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Design and Fabrication of Automatic Floor Cleaning Machine using Renesas Board

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ABSTRACT: Automatic floor cleaning machine is a system used to clean the floor with the help of stable and fast electronic operation and control system. The current project focuses on the use of automatic floor cleaning machines for large floors for home and office use. The purpose of cleaning is achieved only by the permanent connection between the washing machine and the floor. When the car is washed and moved, the drive mechanism such as the drive wheel and tires are on the surface of the dirt to be cleaned, and the vacuum pump sucks the water, and the scrubbing is carried out by the circulation of water washer at the lower end. Better still, the sweeper is mounted on the main body, supported by the drive system and works in conjunction with such controls before cleaning the debris from the floor. New automatic floor cleaning machines will save you a lot of labour costs in the future. The best thing about this product is that it is cost effective and requires no human management. Once in the mod, it will clear the entire room without gaps.

KEYWORDS: Floor cleaning, Floor dryer, Renesas Board, Relay Driver, LCD display etc.

I.INTRODUCTION

Floor cleaning is done with different methods that can be done in different categories. Different types of floors require different types of treatment. After cleaning, the floor must be completely dry. Failure to do so would be dangerous. In some floors, sawdust is used to absorb various liquids. Our automatic floor cleaning machine will save you a lot of labor costs in the future. This ensures that there is no need to prevent their spillage, sawdust must be removed and replaced daily. Cleaning is a job that is repeated by many every day. Therefore, there is a need to make changes in science and technology that can help us do our daily work easily. It also takes into account the effort required and leads to an agreement. There is a need for the development of the vacuum cleaner as a new technology to overcome the disadvantages of the current vacuum cleaner.

II.RELATED WORK

Arjun V Murali [1] in their work, they worked on a floor cleaning machine. Their mission is to develop and renew wet and dry floor systems. First collect the dust in the vacuum cleaner. Then, water is sprayed from the tank and the floor is cleaned with a rotary press connected to the DC motor. The fan is used to dry the water behind the car.

S. Rameshkumar [2], in their research, they worked on floor washer design and manufacture. In their work, the design and analysis of the floor cleaning machine is done using appropriate software. From the final analysis, the stress of the floor cleaning machine

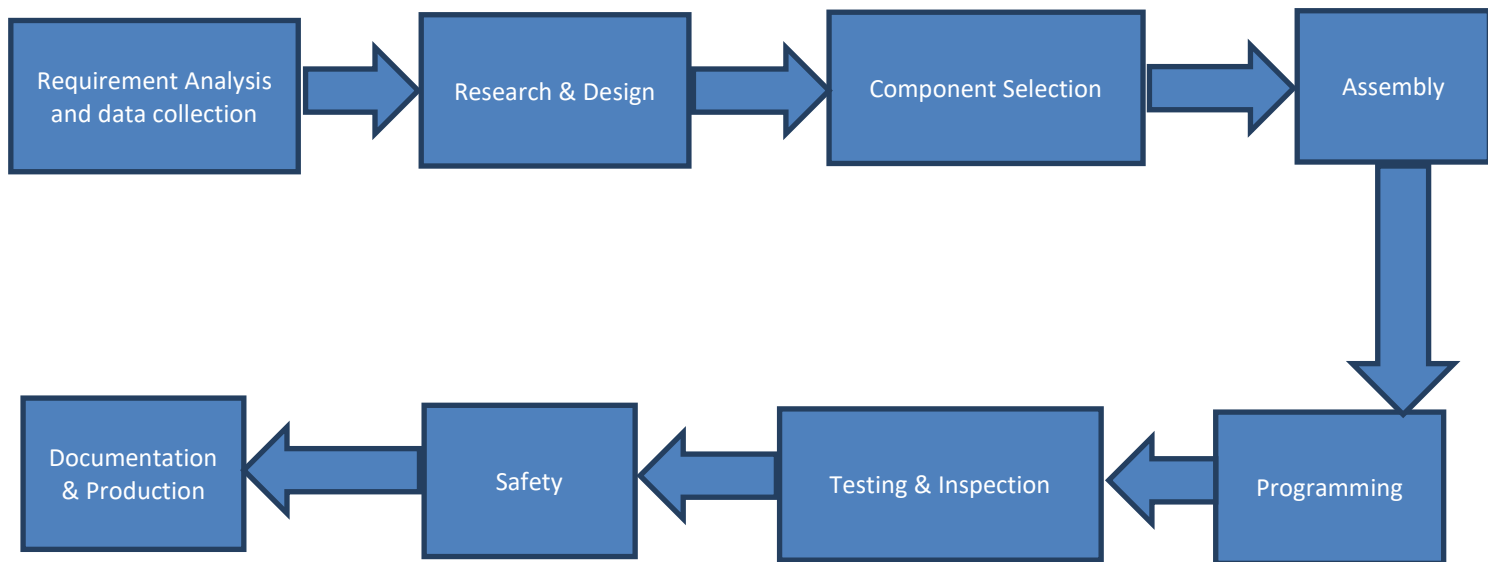
Samarth G. Gaikwad [3], in their research, they worked on the design and manufacture of floor products and cleaning solutions. They focus on the design and manufacture of floor equipment and washing machines, which will greatly reduce the cleaning time and cost of the machine. At the same time, the floor cleaner should be able to effectively clean rough and smooth floors and difficult corners. Factors such as reducing production and operating costs, aesthetics and ergonomics are taken into account in project management. In the end this machine will save time, money and effort

Shubham Khade [4], researched on various washing machines. It produces machines that can clean dry and wet floors and corners, semiautomatic water sprayers, and cleaning stools. The design of this floor cleaning machine meets the basic needs of the machine and the operating cost reduction, reduced labor, environmentally friendly and easy to use.

Shubham Antapurkar [5], worked on an Arduino based wet dry automatic washing machine. Its aim is to create a floor washing machine that combines wet and dry cleaning with UV disinfection. The current market is dominated by vacuum cleaners that only have one or two functions. It uses Arduino for cost and convenience.

Aadil Arshad[6], in their research, they worked to design and build a floor cleaning machine. They have devised and developed methods for cleaning floors both wet and dry. That's why they developed machines that work in both dry and wet conditions. This machine can remove dust in summer and dirt and water stains on the floor in rainy season.

III.METHODOLOGY

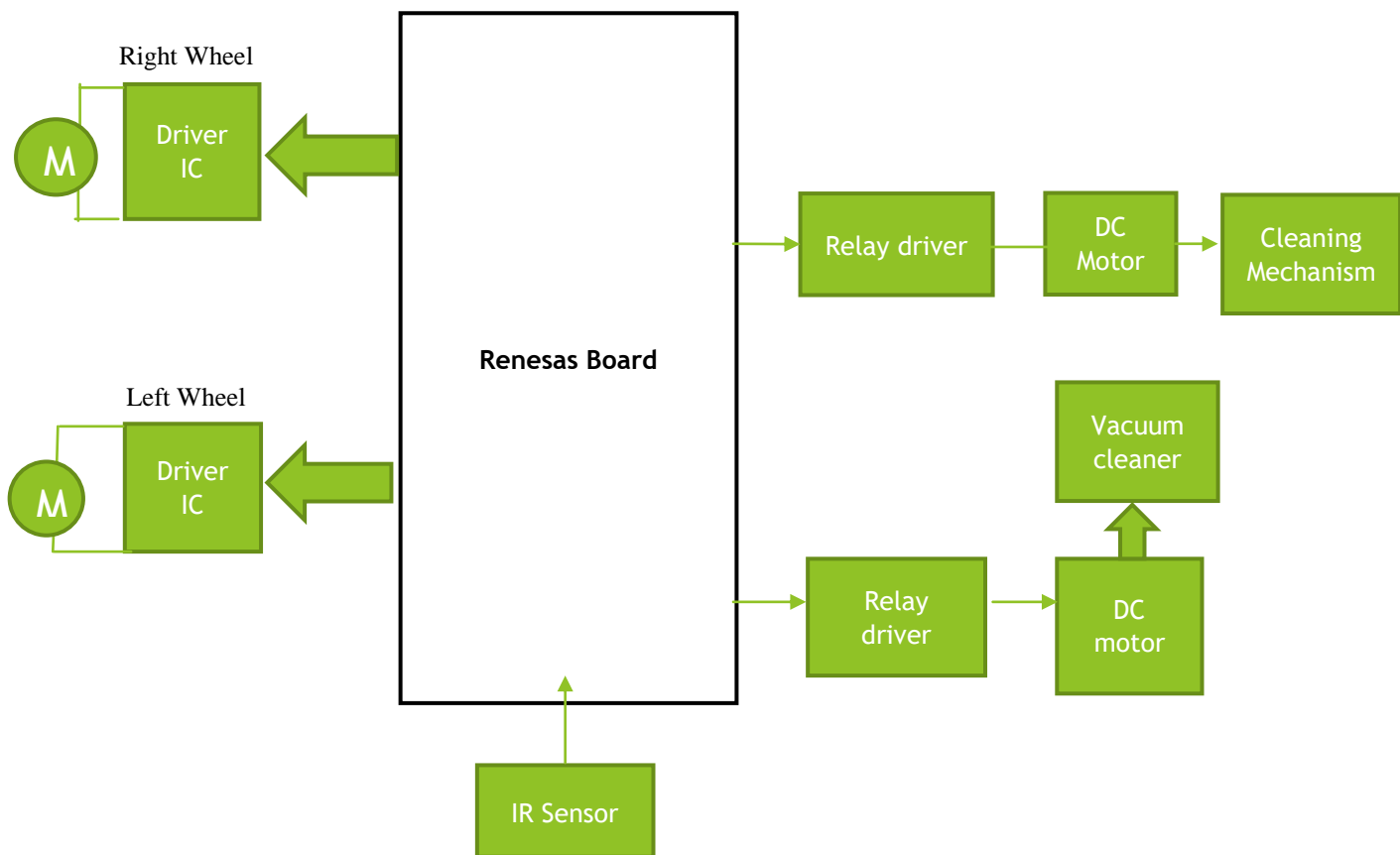


PROBLEM FINDINGS:

- Manual Cleaning consumes time and effort
- Inconsistency while Cleaning
- Safety Hazards and Health Risks are inevitable if not maintained especially in industries
- Labour Intensity and Cost is more
- Limited Access to Hard-to-Reach Areas

OBJECTIVE:

- Increased Cleaning Efficiency
- Consistency in Cleaning
- Time, Cost and number of labour required can be saved
- Enhanced Safety can be taken care

IV. BLOCK DIAGRAM**V. WORKING**

These products are integrated for cleaning applications. Floor cleaning needs such as water, brushes and fans. It is a motion-controlled wheeled machine. This floor cleaner has several DC motors that drive the wheels and rotate the material to be brushed. The wiring of the motor is well designed considering that the control comes from two-way switches, so the wheel is attached.

A button is also configured as an on/off switch for rotating objects such as brushes. Plastic pipes are also designed with holes and gate valves to control the discharge of clean water from the floor. When the controller is connected to DC power, the machine is connected to its controller by cable. This product is suitable for most floor cleaning. The current work is to create a household washing machine that can be used for domestic use. The whole process of the machine starts from the front pump. It is used to vacuum waste from the floor. This is useful for sloping sites with heavier soils. Therefore, the absorbed waste must be stored so that it can be removed later. This is done using a 12v vacuum with a waste chamber attached to it.

The next goal is to moisten the area by spraying water on the floor. This goal is achieved using a generator and vacuum cleaner. The system consists of a shower-like outlet and a chamber whose voltage is controlled by a DC motor pump. To clean the floor, the washing machine needs to move or scrub the floor. The soil must be completely removed, the accumulated water will flow to the back of the robot.

The vacuum is attached to the chassis using clips. The structure of the washing machine involves connecting one side to the motor, and the other to ball bearings. The bearings are clamped to the chassis. At the bottom of the system, a vacuum is used to absorb the dirty water along with the waste. This is also the same type of pump and reservoir.

VI. DESIGNING COMPONENTS& SOFTWARE USED

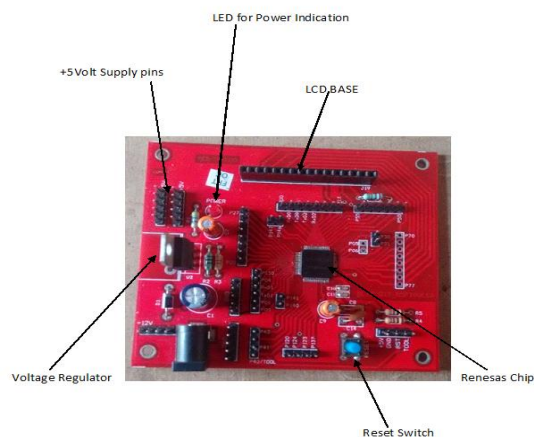
1. Chassis
2. Vacuum Pumps

3. Sprinkler System
4. Scrubber
5. DC Motor
6. Wheels
7. Control System
9. Water Tank
10. Brush
11. Mop
12. Relay Board
13. IR sensor
14. Renesas Board
15. LCD Display
16. Battery
17. Air Dryer

VII. COMPONENTS SPECIFICATION

A. Renesas Board

- General-purpose register: 8 bits \times 32 registers (8 bits \times 8 registers \times 4 banks)
- ROM: 512 KB, RAM: 32 KB, Data flash memory: 8 KB
- On-chip high-speed on-chip oscillator
- On-chip single-power-supply flash memory (with prohibition of block erase/writing function)



B. LCD Display (16*2)

A liquid crystal display (LCD) is a thin, flat panel used for electronically displaying information such as text, images, and moving pictures.



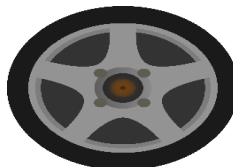
C. DC Motor:

DC motor is an electrical machine that utilizes electric power resulting in mechanical power output. Normally the motor output is a rotational motion of the shaft... It requires 12V battery to operate, in this two D.C. motor are required.



D. Wheels

It used to drive the whole machine. As the high torque motor attached to wheels, when button is pressed whole system runs automatically.



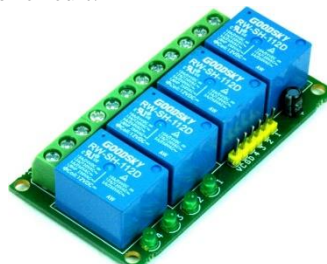
E. IR Sensors

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment.



F. RELAY Board

A relay is usually an electromechanical device that is actuated by an electrical current. The current flowing in one circuit causes the opening or closing of another circuit.



G. Vacuum Cleaner (12v DC)

Universal motor is generally used for suction in vacuum cleaners. It is a series DC-motor that is designed to operate on AC as well as on DC.

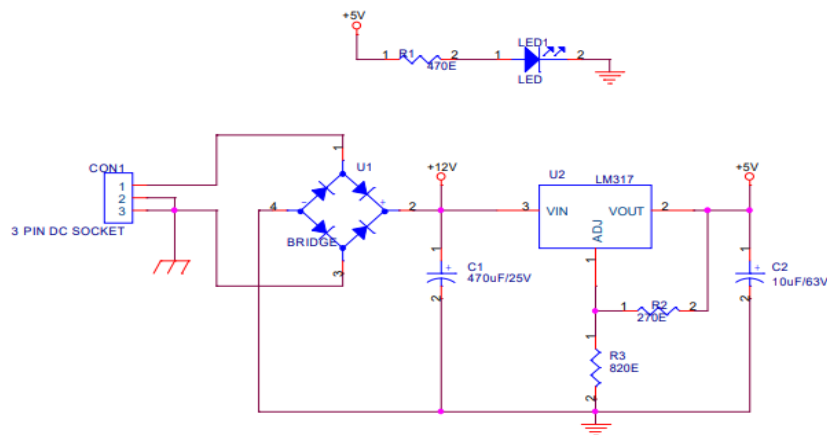


H. Sprinkler system:

It is connected to a shower type arrangement via connecting pipe. The sprinkler system has a number of holes arranged sequentially which can be modified manually.



VIII. CIRCUIT DIAGRAM



IX.APPLICATIONS

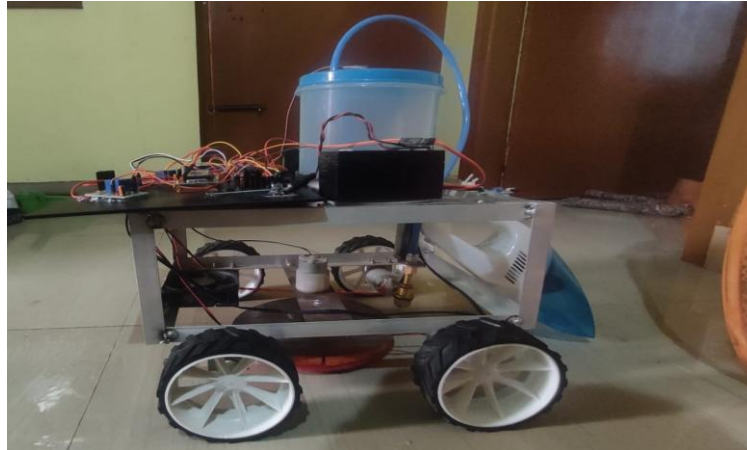
- Residential Cleaning
- Commercial Spaces
- Healthcare Facilities
- Industrial Settings
- Educational Institutions
- Hospitality Industry

X. OUTCOMES

In our project we created a floor cleaner that can sweep and mop. The main purpose of this study is to cover all

aspects of hygiene. Many applications have many functions where we can clean pipes, scrub the area to clean the floor, remove dust and dirt from the road. This project benefits the social and economic sphere and plays an important role in the cleanliness of the country.

XI. PROJECT IMAGE



XIV. CONCLUSION

The product developed in this way is fully functional and provides the desired movement. It is tested in the room, resulting in a successful result. The design of the washing machine should be modified in the future, as the current design has few problems. Few of them are that the motor is not removable and high rpm leads to vibration of the whole system. If these features are modified it will work fine. The overall concept is very helpful and has scope for many developments in mechanical parts. The optimization will continue until the best is achieved. Overall this project is successful in its aim and will surely change the era of robotics and floor cleaning. The algorithm in the automation part is designed to give 90% efficiency which is very high in the current situation. The sensory field can be developed. But this product has the ability to track the dust as it moves and thus results in better cleaning of the floor. Overall this is a successful product that can be used in present day Indian homes

A. PROJECT CODE:

```
#include "r_cg_macrodriver.h"
#include "r_cg_cgc.h"
#include "r_cg_port.h"
#include "r_cg_adc.h"
#include "ALCD64.c"

#define IR_Obstacle P3.0

#define L_Motor_Data1 P5.0
#define L_Motor_Data2 P5.1
#define R_Motor_Data1 P5.2
#define R_Motor_Data2 P5.3

#define Cleaning_motor P5.4
#define Spraypump_motor P1.5
#define Vacuum_motor P1.6
#define Fan_relay P1.7
#include "r_cg_userdefine.h"

/*Global variables and functions
void Device_Init( void );
```



```

void Forward( void );
void Reverse( void );
void Left( void );
void Right( void );

/* End user code.

void main(void)
{
    Device_Init( );
    MSDelay( 500 );

    ALCD_Comm( 0x01 );                                     // Clear display Screen
    MSDelay(500);

    while(1)
    {
        if(IR_Obstacle == 0)
        {
            L_Motor_Data1 = 0;
            L_Motor_Data2 = 1;
            R_Motor_Data1 = 0;
            R_Motor_Data2 = 1;
            MSDelay(2000);

            L_Motor_Data2 = 0;
            R_Motor_Data2 = 0;
            MSDelay(500);
            L_Motor_Data1 = 1;
            L_Motor_Data2 = 0;
            R_Motor_Data1 = 0;
            R_Motor_Data2 = 1;

MSDelay( 2000 );

L_Motor_Data1 = 0;

            R_Motor_Data1 = 0;
            MSDelay( 2000 );

            L_Motor_Data1 = 1;
            L_Motor_Data2 = 0;
            R_Motor_Data1 = 1;
            R_Motor_Data2 = 0;
            MSDelay( 2000 );

            L_Motor_Data2 = 0;
            R_Motor_Data2 = 0;
            MSDelay( 2000 );

        }

        L_Motor_Data1 = 1;
        L_Motor_Data2 = 0;
        R_Motor_Data1 = 1;
        R_Motor_Data2 = 0;
        ALCD_Message(0xc0, "  FORWARD  ");
        Vacuum_motor  = 1;
        Spraypump_motor = 1;
        Cleaning_motor  = 1;

```



```

Fan_relay    = 1;
MSDelay( 2000 );

Vacuum_motor    = 0;
Spraypump_motor = 0;
Cleaning_motor  = 0;
Fan_relay       = 0;
L_Motor_Data1   = 0;
R_Motor_Data1   = 0;
MSDelay( 2000 );

}

while (1U)
{
    ;
}

void Device_Init( void)
{
    MSDelay(400);
    ALCD_Init( );
    MSDelay(100);

    ALCD_Message(0x80, "  FLOOR  ");
    ALCD_Message(0xC0, "  CLEANING  ");
    MSDelay( 1500 );

    R_ADC_Create( );
    R_ADC_Set_OperationOn( );
    MSDelay(1000);
}

```

REFERENCES

- [1] Arjun V Murali, Amal Raj, Anandhu Jayaram "Floor Cleaning Machine", International Journal of Advanced Engineering and Global Technology, Volume 5, Issue-03, 1824-1826, May 2017.
- [2] Mr. S. Rameshkumar, M. Selvakumar, S. Senthilkumar "Design and Fabrication of Multipurpose Floor Cleaning Machine et al, International Journal of Advanced Science and Engineering Research , Volume 3, Issue: 1, 1012-1019, 2018.
- [3] Samarth G. Gaikwad, Shashank S. Kulkarni, Virendra P. Patil "Design And Development Of Multi-Functional Floor Scrubber And Cleaner", et al International Journal of Scientific & Technology Research, Volume 8, Issue 12, 3638-3644, December 2019.
- [4] Shubham Khade "Multi-use Floor Cleaning Machine", International Journal of Mechanical Engineering and Technology, Volume 8, Issue 5, 656-664, May 2017.
- [5] Shubham Antapurkar "Arduino Based Dry & Wet Automatic Floor Cleaner ,International Journal of Engineering Technologies and Management Research, Volume 5 Issue2, 1418, February, 2018.
- [6] Aadil Arshad, Muhammad Kashif, Nandkishor S. Kale "Design & Development of Floor Cleaning Machine", International Journal for Scientific Research & Development, Volume 6, Issue 01, 278-280, 2018.
- [7] Ms. R. Abarna, S.Devadharshini, S.Dhileep "Design And Fabrication Of Automatic Floor Cleaning Machine", International Journal of Science and Engineering Research, Volume 6, Issue 3, 2230-235, 2011
- [8] Manya Jain and Pankaj Singh Rawat "Design and fabrication of Automatic Floor Cleaner", International Research Journal of Engineering and Technology (IRJET) Vol. 04, No. 04, pp. 303- 307, 2011
- [9] Mahima Patel , "Wireless Multi -Purpose Floor Cleaning Machine", International Journal of Latest Technology in Engineering, Management & Applied Science, Volume 8, Issue 4, 16-19, April 2019.
10. AnupMendhe, DineshShende "Multipurpose Floor Cleaning Machine", International Journal for Scientific Research & Development, Volume 5, Issue 01, 740-742, 2017.



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