Auto Charging of Battery in E-Vehicle Based Microcontroller

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Abstract— More than forty percentage of the populace in the world chooses agriculture as the main occupation. The principal goal of the task is to diagram multitasking car for agriculture which ought to run automatically. It is designed to reduce the labor of farmers in addition to extend the pace and accuracy of the work. The manage and monitoring are primarily based on web of things, due to which the genuine fame of the discipline can be monitored and managed from any phase of world the use of internet. In our challenge we have two manipulate structures i.e. subject manage and robotic control. In area manage the soil moisture, temperature and humidity is sensed the usage of appropriate sensors and the subject is managed by using appropriate movements as nicely as the facts is up to date to the farmer with the aid of an app. The theft of plants by means of human beings and the assault of animals in the agricultural land motive heavy loss in cultivation. For intruder detection in the agricultural discipline we can use IR sensor and do photo processing approach to realize them. Usually, fires show up naturally in agricultural fields, ignited with the aid of warmth from the solar or a lightning strike. So, we sketch a machine in the subject to extinguish such hearth at very early stage. The robotic manipulate has a digital camera to grant a stay imaginative and prescient of the subject so whilst it performs its simple operations, we can display everything. The whole device can be switched to computerized mode for entire manage of the farm by using the robotic and guide mode for manage by using farmer. The robotic sprays pesticides and weedicides to manage assault of pest and weeds in the field. Also, the battery can be recharged with the aid of the photo voltaic panel stored above the vehicle. This ensures the the usage of eco-friendly electricity supply and prevents normal charging of the vehicle.

Keywords— **Automation, control systems, Raspberry, solar** P**anel, microcontrollers**.

I. INTRODUCTION

The major occupation in a growing country like India is agriculture. But currently the range of people worried in agricultural zone is declining due to various reasons. It is necessary to enhance the effectivity and productivity of agriculture. By the use of this project, we can perform a number of duties for agricultural purposes. Despite large-scale mechanization in agricultural discipline in some parts of the country, most of the agricultural operations in large number of components are carried on with the aid of human beings with the aid of the usage of simple tools and implements like timber plough, sickle, etc. Little or no use of machines is made in ploughing, sowing, irrigating, weeding the crops. This is mainly the case with small and marginal farmers. It effects in big wastage of men strength and in decrease yields per capita labour force. So, we have to mechanize the agricultural operations so that wastage

of labour pressure is avoided, and farming is made convenient and efficient. We trust some growth will be made with the aid of making use of this automobile in agricultural field. Current agricultural practices in India are neither economically nor sustainable and India's yield for many agricultural commodities are low. The major elements are poorly maintained irrigation structures and nearly universal lack of properly extension services. So, this challenge is also meant for manipulate the irrigation activities. Through this design the required water provide is routinely monitored and used on every occasion needed. Some farmers are unaware of the technological trends in farming. Increase the yields which no longer solely alleviated the stage of hunger, but simultaneously launched the human populace from the nutritional impediment to similarly growth. So persevered growth demands even greater agricultural improvements. So, we must discover something approaches to enhance the agriculture and make our higher area to live. India is an agricultural country. Nearly seventy percentage e of our populace depends on agriculture. Agriculture yields one-third of our National income. Our economic system is primarily based on agriculture. The development of agriculture has a terrific influence on the economic welfare of our country. Our agriculture was once in underdeveloped situation for a lengthy time. We didn't produce sufficient meals for our people. Our us of a had to buy veggies and grains from overseas countries, however the things are altering now. India is producing extra food grains than its needs. Some food-grains are being dispatched to other countries. Great upgrades have been made in.agriculture via our five-year plans. Green Revolution has been delivered in the agricultural sector. Now our country is self-sufficient in food-grains. It is now capable to export surplus food-grains and some different agricultural products to different countries. Our u . s . a . ranks first in the world in the manufacturing of tea and groundnuts. It ranks second in the world in the manufacturing of rice, sugarcane, jute and oil seeds. Before independence our agriculture depended on rains. As a result, our productiveness from agriculture wasvery small. In case the seasons had been good, we obtained a good harvest and in case the seasons have been no longer good, the crops failed and there used to be famine in some components of the country. After the independence the Government made plans for the development of agriculture. In the previous irrigation facilities were now not enough. Farmers depended often on rainwater for irrigation. Canals and tube-wells had been very few. Water is saved in rivers, lakes and reservoirs for generating electricity for our industries and agriculture. Water from the dams is being taken to far-off lands for irrigation. Tubewells and pumping units have been given to farmers. Now more land is used for irrigation and higher vegetation are produced. During the work farmers should go through many problems. At the time of spraying pesticide liquids, they must face some respiratory diseases. Chemicals used in the pesticide beverages are unsafe and hazardous for mankind, if they don't pay interest at some point of spraying, they have to suffer problems. Time bump off for spraying the beverages in the field is more.

II. RELATED STUDY

1.2.1 Designing an Autonomous Soil Monitoring Robot (IEEE - 2015)

Patrick M. Piper and Jacob S. Vogel et al designed an autonomous soil monitoring rover to expedite statistics collection. The rover will be in a position to autonomously navigate thru a field and keep away from obstacles. It will collect records on soil moisture and temperatures at a set of given factors and relay the information returned to the farm manager. The automobile is equipped with a stevens hydra probe II used to feel the soil moisture and temperature. GPS is used tonavigate through the field.

1.2.2 Application of Computer Vision Technique on Sorting and Grading of Fruits and Vegetables (JFPT2012)

Mahendran R and Jayashree GC et alp resented an concept of sorting and grading of fruits by means of photograph analysis. Computer Vision approach is used to consider the fantastic of the fruits. This paper affords the utility of picture evaluation and computer imaginative and prescient machine to consider the fine of merchandise in the subject of agriculture. Computer imaginative and prescient isa novel technology for obtaining and analysing an photo with the aid of the use of computer systems to control machines or to method it. It consists of capturing, processing and analysing pics to facilitate the quality characteristics in agricultural and meals products. The techniques used in picture evaluation encompass photograph acquisition, image pre-processing and photo interpretation, main to quantification and classification of photos and objects of interest within images. Images are received with a physical image sensor and devoted computing hardware and software are used to analyse the photos with the goal of performing a predefined visible task.

1.2.3 Robots for Precision Agriculture (National Conference on Mechanisms and Machines-2007)

Satish Kumar KN, Sudeep CS et al introduced a multi-purpose agricultural robotic to enforce precision irrigation, fertilizer addition and de-weeding aside from non-stop monitoring of crop and soil conditions. This will contain efficient utilization of water resources, intensive plant and soil monitoring, situation primarily based use of

fertilizers and the ability to work in unstructured environments. Precision agriculture. Entails the sufficient and most advantageous utilization of assets based on a variety of parameters governing crop yield. The Handbook of Precision Agriculture defines that the necessary elements that affect the yield are recognized and the variability in soil, crop in the agricultural discipline are determined. The gantry robots perform quite a number operations and helps the farmers to reduce the enter fees and the utilization of water resources.

1.2.4 Agribot (International Journal of Advanced Research in Computer and Communication Engineering2015)
Ankit Singh, Abhishek Gupta et al introduced an concept that agribot is a robotic designed for agricultural purposes. This Bot performs primary basic features like picking, harvesting, weeding, pruning, planting, grafting. It is designed to minimize the labour of farmers in addition to growing the speed and accuracy of the work. The principal characteristic of the robot is the potential to locate the grass in the subject the use of image processing. For this a extraordinary reason internet cam which will take pics internal the discipline and if the grass is discovered then the user will inform the robotic to reduce the grass in the crop field and additionally the consumer will choose the grass which has been reduce by the robot. The picture processing is additionally used for analyzing the height of the plant. If the top of the crop is large than the reference peak then the slicing mechanism will be used by the robotic to reduce the crop. Vision-based row instruction method is introduced to information the Robot platform pushed alongside crops planted in row.

1.2.5 Autonomous farming robotic with plant health
Indication (IJATES-2015)
K.V.Fale and P.Bhure Amit et al designed an autonomous Intelligent farming robotic which suggests plant fitness by?Observing the coloration of their leaves and the peak of the
plant. It additionally notes environmental prerequisites such as
Temperature, moisture and humidity. The fitness of the plant
is displayed on the LCD. The robotic has additionally watering mechanism; it will water the flora according to their needs by gazing soil moisture and humidity. The principal characteristic of the robotic is the potential to experience the fitness of the flowers using image processing. Webcam will take the photograph internal the field and analyses the boom in accordance to the height, colour of the leaves, etc.. Vision primarily based row training approach is used to information the robotic platform pushed alongside vegetation planted in row.

III. METHODOLOGY

I. Motion Control:-
For the movement manage purpose, 4 DC equipment motors (12V) can be used. The dc motors can be linked to the motor driver circuit. The motor driver converts the low enter sign into excessive enter signal. The dc tools motor is used to generate excessive torque. The motor driver is managed through the raspberry pi which in flip drives the motors. The locomotion can do autonomously the use of image processing algorithms; additionally can be managed by means of guide operation in app.
II. Seed Sower :-
In this area we layout and fabricate a completely computerized seed sower which operates when the consumer change ON the seed sower button in the app. It has a funnel fashioned seed collector which courses the seeds to a wheel arrangement. The motor is linked to the shaft which consists of small bracket for pouring seeds in a wheel. When the change is on, the seed sower starts offevolved implanting seeds into the ground. This ensures uniform implanting of seeds in the field.
III. Harvester:-
It's a setup in which a rotating blade cuts the crop as the robotic moves. The blade is run by using the high-speed motor which ensuressmooth slicing of the crop. This setup is appropriate for industrial vegetation likes paddy and wheat.
IV. Monitoring:-
It has a digital camera which will supply a stay imaginative and prescient of the area so whilst it performs its fundamental operations, we can screen the whole thing in and around the field. It acts as an eye to get entry to from IOT device. Other sensors like moisture sensor, temperature and humidity sensor,
PIR sensor and fireplace sensors are additionally used for monitoring and controlling the field.

BLOCK DIAGRAM

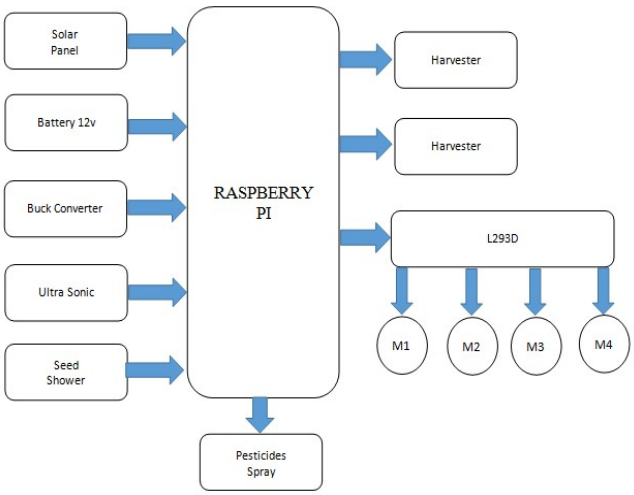
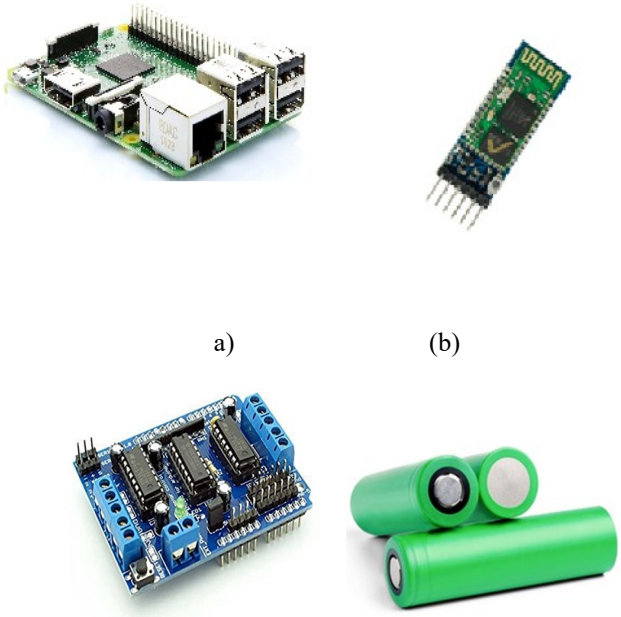


Fig.2 Block Diagram of Proposed System

The discern suggests the useful block graph of the device hardware. The device has been designed to take a number of inputs to manage the Robot. The inputs from the sensors are built-in and processed. The outcomes are displayed on the Serial Monitor. The software is a person interface, permitting a record on the contemporary repute of the individual. Once the person has linked to the receiver unit, statistics is mechanically up to date on the screen. The graph is modular which makes it instead handy and straight ahead to add greater sensors for measuring and monitoring different parameters. Then sensor values are add to the micro controller board.



a) (b)

(c) (d)

Fig.3 (a) Raspberry 5, (b) HC05 Bluetooth, (c) L293D Motor and (d) Lithium Ferro Phosphate Battery

A. Raspberry 5

Raspberry Pi 3B+ is a small board computer. It has CPU, GPU, USP ports and I/O pins, Wi-Fi, Bluetooth, USB and network boot and is capable of doing some functions like a regular computer. The SOC (system on chip) combines both CPU and GPU on a package and turns out to be faster than Pi 2 and Pi 3 models. CPU means central processing unit it performs the basic arithmetical, logical and input output operation of raspberry pi 3B+.CPU is divided into 2 parts APU and GPU.APU means arithmetic processing unit which performs arithmetic operation. GPU means graphic processing unit is a specialized electronic circuit. Using rapidly manipulate and after memory to accelerate creation of image in a frame buffer intended for output to a display. BCM 2837B0 chip is used in the raspberry pi 3B+.There are 2 USB ports and POE header. It has 40 GPIO pins and 4 pole stereo output and composite video port. It has CSI and DSI.CSI means camera serial interface and DSI means display serial interface. Raspberry pi 3B+ get supply from power supply regulator and it also takes signal from camera whenever it sense green plant.

B. Bluetooth Module (HC05)

The Bluetooth SPP (Serial Port Protocol) module facilitates a covertly networked serial connection through wireless technology. The HC-05 Bluetooth Module is a great choice for wireless communication since it can be set up in either a Master or Slave configuration. Complete with a radio transceiver and baseband operating at 2.4 GHz, this SP Bluetooth module is certified to work with Bluetooth V2.0+EDR (Enhanced Data Rate) at 3 Mbps Modulation.

C. L293D Motor Driver The L293D, a 16-pin Motor Driver IC, is capable of driving two DC motors in opposite directions at the same time. The L293D can supply up to 600 mA (per channel) of driving current at voltages between 4.5 V and 36 V.

D. Lithium Ferro Phosphate Battery

Graphitic carbon with a metallic backing serves as the anode in the Lithium Ferro Phosphate battery, a subset of the lithium-ion battery family. Lower cost, higher safety, reduced toxicity, longer cycle life, and other features are helping LFP batteries find a variety of uses in vehicles, large-scale stationary applications, as well as backup power. To put it simply, LFP batteries do not include cobalt.

E. Solar Panel and Battery Section:

In this section, we are the use of the photo voltaic panel of 10Watts and two 12V DC batteries. Here the photo voltaic panel is used for producing photo voltaic energy. This photo voltaic energy is then saved into the batteries. Once the strength is stored, then this strength is transferred to every and every gadget of the circuit.

IV. Results and Discussions

The designed robotic receives strength from photo voltaic panel which converts daylight into electricity. This electrical energy is given to the charging circuit in order to cost the battery to 12V. This battery offers strength to controller, motor driver and different mechanisms.

The complete prototype of photo voltaic powered multifunction agri robotic is shown in.

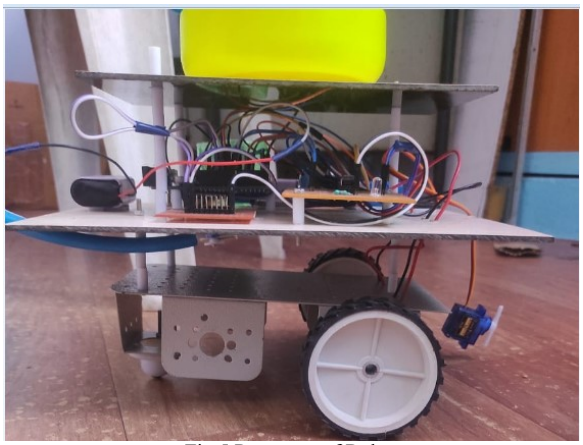
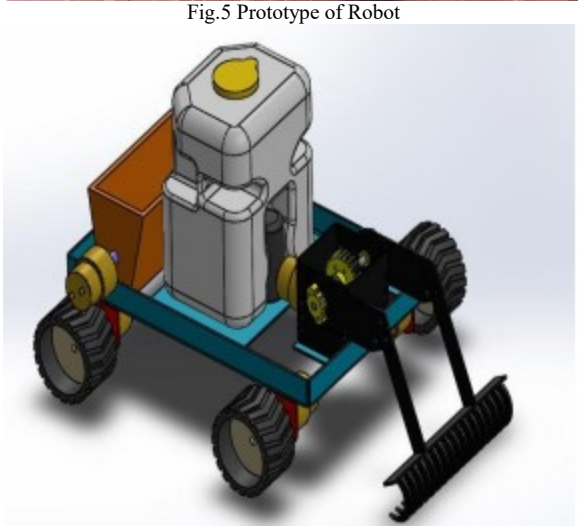


Fig.5 Prototype of Robot



The prototype was tested on normal agricultural soil for different types of seeds are Wheat, Rice and gram. Funnel is used to store these seeds. All operations of robot are controlled by android app Bluetooth terminal HC-05 as shown in fig.4.

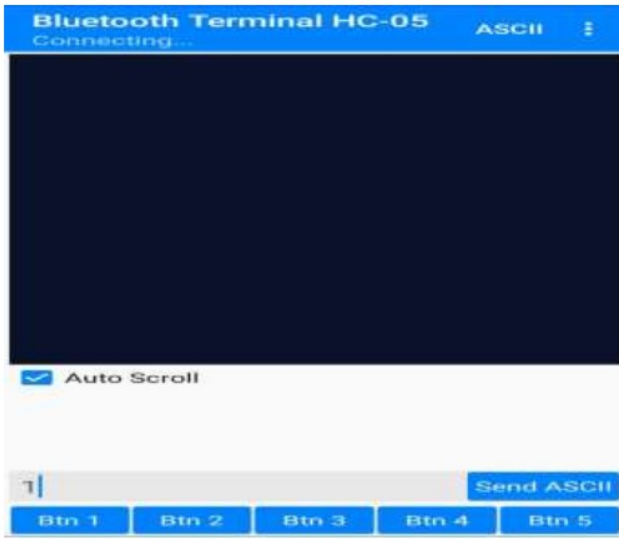


Fig.6 Serial terminal

Firstly it paired app with the HC-05 module. The movement of robot controlled by following commands 0: Stop, 1: Forward movement, 2: Backward movement, 3: Right turn, 4: Left turn When we send '5' and '7' commands the

robot starts to plugging, simultaneously dispensing seeds side by side as shown in fig:5. For plugging operation plough is tilts in a downward direction at a specific angle to provide proper dept for rows. Command '8' is provided to move plough to its original position. Funnels are mounted on a slider. Command '5' is sent then slider starts moving to and fro direction. In this operation seeds were distributed in rows, however, the distance between seeds was uniform. Command '6' is used to stop slider. Grass cutting mechanism has a circular cutter provided with sharp edges. Command 'a' is sent to rotate the cutter. Weeds were successfully cut by this cutter as shown in fig:6. 'b' is sent to stop the rotation of the cutter. The container is provided to store the water. 'c' is sent to sprinkle water on field. 'd' is used to stop sprinkling.

V. CONCLUSION

Hence, we have developed an self sufficient robotic and field control gadget which is used for basic functioning of the farm with least use of manpower. Nowadays, the people involved in agricultural region are diminished due to the fact of the influence of the modernization and intervention of IT sector. This work makes to manger the farm in a modern way. The use of IOT in agricultural area enhances the advantage of this work. Also, this is extra eco-friendly tool as it is run via photo voltaic power.

VI. FUTURE SCOPE

Since the AgRo-Bot performs three principal features particularly ploughing, seeding and fertilizer spraying. So can we add harvesting operation too As a long way as future enhancement is concerned, this assignment has ample scope. As an extension to this preliminary prototype many sensors can be brought to become aware of limitations and make the robot smarter. Sensors to discover the depth of the land to as it should be sow seeds can be added.

REFERENCES

[1] Online].Available:http://www.fao.com/india/faoin-india/india-at-a-glance/en/ [Accessed Nov 2019].
[2] Online].Available: http://blog.robotiq.com/top10-robotic-application-in-agriculturalindustry. [Accessed December 2019].
[3] [Online].Available:https://components101.com/wi reless/hc-05-bluetoothmodule. [Accessed Nov 2019].
[4] S. Umarkar and A. Karwankar, "Automated Seed Sowing Agribot using Arduino", IEEE Conference on Communication and Signal Processing, April 2016, pp.1379-1383.
[5] M.D.I. Sujon, R. Nasir, M.M.I. Habib, M.I. Nomaan J. Baidya and M.R. Islam "Agribot: Arduino Controlled Autonomous Multipurpose Farm Machinery Robot for Small to medium scale cultivation", IEEE conference on intelligent autonomous systems,March 2018, pp.155- 159.
[6] P.V.S. Jayakrisna, M.S. Reddy, N.J. Sai, N. Susheel and K.P. Peeyush, "Autonomous Seed Sowing Agricultural Robot", in IEEE Conference on advances in computing, communications and informatics (ICACCI),2018, pp.2332-2336.
[7] S. Kareemulla, E. Prajwal, B. Sujeshkumar, B. Mahesh, and V Reddy, "GPS based Autonomous Agriculture Robot", IEEE International conference on design innovations for 3Cs compute communicate control, 2018, pp.100-105.
[8] Ranjitha B., Nikhitha M. N. and Aruna K, "Solar Powered Autonomous Multipurpose Agricultural Robot Using Bluetooth/Android App", IEEE Conference on Electronics Communication and Aerospace Technology [ICECA], June 2019, pp.872-877.
[9] B. S. Shivprasad, M. N. Ravishankara, B. N. Shoba, "Design and Implementation of Seeding and Fertilizing Agricultural Robot", International Journal of Application or Innovation Engineering and Management(IJAIEM), Volume 3, Issue6, June 2014.
[10] S. Konam, N. Srinivasa Rao and K. Mohan Krishna, "Design encompassing mechanical aspects of ROTAAI: Robot to aid agricultural industry", in IEEE International conference on soft computing and machine intelligence, 2014, pp.15- 19.
[11] C.M. Barber, R.J. Shucksmith, B.M. Donald and B.C Wunsche, "Sketch-based robot programming," in IEEE International conference of image and vision computing newzealand, 2010, pp. 1-8.
[12] N.S. Naik, V.V.Shete and S.R.Danve, "Precision agricultural robot for seed function", in IEEE International conference on inventive computational technologies (ICICT), 2016, pp.15-19.
[13] P.V. Santhi, N. Kapileshwae, V. K. R. Chenchela and C. H. V. S. Prasad, "Sensor and vision based autonomous agribot for sowing seeds", in IEEE International conference on energy communication, data analysis and soft computing (ICECDS), 2017, pp. 242-245.
[14] C.Nagarajan and M.Madheswaran - 'Experimental verification and stability state space analysis of CLL-T Series Parallel Resonant Converter' - *Journal of ELECTRICAL ENGINEERING,* Vol.63 (6), pp.365-372, Dec.2012.
[15] C.Nagarajan and M.Madheswaran - 'Performance Analysis of LCL-T Resonant Converter with Fuzzy/PID Using State Space Analysis'- *Springer, Electrical Engineering*, Vol.93 (3), pp.167-178, September 2011.
[16] C.Nagarajan and M.Madheswaran - 'Stability Analysis of Series Parallel Resonant Converter with Fuzzy Logic Controller Using State Space Techniques'- *Taylor & Francis, Electric Power Components and Systems*, Vol.39 (8), pp.780-793, May 2011.
[17] Nagarajan and M.Madheswaran - 'Experimental Study and steady state stability analysis of CLL-T Series Parallel Resonant Converter with Fuzzy controller using State Space Analysis'- *Iranian Journal of Electrical & Electronic Engineering*, Vol.8 (3), pp.259-267, September 2012.
[18] G.Neelakrishnan, P.Iraianbu, T.Abishek, G.Rajesh, S.Vignesh, "IOT Based Monitoring in Agricultural" International Journal of Innovative Research in Science, Engineering and Technology, March 2020, Volume 9, Issue 3, pp:814-819
[19] G.Neelakrishnan, R.S.Jeevitha, P.Srinisha, S.Kowsalya, S.Dhivya, "Smart Gas Level Monitoring, Booking and Gas Leakage Detector over IOT" International Journal of Innovative Research in Science, Engineering and Technology, March 2020, Volume 9, Issue 3, pp: 825-836