot speaks out about the corresponding monument that is presented at the points of the counter measures.

The communication between RFID scanned information and the speaker is given using serial communication designed in the embedded system. Finally, a robot is developed according to the mentioned modules.

2. Literature Review

There are many works related to this project and which helps us create a new prototype by using these existing methodologies. Christian et al explained the additional applications of the RFID technology. In this paper, they described the localization of mobile robots in industrial areas. This application is mainly used for handling and finishing operations. The localization is done in a two-dimensional spatial domain with single and multiple transponders.[2]

Hwang et al had explained their ideology by designing a coffee maker robot demonstration. This is made done by using deep learning algorithms like YOLO algorithms. The movements of the robots and the dimensions for the required purpose are calculated by the DIY measurement applications.[3]Alexandre et al developed a natural language interface between the robot and human interaction. In this development, they used a Google speech recognizer app installed in the mobile and a Bluetooth module interfaced in the robot and together

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connected to a laptop. Thus, the recognized speech can be managed upto a low bit error rate and then it can manage the instructions autonomously based on the recognized speech.[4]

Thus from the above-discussed methods, we can develop the robot in different ideologies. This prototype can be considered as similar to my previous work as detailed by the extension of the previously used principle. [1]

3. Overview

The current prototype can be designed by combining the different models that are existing already. Thus the RFID technology was detailed earlier and also the speaker output with Arduino was also described previously. Currently, we are going to implement the robot by integrating the above two technologies.

4. Project Description

Module

The movement of the robot is done using counter flow measures. The robot consists of different IR sensor arrays which are used to count the number of steps crossing on the ground. As the monuments in the museum are made to be arranged in such an order the robot can identify the locations based on its counter flows.

Module

The method of scanning information about the monument is done using RFID technology. Each monument is provided with a unique code along with its RFID tag. The robot consists of an RFID scanner to scan the information about the monument. The scanned information is shared between the Arduino using serial communication.

Module

The details regarding the monument are delivered by the robot using a public address system. The scanned information is matched with the pre-recorded audio files in serial communication. In this module, a speaker output using Arduino is used for detailing about the monument.

5. System Modeling

This work mainly focuses on the movement of the robot in the prescribed locations and that is achieved by the usage of robot movements based on the counter-flows. [1]Thus the required block diagram for the development of this prototype is given below. The required components are displayed exclusively in the below diagram.

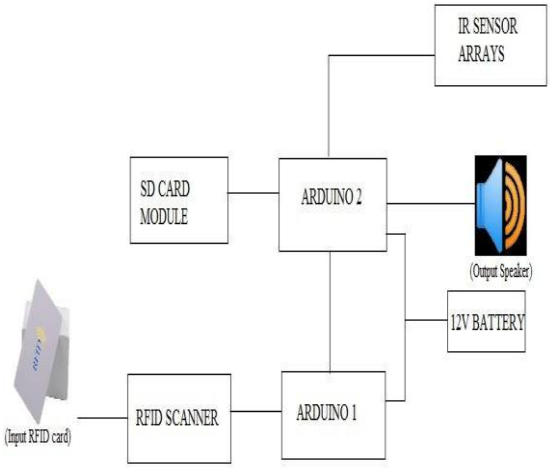

Figure 1: Block diagram of the model.

To implement this prototype we mainly need two Arduino boards for two different purposes. The first Arduino is used for providing the scanned information from the RFID scanner to the other one. The second Arduino board is used for the movement of the robot and also for demonstrating the monument in the museum. Thus the serial communication is enabled between the two Arduino's for enhancing the desired output. The power supply for both the Arduino is given by the external 12V battery.

For describing the movement of the robot there are different IR sensors used to detect the floor and it counts the number of barriers it crossed upon the floor. After crossing each one, the robot stops moving and waits until the RFID card gets scanned and then after successful completion of scanning the robot speaks about the monument based on the scanned information. After details about the monument, the robot starts moving until the next barrier is identified by the IR sensors.

6. Experiments And Results

The robot was designed with the above-mentioned modules. Each module output is verified individually. In this work, the robot movement is based on counter flows with the help of IR sensor arrays. The identification of the monument is done using RFID technology. The scanned information is communicated to the Arduino used for the speaker output using serial communication. Finally, based on the scanned information the robot delivers the information with the pre-recorded files.

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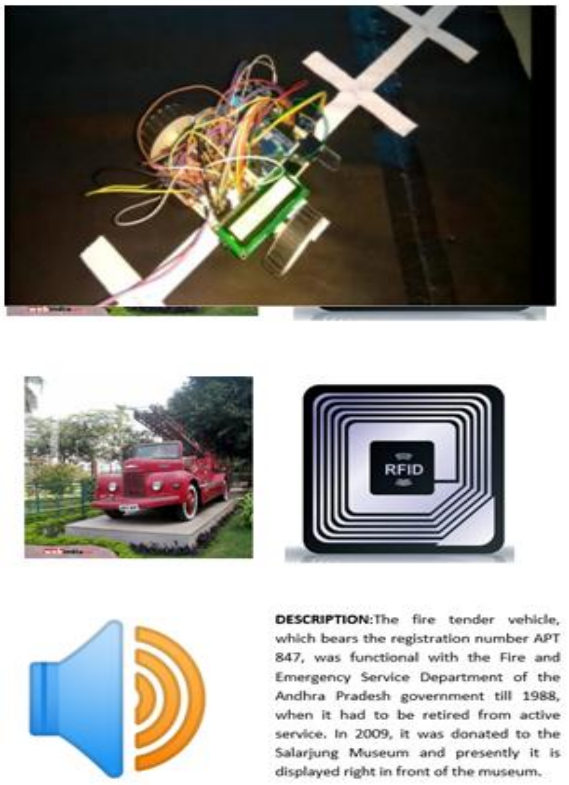

Figure 2: Robot track for moving across the floor, Fire Engin salar Jung Museum[7], RFID Description[8], Spaker Emoji[9], Description about the Monument[7]

7. Conclusion and Future Work

In this paper, we had discussed the demonstration robot based on the basic Arduino modules. The major changes can be done in this project. Further, this can be done used RF modules and also it can be applied through other trending technologies like machine learning and deep learning. At the most, it is possible to design an automated vehicle which can carry a strength of minimum five and explain about the monuments on the specified track.

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