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MAGIC MOB – AN AUTONOMOUS TABLE CLEANING ROBOT

[1]**S. Aishwarya, S**tudent, Department of Computer science and Engineering, Karunya Institute of Technology and Sciences, Coimbatore, India
[2]**Dr. E. Kirubakaran,** Professor, Department of Computer science and Engineering Karunya Institute of Technology and Sciences, Coimbatore, India

ABSTRACT

The autonomous table cleaning robot cleans a table after every dine-in. It is designed in a more efficient, secured and cost effective way using Internet of Things (IOT) technology and controlled using a mobile application developed using android studio with Google firebase with a secured, authenticated and cloud stored API's. This autonomous table cleaning robot doesn't disturb the people who are having food. This robot not only automates cleaning but also reduces man power and monthly wages to pay for employees. It also provides latest technology support with secured application interface to the user.

Key words:IOT, Motors, Torque, Firebase.

1.INTRODUCTION

Food is playing a major role in the current business market and there is a need for many people to work in the serving and cleaning system. Now a days there is an increasing demand for employees in the market for cleaning. Mainly, the IT companies and malls are increasing in the country and food courts are also simultaneously increasing. The need for employees in the cleaning stream has increased. At this point the autonomous table cleaning robot plays a major role. The autonomous table cleaning robot is fitted to every table and integrated to a mobile application. The tables are provided with a uniquely identifiable number and are controlled through a mobile application. This autonomous table cleaning robot is designed in such a way that it is not disturbing the people having food, on the table, at any cause. This robot is implemented with the latest developing technology, Internet of Things, shortly known as IOT, so that it can be connected over the internet and can be controlled from any remote area. The process of the robot can also be monitored and data can be collected and stored in the database based on the need to bring about a better and efficient working product in future. It can be designed in a cost effective way for better sales. The plates on the table in food courts are expected to be removed by the people as a Self Service.
The plates are taken to the provided bin by the eaters or a conveyor beltcan be provided near the tablesso that the used plates can be placed there.

Android studio and Google firebase can be used to develop mobile app because they provide a better API with cloud storage and functioning,ML kit, Authentication and Real-time database. Crashlytics, Performance Monitoring and Test Labs are also provided by them so that there can be a better interface and a more secured infrastructure available.

A. 1.1 OBJECTIVE

The main objective of this project is to provide a possible solution to the table cleaning system through secured and economical interface and infrastructure[2]. This economical solution can be a one-time investment that can be efficiently and securely installed so that the cleaning system can be automated in a cheaper way and can be widely used.

B. 1.2 MOTIVATION OF THE PROJECT

To automate the cleaning system and reduce the burden of employees in hotels and food courts. Also to efficiently make the cleaning system economical and secured through a one-time investment. This addresses the problem of paying monthly high wages to employees at hotels for cleaning and also reduces the burden of lack of employees.

C. 2.1 EXISTING SYSTEM

- So far, there have been automatic cleaning robots also termed as robot vacuum cleaner for cleaning the floor using IOT technology.
- Smart toilets that provide clean and hygienic toilets[1].
- Waste management system using IOT[3].

1) DISADVANTAGES FOR EXISTING SYSTEM

- No specific robot for table cleaning
- Not cost effective
- Doesn't provide any secured interface to operate from remote areas.

2.PROPOSED SYSTEM

The new "Autonomous table cleaning robot" is shown in figure 1. This is an efficient, cost effective and secured way to automate table cleaning system with a one-time

investment and reduce high monthly wages to more employees and lack of employee problem.

*2) **ADVANTAGES***

- Automates cleaning system
- Reduces man power
- Addresses lack of employee problem
- Prevents the pay of high monthly wages
- Can be controlled from any place.
- Secured
- Cheap
- Efficient

HARDWARE REQUIREMENTS:

- Arduino UNO
- 10KG Torque - 10rpm * 2
- 5KG Torque - 30/60/50 rpm * 4
- 3KG Torque – 10rpm * 2
- 12V Amaron Scooter Battery * 1
- RC car chasis * 1
- Wires
- Small pump * 1
- Gears * 15 (Small size)
- RC car wheel * 4

-RC: Radio Controlled

SOFTWARE REQUIREMENTS:

- Google Firebase
- Arduino IDE

3.METHODOLOGY

3.1 INTERNET OF THINGS (IOT)

The Internet of things (IOT) is the inter connection of physical devices, vehicles, buildings and other items (also referred to as “connected devices” or “smart devices”) ,inter-networking of them and embedded with electronics, software, sensors and network connectivity.

Example:

- Home automation
- Automatic car parking, etc.,
- Telemedicine
- Predictive maintenance
- Intelligent buildings.

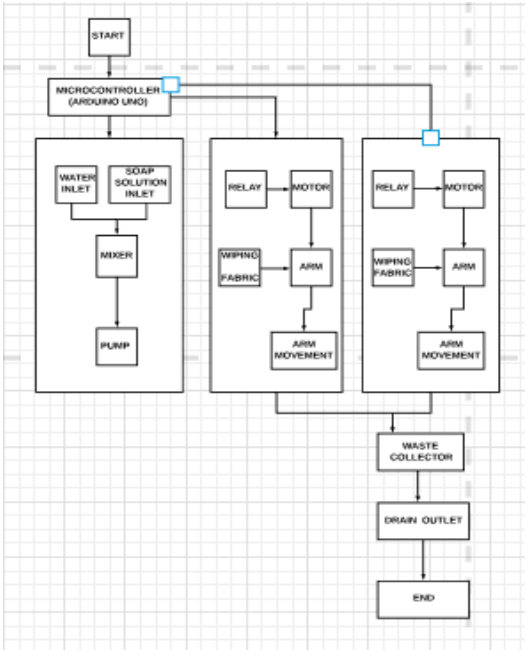

Figure 1: proposed system

WHAT IS NOT AN IOT?

- Not just an automation
- Not just machine to machine
- No an input of human intelligence just for a particular solution
- Not just one place, one device and one time.
- Not keeping all the data just stored
- Not just being connected on the internet

AN IOT IS:

- **A** bunch of smart, low power devices
- Securely connected to the gateway
- Collecting and sending live data
- To post process
- To make intelligent devices
- Self Corrective
- Transfer intelligence to other clusters
- Storing the results for the future predictions and self-corrections. The four-layered architecture of IoT is shown in figure 2.

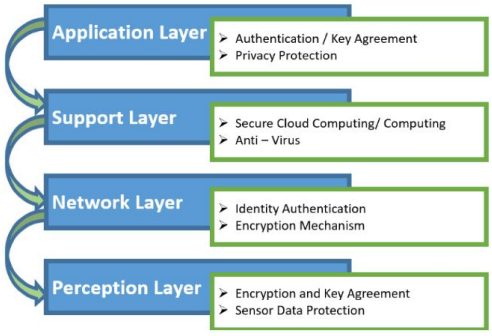

Figure2: The four-layered architecture of IoT along recommended security mechanisms.

4.IMPLEMENTATION

Autonomous table cleaning robot can be fitted to every table and integrated to a mobile application developed using android firebase and google firebase that gives secured connection. When one person completes their food, the other person wanted to occupy the table and the table is left unclean. When a person leaves the table, we can switch on the autonomous table cleaning robot through the mobile app. The tables can be uniquely identified through the numbers provided in the application. Now the required table can be selected to function. When the table is selected, the wiper comes up on the table with the help of the motor, controlled by Arduino UNO. For the first time, the wiper makes a dry wipe and pushes the dirt into the ejected bin. For the second time, water is sprayed with minimum speed and the table is cleanly wiped. The bin and the wiper are fitted in such a way that it doesn't disturb the people having food at any cause.

Once the robot is switched on, the wiper comes from underneath the table and the bin emerges outside the table. The wiper moves from one end and pushes the dirt into the bin onto the other side. Once the process is over, the wiper goes underneath the table and the bin also goes in. There will not be any stingy smell as the bin gets tightly fitted under the table after the process. The plates should be removed by the people having food, otherwise a conveyor belt can be provided near the table on which the plates that have to be cleaned can be placed.

D. ADVANTAGES

- One-time investment
- Reduces high wages to employees
- Reduces man power
- Addresses the problem of lack of workers in cleaning stream
- Maintenance cost is low

AUTONOMOUS TABLE CLEANING ROBOT IN INDUSTRY 4.0:

Autonomous table cleaning robot implements the industry 4.0 concepts to provide clean tables to the food industry on applying IOT and stores the data in google cloud. It can also implement artificial intelligence through self-cleaning and self-detection of obstacles on table. Big data analytics can be implemented to store data and analysis so that a better version can be provided in the future.

5.CONCLUSION

Now a days cleaning is a big deal in all areas and it is the demanding stream. This autonomous table cleaning robot will provide an efficient automation to cleaning system and can also be controlled through a secured API from any remote area. It can be designed in an efficient, secured and cost effective way. This can provide a good automation to cleaning system in a cheaper way. It can be used in any food courts, hotels, restaurants, etc.

E. FUTURE SCOPE

We can make the autonomous cleaning robot as a single kit manufactured along with the table to reduce the fitting time and customization for different tables. The plates can be removed with the help of a conveyor belt that keeps moving near the table.

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