iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** XI **Month of publication:** November 2020

DOI: https://doi.org/10.22214/ijraset.2020.32262

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue XI Nov 2020- Available at www.ijraset.com

A Survey on Waste Management and Maintenance of Hygiene using Internet of Things

Shrutee Vilas Ghegadmal
Research Student, Department of Information Technology, B. K. Birla College of Arts, Science and Commerce (Autonomous), Kalyan.

Abstract: ***In a world full of the internet we all need digital devices to use. Everyone needs smart devices for easy living. Smart waste management is one of the examples of it. Smart waste management helps in improving the city safer, greener, and more efficient. It is an easy way to get rid of waste like medicinal waste, liquid waste, solid waste, organic waste, hazardous waste, recyclable waste, etc. Although burning of some waste like a medicinal waste cause to disease and bacteria. It also affects the surrounding. Also, some of the waste like Recyclable waste beneficial for reuse. Sensors can help in segregating the waste. In this paper, smart waste management helps citizens and the government also to reduce the overflowing of waste bins and hygiene maintenance in the environment. The fill level of the bin and weight is measured by the sensors. According to that through a Wi-Fi module sends the status to the cloud and nearby truck drivers get notification about the bin level.***
Keywords: Waste management system, Hygiene, IoT, Real-time, Sensors.

I. INTRODUCTION

Waste is a major part of the pollution. Due to pollution humans and animals are getting affected. The overflowing of dustbins leads to an unhealthy environment and also unpleasant views in urban areas. Besides biomedical waste, industrial waste is tough to handle. The paper aims to manage waste, which is important because it will lead to a healthy and pleasant environment. The system developed using ultrasonic sensors, RFID tags, Wi-Fi modules, etc. with the help of the internet of things. It is also known as smart waste management. The benefits of this system are, it reduces the time consumed during collecting the waste in unnecessary locations, the traffic problems decreased with the help of this method, hygiene gets maintained, the environment attracts more and more people, and improvement in the quality of life. The management of the waste using iot method in which the solid trash is managed by sensors. This method was developed in St. Joseph college for smart garbage management. This project was based on maintaining hygiene at the organization level. It also promoted Swacha Bharat Abhiyan. Because of the increase in the population, the generation of waste is more. And this method is based on iot so it is a disadvantage of that area where the population is more but iot based device are less [1].

II. OBJECTIVES

A. To recommend the shortest path reaching to the bin which reached the threshold level or going to reach a threshold level.
B. To prevent the human as well as animal health and environment from bacteria and hazardous gases.
C. To determine when to collect the waste from the bin so it'll not overflow.

These objectives will be attained by checking through survey analysis based on the following hypotheses as under:

1) *H1:* "Waste segregation helps in recycle waste because less amount of waste goes to landfills which are better for the environment and workers who collects the waste through smart waste management system."
2) *H2:* "Waste management helps in making the environment healthy because the environment won't get affected by the bacteria generated by the decomposition of solid waste and harmful gases."

III. LITERATURE REVIEW

The literature surveyed some different papers to get information about the existing work which has been done Hassan et al. [3] proposed iot helpful even in the management of waste. The author mentioned Arduino2560, GLCD screen, RF receiver, SD card, and many more gadgets to create the device for sensing the level of garbage and sending SMS to the nearer cleaning sector. It's mainly based on Smart bin, Smart control and monitoring system, and waste vehicle. Kumar et al. [6] proposed a project in which they added sensors and GSM/GPRS to get the updates from the bin. And also used two kinds of lights red and green. A red alert that the bin is full and sends the data to the user's application. And the same with green, green light means the bin is empty. Also, they used a mobile application for the user to get notified about the status of the bin.

©IJRASET: All Rights are Reserved

It was for demo purposes so it can be implemented at the product level. And could use two separate bins for wet and dry waste and also can use wet waste to make biogas. Memon et al. [8] proposed a waste management system which dependent on WeMos D1 mini, ThingSpeak, WiFi. The generated data is sent over the Internet and stored using the ThingSpeak iot platform. Raundale et al. [9] proposed, in biomedical waste(bmw) management probability of fraud is more and also bmw was hazardous to a human being. It consists of color-coded bags that segregate the waste.

Also, the system of waste management is like the BlackBox system so that the user cannot manipulate the data. Nirde et al. [11] the authors used the ultrasonic sensor and load cell for making the system. The system was only for a lab experiment though the authors didn't consider manufacturing problems. The system is not for mass production. It's a smart system but it needs some features to get used at the production level. Nasar et al. [12] proposed the authors modified smart waste management so that it can be easily handled by anyone. Also, the authors used different bins for different kinds of wastes. The proposed method saved 34% the cost and also time compared to previous methods. In this method, the authors used smart waste bin applications. Users can also check the current situation. And the credits were added to the user's account so they sort the waste accordingly and get motivated because of the credits. Norwegian municipalities made use of this conceptual model. Rao et al. [14] authors developed a system using ultrasonic sensors, NodeMCU, servo motor, and Blynk app for waste management. The Blynk app is used for attentive messaging to the authorities. The authors kept a perspective of a clean and hygienic environment and made the system. Veluchamy et al. [15] proposed a system with an IR sensor and it was connected to the buzzer which was located at the waste collection office. Though the e-waste hard to decomposed and only 20% of the waste can recycle. Marques et al. [17] the authors implemented an architecture along with three different protocols i.e. CoAP, HTTPS, and MQTT. CoAP is a relevant protocol according to cost and power consumption. The protocols used in waste management. An implementation can be done using AMQP and XMPP in existing architecture with 5G/LTE-Advanced/ IEEE 802.22 network layer technologies. Singh et al. [18] proposed the system used for waste management contain an ultrasonic sensor, Arduino board, Wi-Fi module-ESP8266. It was based on a clean and hygienic environment. All the waste is stored in one place. The system does not segregate the waste like plastic, paper, disposable waste. It can be a major problem afterward. Kadus et al. [19] proposed the system made of Arduino, load cell, IR sensor, Wi-Fi module, shredder, LCD, HX711 amplifier, power supply, and load sensing plate. The proposed system maintained the hygiene and overflowing of dustbin using shredder which crashed the trash and after that the trash collected on the load sensing plate which placed below the shredder. The load cell is attached at the bottom of the load sensing plate which measures the weight of the trash. After measuring the trash, the LCD shows the password to the user but for accessing the router user must have to pull the plate so that the trash gets collected at the bottom of the dustbin. And the falling motion of the trash captured by the IR sensors. Mishra et al. [20] The proposed system was made at an academic level. The system is made of ultrasonic sensors, ESP8266 Wi-Fi module, RFID tags, GUI. The proposed system was to find the shortest routes for the garbage collection vehicles which beneficial for hygiene and the environment. Srikanth et al. [22] proposed, the sharp garbage bin made with HX711 Strain gauge drivers, EC05 Bluetooth Module, Arduino Uno Micro Controller, NodeMCU, L393 Comparator, Smoke sensor. The sensors present in the bin detects the abnormal behaviour of the bin and respond accordingly.

IV. METHODOLOGY

This study is based on the secondary data derived from the various research paper related to the smart waste management system.

A. Participants

A study was conducted to know people's interests and experience with the current waste management system also the problems faced during managing the household waste as well as dumpster waste. The study was conducted through google forms which circulated randomly though the study doesn't need any specific population but a population that faces issues in waste management. A total of 46 participants are involved in this survey (female 26 and male 20). The survey conducted in Kalyan city only and it doesn't involve any biased condition since providing the purpose of random sampling.

B. Materials

Google Forms were the source for conducting the survey. The survey population includes citizens, students of Kalyan city.

C. Procedure

A google form was chosen as a medium to conduct the survey. It was circulated by using the sampling technique of simple random sampling which involves an equal chance of in a population of inclusion which will help in having a fair opportunity to test the hypothesis. The google form was circulated for 2 weeks which resulted in a set of 46 responses.

©IJRASET: All Rights are Reserved

V. EXPERIMENT

The outcome of survey analysis is calculated by chi-square test at 95 confidence level. The question that was appropriate for the study was developed in the form of a survey which will have an impact on the hypothesis. All the participants who have gone through all the questions in the survey related to waste management would come across various questions that will lead to improving smart waste management. A survey was conducted on the parameters of gender and segregation level. A calculated value for the analysed values by the parameter-oriented questions was further compared to a tabulated value by considering the degree of freedom as 5%. Though the hypothesis got accepted on a survey basis.

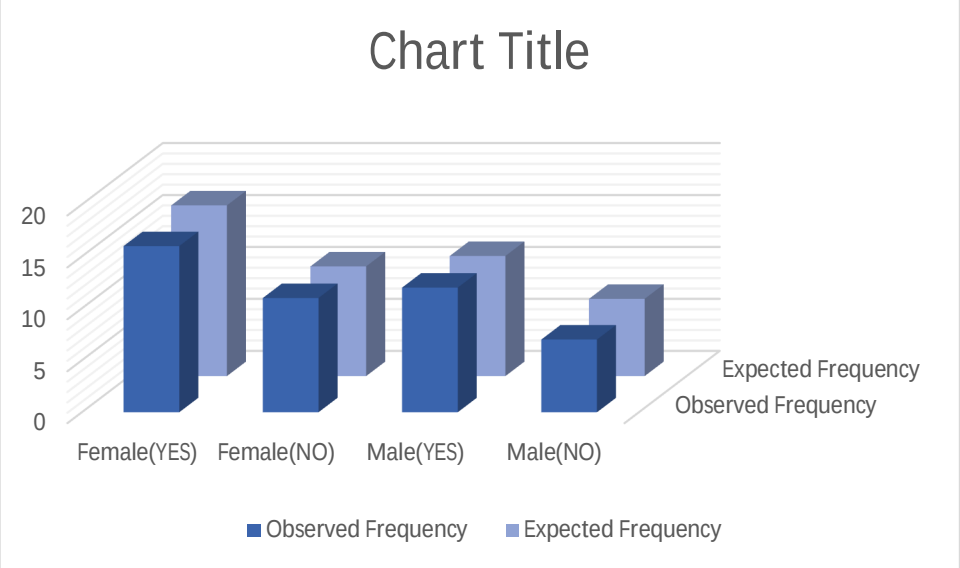


Fig. 1 Survey Frequency

VI. RESULT

The test scores of the survey were analysed and experimented on a random population-based on specific parameters resulted that the population is likely to segregate the waste for the betterment of the environment through smart waste management system therefore if smart waste management system fully implemented the acceptance for such technology would be majorly supported to prove H1.
The test scores in accordance with H2 could just be provided some outcomes which support the hypothesis. Since the participants faced some issues in managing the waste was not specific a partial proof of the H2 has resulted. To prove the hypothesis the population needs to be specific who can properly provide the data.

VII. CONCLUSION

Waste management is a major problem in an urban area. Through smart waste management, all the dumpsters are managed in a real-time system with the help of the internet. The problems faced by citizens like odor, unpleasant view of dumpsters, flies over the waste, waste overflowing will get reduced through this smart waste management method. Since segregation is beneficial for all the stakeholders though everyone should consider it as a part of life.

VIII. ACKNOWLEDGEMENT

I would like to thank Prof. Swapna Augustine Nikale, Department of Information Technology of B.K. Birla College of Arts, Science and Commerce (Autonomous) Kalyan, for providing guidance for this research work.

GLOSSARY

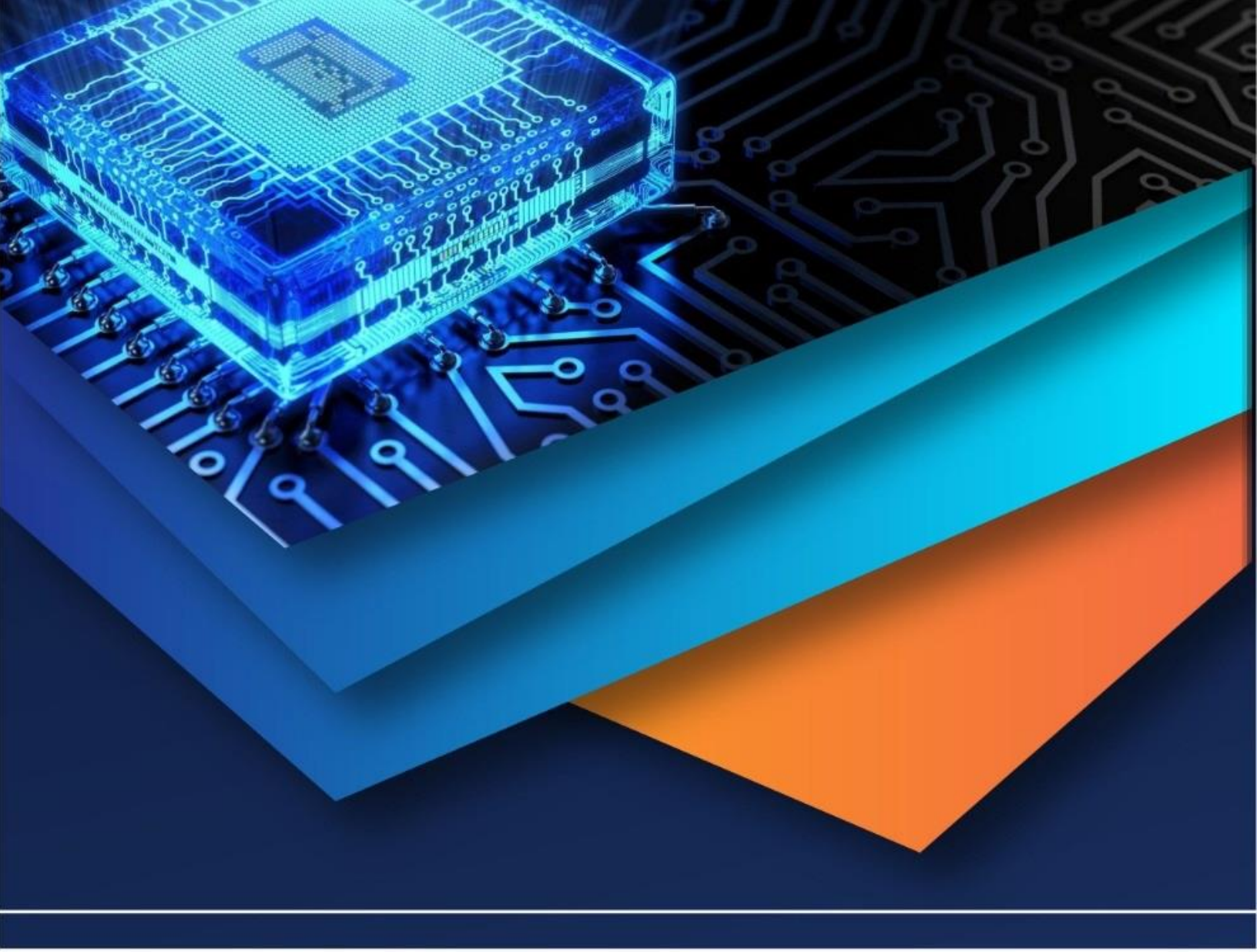
1) *RFID:* Radio-frequency identification
2) *IOT:* Internet of things
3) *BMW:* biomedical waste
4) *LCD:* Liquid Crystal Display
5) *Chi-Square Test:* Non-parametric test of independence used for comparison with categorical and associated variables
6) *Wi-Fi:* Wireless Fidelity

©IJRASET: All Rights are Reserved

REFERENCES

[1] Anitha, A. Arul, and L. Arockia are. “Promoting a Clean and Hygienic Environment Using IoT.” International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, vol. 8, no. 5, 2020, pp. 4722–26, DOI:10.35940/ijrte.E6893.018520.
[2] G. K. Shyam, S. S. Manvi and P. Bharti, "Smart waste management using Internet-of-Things (IoT)," 2017 2nd International Conference on Computing and Communications Technologies (ICCCT), Chennai, 2017, pp. 199-203, DOI: 10.1109/ICCCT2.2017.7972276.
[3] Abdullah Hassan, Shilan & M. Jameel, Noor & Sekeroglu, Boran. (2016). Smart Solid Waste Monitoring and Collection System. IJARCSSE. 6. 7-12.
[4] A. Singh, P. Aggarwal and R. Arora, "IoT based waste collection system using infrared sensors," 2016 5th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO), Noida, 2016, pp. 505-509, doi: 10.1109/ICRITO.2016.7785008.
[5] H. N. Saha et al., "Waste management using Internet of Things (IoT)," 2017 8th Annual Industrial Automation and Electromechanical Engineering Conference (IEMECON), Bangkok, 2017, pp. 359-363, doi: 10.1109/IEMECON.2017.8079623.
[6] S. V. Kumar, T. S. Kumaran, A. K. Kumar and M. Mathapati, "Smart garbage monitoring and clearance system using internet of things," 2017 IEEE International Conference on Smart Technologies and Management for Computing, Communication, Controls, Energy and Materials (ICSTM), Chennai, 2017, pp. 184-189, doi: 10.1109/ICSTM.2017.8089148.
[7] M. Al-Jabi and M. Diab, “IoT-enabled citizen attractive waste management system,” 2017 2nd International Conference on the Applications of Information Technology in Developing Renewable Energy Processes & Systems (IT-DREPS), Amman, 2017, pp. 1-5, doi: 10.1109/IT-DREPS.2017.8277804.
[8] S. K. Memon, A. R. Memon and A. A. Memon, “Smart Garbage Bin: An IoT Platform for Smart Waste Management System in Pakistan,” 2020 3rd International Conference on Computing, Mathematics and Engineering Technologies (iCoMET), Sukkur, Pakistan, 2020, pp. 1-5, doi: 10.1109/iCoMET48670.2020.9074108.
[9] P. Raundale, S. Gadagi and C. Acharya, “IoT based biomedical waste classification, quantification and management,” 2017 International Conference on Computing Methodologies and Communication (ICCMC), Erode, 2017, pp. 487-490, doi: 10.1109/ICCMC.2017.8282737.
[10] Atayero A.A., Popoola S.I., Williams R., Badejo J.A., Misra S. (2021) Smart City Waste Management System Using Internet of Things and Cloud Computing. In: Abraham A., Siarry P., Ma K., Kaklauskas A. (eds) Intelligent Systems Design and Applications. ISDA 2019. Advances in Intelligent Systems and Computing, vol 1181. Springer, Cham. https://doi.org/10.1007/978-3-030-49342-4_58
[11] K. Nirde, P. S. Mulay and U. M. Chaskar, "IoT based solid waste management system for smart city," 2017 International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, 2017, pp. 666-669, doi: 10.1109/ICCONS.2017.8250546.
[12] Nasar, Wajeeha & Karlsen, Anniken & Hameed, Ibrahim. (2020). A Conceptual Model Of An IOT-Based Smart And Sustainable Solid Waste Management System: A case Study Of A Norwegian Municipality. 10.7148/2020-0019.
[13] Harith, Muhammad & Hossain, Mohammad Asif & Ahmedy, Ismail & Idris, Mohd & Soon, Tey & Md. Noor, Rafidah. (2020). Prototype Development of IoT Based Smart Waste Management System for Smart City. IOP Conference Series: Materials Science and Engineering. 884. 012051. 10.1088/1757-899X/884/1/012051
[14] P. V. Rao et al., “IoT based Waste Management for Smart Cities,” 2020 International Conference on Computer Communication and Informatics (ICCCI), Coimbatore, India, 2020, pp. 1-5, doi: 10.1109/ICCCI48352.2020.9104069.
[15] Veluchamy, Ramanujam & Napoleon, D. (2020). IoT Based Green Computing: An Attempt to Delineate E-Waste Management. 5972-5981.
[16] R. Aishwarya, S. V. Sharanya, S. H. Naik, and M. G. Hegde, “IoT Based Industrial Production Line Waste Management and Energy Management with Smart Machine Access System,” in *International Journal of Research in Engineering, Science and Management*, vol. 3, no. 1, pp. 479-481, January 2020.
[17] Marques, Patric, et al. “An IoT-Based Smart Cities Infrastructure Architecture Applied to a Waste Management Scenario.” Ad Hoc Networks, vol. 87, 2019, pp. 200–08, doi:10.1016/j.adhoc.2018.12.009.
[18] P. Singh, A. Gupta, and S. Raj, “IoT Based Smart Waste Management System Using Arduino,” in *International Journal of Research in Engineering, Science and Management*, vol. 3, no. 5, pp. 569-571, May 2020.
[19] Kadus, Tejashree, et al. “Smart Waste Management System Using IOT.” International Journal of Engineering
[20] Mishra, Ayaskanta & Ghosh, Nisha & Jena, Pujarini. (2019). Internet of Things based Waste Management System for Smart Cities: A real time route optimization for waste collection vehicles. INTERNATIONAL JOURNAL OF COMPUTER SCIENCES AND ENGINEERING. 7. 541-548. 10.26438/ijcse/v7i4.541548
[21] Suresh, Nalina & Hashiyana, Valerianus & Ujakpa, Martin. (2020). An Internet of Things (IoT) Based Solid Waste Monitoring Systems.
[22] Srikanth, C. S., Rayudu, T. B., Radhika, J., & Anitha, R. (2019). Smart Waste Management using Internet-of-Things (IoT). International Journal of Innovative Technology and Exploring Engineering (IJITEE), 8(9), 2518–2522. https://doi.org/10.35940/ijitee.G5334.078919

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)