Android Phone Controlled Conceptual Prototype Model of Solar Powered Sanitization Machine

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Abstract**—** *The project titled "Android Phone Controlled Prototype Model of Solar Powered Sanitization Machine" presents a methodology for analyzing, fabricating, developing, controlling, and enhancing a Mechatronic Machine controlled by a Mobile Application. This machine finds applications in various public settings such as hospitals, schools, and colleges, particularly in rooms and corridors. Given the challenges posed by the Covid-19 pandemic, maintaining social distancing is imperative due to the virus's propensity for deeper penetration into the respiratory system, potentially causing inflammation and respiratory distress.*

The primary objective of this project is to develop a prototype model of a four-wheeled Mobile Application-controlled Mechatronic Machine, designed using Atmel Studios (Version 7.0). This Mechatronic Machine is operated via Arduino or NodeMCU ESP32 pins directly from Android smartphones, eliminating the need for manual code writing. The control system includes a Motor Control Shield and a dedicated mobile application interface. Additionally, the machine incorporates a solar panel for recharging its battery, enhancing its sustainability.

Keywords— Sanitization, Machine, Solar Power, NodeMCU ESP32, Mobile Controlled.

I. INTRODUCTION

Multi-Functionality Agile Robot System (MARC-bot) has for the first time used by US police to kill a sniper. Also, during the NASA Sample Return Robot Centennial Challenge, one of the robots displayed successful autonomous navigation, decision making, sample detection, retrieval, and return capabilities. Robots are also developed to work under extreme conditions of offshore oil and gas installation. Today Omni-channel and e-commerce need hug labour and therefore mobile robots are needed to automate these things to lessen complexities. The fast development of mobile robots with less dependence on the guidance system has been due to the huge need for piece-picking in e- commerce. Nowadays robots are being used in almost every sector including logistic facilities, the service sector, e-commerce, a wide range of supply chains, in our daily household lives, etc.

Joseph Engelberger played an important role in the history of mobile robotics and developed the first commercially available autonomous mobile hospital robots. In 1993-

1994 Dante I and Dantae II were developed to explore live volcanoes. In 1995 Ernst Dickmann drove his robot car for 1000 miles in traffic up to a speed of 120mph. In 1996- 1997, NASA sent the Mars Pathfinder along with its rover Sojourner to Mars which was expected to explore the surface and find its way in unknown terrain. In 1999, Sony introduced Aibo which was a robotic dog capable of seeing, walking, and interacting with its environment. **(Engelberger., 2015) Darmawan and Budiyanta (2020)** developed a multiplatform robot that can be used asa medium to socialize robotics technology among adolescents. This multi-platform robotis also expected to help teens who are interested in robots to facilitate them in learning

robotics technology. **Barua et al. (2020)** designed an automatic guided vehicle. In their project, a L293D motorshield was used to detect line also prevent edge and setback path. **Chaudhari et al. (2019)** designed a task and follower robot which used Arduino IDE based on Atmel microcontroller. Arduino IDE is used to program the Arduino board. It is able to simulate input and in return produces an output. **Vamsi et al. (2019)** designed a line follower robot to carry products in the manufacturing process in industries which was light in weight and equipped with 5 sensors to work upon different complex paths during the industry or workshop. They used black detector infrared sensors so that speed of response of the robot is high. The use of various mechatronic components such as Arduino UNO, 7805 voltage regulator, Infrared sensors (Black Detector), Battery 12V, Breadboard, Motor Driver were applied.

TABLE 1
PRINCIPLE COMPONENTS OF MECHATRONIC ROBOT CONTROLLED THROUGH WI-FI HOTSPOT

1. NodeMCU Development Board	9. DC Gear Motors
2. ESP8266 Wi-Fi Soc	10. Diode
3. B Type USB Cable (for program upload through computer)	11. Electrolytic capacitor
4. Servo Motor	12. Regulator- I.C
5. USPASP Programmer	13. Motor Chassis.
6. Solar Panel	14. Wheels
7. Battery	15. D.C Tullu pump
8. Motor Driver Module- L298D	16. L.E.D

II. METHODOLOGY

In the project, it was supposed to make the robot by the following method, but due to pandemic, the work had been not done on hardware. The detailed functionality of the various components had enlisted using the diagrams as shown in fig 3.12. Blynk software had been used for writing the C program which is supposed to run on Proteus Design Suite version 8.0. The circuit connection depends on the port configuration of Arduino ESP8266 NodeMCU microcontroller IC. It had been mounted on Arduino ESP8266 NodeMCU. Development Board, including DC motors L298N, L298D motor driver module, mobile hotspot module and the connections had been established. The details of exact working process and other components had been given. Only simulation and programming part had been performed.

In this project water sensor had been used for sanitization purpose and it is controlled by Arduino using Blynk app on a smartphone. Using this implementation, it can control an Arduino board-based machine from anywhere in the world. The NodeMCU ESP8266 microcontroller provides the necessary signal to the DC Motor Driver to run the robot in forward, left, right, reverse direction and to stop it respectively each for 2 minutes. The communication was set up between Internet Wi-Fi module and Android Smart Phone successfully. The communication channel between Internet Wi-Fi module and NodeMCU ESP8266 Microcontroller took place through USART serial communication protocol as shown in fig 4.1 and 4.2. The programming has coded on Atmel Studios Version 7.0 and run on Proteus 8 design suite for simulation of the circuit desired. And finally using USBASP programmer it was written on NodeMCU ESP8266 microcontroller.

2.1 Developed a conceptual prototype model of sanitization machine:

Finally, a prototype model had made manufactured with the above-mentioned concept and methodology. The model finally able to persue is required, sanitizing the environment, and designed an automatic sanitizer system that is compatible with various containers. When clicked the pump button it's close to the device sensor, the sanitizer container opened while pumped once. A novel design and subsequent fabrication of a low-cost, touchless, automated sanitizer dispenser to be used in public places, was demonstrated. The overall performance of the manufactured device was analyzed based on the cost and power consumption, and environmental factors by deploying it in busy public places as well as in indoor environment in major cities in country, and found to be more efficient and cost-effective compared to other dispensers available in the market. A comprehensive discussion on this unique design compared to the conventional ultrasonic and infra-red based dispensers, is presented to show its suitability over the commercial ones. The guidelines of the World Health Organization are followed for

the preparation of sanitizer liquid. A clear demonstration of the circuitry connections is presented herein, which facilitates the interested individual to manufacture a cost-effective dispenser device in a relatively short time and use it accordingly.

FIGURE 1: Final Mechatronic Machine Top View

FIGURE 2: Final Mechatronic Machine Side View

III. CONCLUSION

"Android Phone Controlled Prototype Model of Solar Powered Sanitization Machine" was developed for sanitization purpose. It works with the help of the battery and solar. The machine can choose the driving method and anyone of its medical operations automatically according to the needs. In this section the recent work had been analyzed which can be characterized as AI Robotics, by arranging it into the two basic issues in robot design Action and Perception. This research is a research development that aims to make a multiplatform robot as a medium for the introduction of technology among adolescents. They're used to deliver communications and drugs in a hospital. It can be suggested to run autos, mass transport systems and freestanding autos which navigating the road. They can be used in service as mole sprats, shop bottom, etc. While, investigators are working on ways to help machine move and suppose more efficiently. Since paramount robots in use now are designed for specific tasks, our meaning is to ultimately make universal robots that are flexible enough to do just about anything a human does and farther.

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AUTHORS' CONTRIBUTION

Kartikey Pandey: Conceptualization, Methodology, Software

Gargi Shekhar: Writing – Original Draft Preparation, Formal Analysis, Investigation

Anshuka Srivastava: Methodology, Validation, Writing – Review & Editing

Happy Narang: Writing – Original Draft Preparation, Formal Analysis, Investigation

CONFLICT OF INTEREST

"The authors declare no conflict of interest".

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"Data will be made available on request".

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REFERENCES

[1] **Barua, V., Neloy, M.A.I., Rahat, S.U., Das, M., Joy, M.S.I., Nahar, N., and Abhijit Pathak, A. (2020)** "An Ultrasonic Line Follower Robot to Detect Obstacles and Edges for Industrial and Rescue Operations" International Journal of Computer Applications, 176(31):0975-8887.

[2] **Chaudhari, J., Desai, A. and Gavarskar, S. (2019)**, "Line Following Robot Using Arduino for Hospitals" 2019 2nd International Conference on IntelligentCommunication and Computational Techniques (ICCT) Manipal University Jaipur.

[3] **Darmawan, I.A. and Budiyanta, N.E. (2020)**, "Multiplatform Mobile Robot as Robotics Technology Socialization Media" International Journal of Advanced Science and Technology, 29(7):3437-3444.

[4] **Dhage, S., Patil, P., Kande, D. and Patil, P. (2018)**, "Wireless Controlled Multipurpose Agricultural Robot" International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, 7(5):2357-2361.

[5] **Mustafa, E. and Engin, D. (2012)** "Path Planning of a Line Follower Robot", 5th European DSP Education and Research Conference".

[6] **Balaji, B.S., Shivakumara, M.C., Sunil, Y.S., Yamuna, A.S. and Shruthi, M. (2018)**, "Smart Phone Operated Multipurpose Agricultural Robot" International Journal of Engineering Research and Technology, 7(5):478-481.