International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878, Volume-8 Issue-3, September 2019

Description and Identification of Soil Quality Measuring Development using Uav's and E-Nose System

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Abstract: ***The development in soil quality measurement using E-nose system has proved to a reliable solution in monitoring and controlling the soil quality. This project aims at electronic nose system which can be used on universally at any scale to monitor the parameters in a given agricultural land. The evaluation of soil and camera devices with chemical sensor technologies remotely monitors the parameters such as pH level, soil moisture and amount of chemical nutrition contents in the soil. We will be using Raspberry-pi as our main board and through a camera it collects the real time data from land and this data will be fetched by the web server and displays on the monitor. User can access this data from anywhere through the internet. Using E-nose system the amount of soil content and suitable for crops information will be provided to agricultural field.***

Keywords: ***Gas Sensing System, Controller (ATMEGA128P), Low Power, Raspberry-pi Camera, TCP/IP, MY SQL server, SD card.***

I. INTRODUCTION

The most important sensory characteristics in the study of quality of soil moisture electronic nose system are soil pH and the amount of chemical nutrition. Main parameters for yield production are its spatial deviation, which sufficiently addressed to improve electronic nose system. Soil pH affects the soils material, chemical properties with process. The classification of soil depends on the pH parameter and nutrition of chemical parameter. The soil pH value decreases. Soil monitoring becomes very essential once farmers need guidance for crop and farming. For this demand, the development of a quad copter controller based E-nose system is designed for monitoring of soil. Such a system should monitor and provide data for remote examine.

The composed data by detecting and identifying easily is exported to a personal computer via serial port to make consequent data analysis hence regular data collection is probable without giving up personal computer resources. Moreover, the chemical gas sensors are used to measure the temperature, oxygen etc, levels in the soil for fermentation. The quad copter is the network of physical things with many sensors, lithium battery and data base connection enables these things to exchange data from one another.

II. RELATED WORK

A. The shortest Examination: - this is the smallest amount of extensive technique, which relies on channel alert top soil sample within the field Fig. 1 and after that inspects reaction weighting and aeration.

Fig. 1. Collected Input Data through Camera

B. Soil Weight:- this techniques is included weight soil test drying them in a broiler, weighing them again and utilizing the characteristic establish the measure of water in the soil while figure everyday running choices this is exceptionally exact and minimal effort in fig. 2.

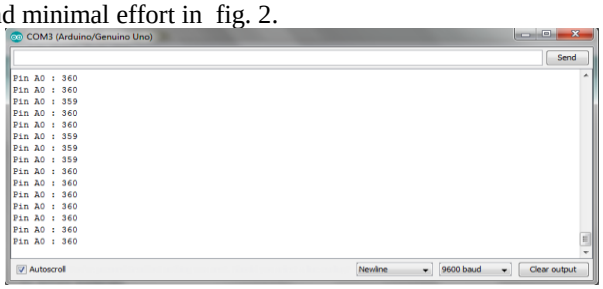

Fig. 2 Maximum Input Soil Weigh

C. Sensor Analysis:- E-nose sensor is more refined, for example, identifying information measure fig. 3 some physical property that is associated with soil humidity, multipurpose detecting devices and short of straightforwardly into the soil.

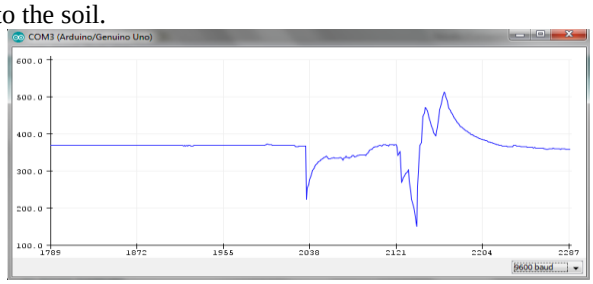

Fig. 3 Over Come Chemical Data Detected Anlysis

Manuscript published on 30 September 2019
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D. Raspberry pi:- this is a small pocket sized and used to tiny registers and systems direction activities fig. 4 it is fundamental leading body of web of things and give them web association programmed framework, additionally remote area controlling. Implement module is ARMv7 quad center processor with control board running 1GB RAM.

Fig. 4 Capturing soil through rasberry pi

E. Image processing:- the picture handling work process information and are put away in the SD card on the camera and information fig. 5 ., can be downloaded by stacking SD card which are through USB associations on the camera and downloading the information.

Fig. 5 Different Input Soil

F. Mounted sensor:- the Raspberry pi and sensors are mounted in UAV's additionally restricted measurements and low measure, diminishing assembling cost likewise we can store the information (pictures) on board preparing the center of the controller and raspberry pi, fig. 6 sensor gear, camera 5mega pixel pictures can put away in the SD card for every last sensor information organize.

Fig. 6 IOT board with camera

G. Quad copter:- here wings are settled with brushless DC engine which are developed and measure in KG ,the battery is comprise of 2200Ah sensor. Raspberry pi and camera are mounted with principle controller load up and quad copter and furthermore it ensures the take off and go up against stacking by wings. The course of movement for every propeller separates the heading venture to every part of the wings propeller which are moving clockwise bearing and another two wings are moving in anticlockwise fig. 7 bearing likewise to permit the more power and steadiness at decreased weight and two brushless engine running inverse course implies one confronting ups and one looking down.

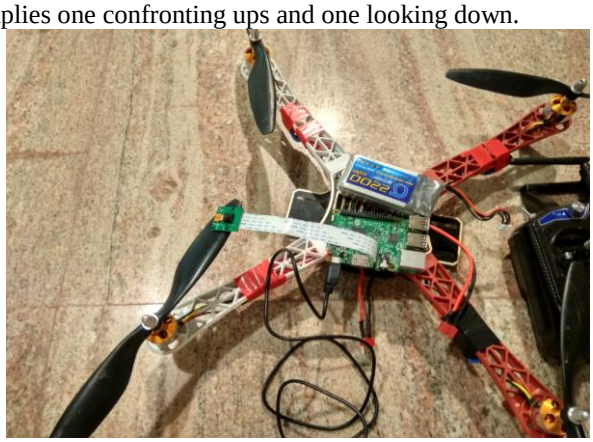

Fig. 7 Quad copter

H. UAV's area: - for this investigation, on board controller mounted with E-nose sensor, camera, battery and quad copter wings traverse 2cm length, 3cm weight and 2.5kg without payload at the ground speed is 20-25km/h and 560gram payload, battery is up to 2.5hours, additionally it is imperative wellbeing viewpoint amid quad copter take off/on UAV's controlled totally self-sufficient fig. 8.

Fig. 8 Agricultur land area

I. Data processing & analysis:- at the point when the quad copter gathers the information over the field, the sensor senses the dirt and camera takes the pictures the specific quad copter picture handling and UAV's can process the pictures locally additionally fig. 8, which can be tedious on numerous examination.

Fig. 9 Final Output Analysis Report

J. Payload:- for this examination ,we picked a settled wings UAV's that is specific zone mapping, the sensor of the payload is extraordinarily intended in fig. 9 just UAV's, correlation and 5mpixel camera sense portrayed by a central length and vast settled pitch, this design permits to uncover times since the camera is inflexibly introduced in the UAV's edge.

III. PROPOSED ARCHITECTURE

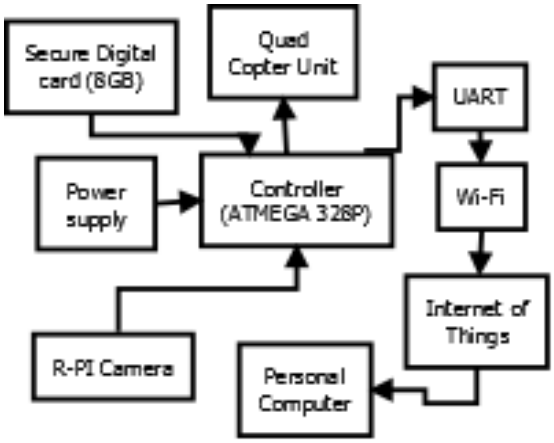

Fig.1.1. Implementation System

A. Batteries: Lithium Polymer (Li-Po) batteries are the most acclaimed quality supply for controlling (or 'automatons') these days. Without broadly expounding, the standard legitimization in the back of that, since they are rechargeable and ordinarily have extensive points of confinement fig. 10.

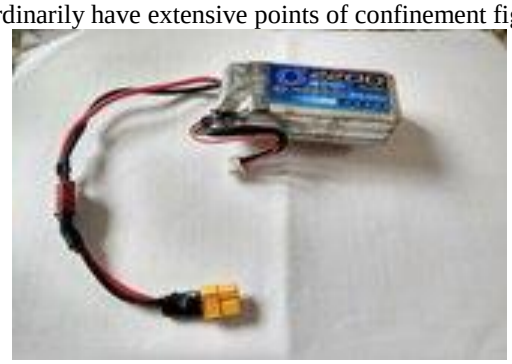

Fig. 10 Battery

B. Controller: this is the most extreme fundamental part in these depictions. It miles chargeable for identification, examination status and controls every one of the devices. It introduces the message at the LCD based at the temperature and mugginess sensors fig. 11. Its far RISC structure and furthermore 1024B EEPROM, 24KB SRAM, 23 favored reason input Output lines.

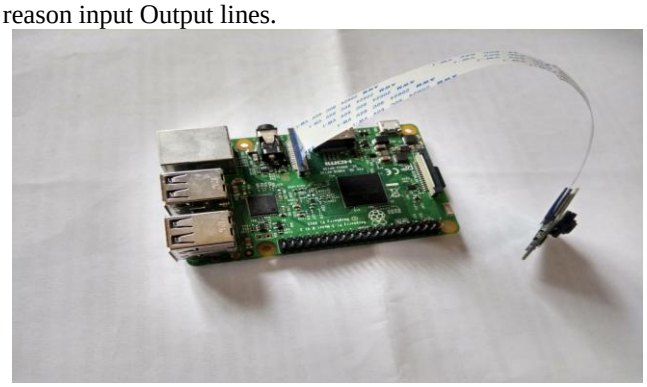

Fig. 11Controller with gas sensor, camera

C. camera: more than likely the most critical quality and computerized camera is needed for creation of report as a simple sign that can get eminent. Some virtual cameras can do this, however no longer exceptionally well; the video flag need to experience the encoders and decoders. The DACs to thusly make it to the including significant inertness fig. 12. A computerized, be that as it may, is reason worked for simple.

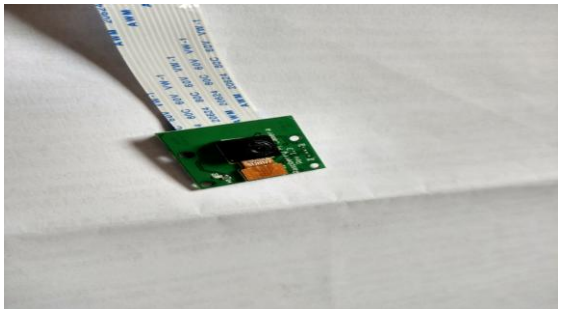

Fig. 12 Raspberry Pi Cameras

A. ALGORITHM

Suitably here were design the soil humidity help part and quickness of the quad copter even as decline machine; we can utilize the detection and description with MAT Lab. The method of interpretation of the calculation works through take off the movement of the boring and following the dirt quality form moreover it will find the every single area and territory additionally breakthrough while table 1 the UAV's region is in like manner up and coming continue distinguishing the dirt land region and previous they can enhance the development discovery.

Table 1: Performance and Comparison of soil quality level

Soil moisture	Percentage (%)	Soil Quality	Soil Quality Level
13.5	0-6	Moderate acidity	Suitable for crop
10.5	0-3	Normal acidity	Suitable for crop soybean, pie etc,.
5.5	0-0	No acidity	Suitable for all crops
20.5	0-9	More acidity	Difficult to crop
27.5	0-12	Acidity	No use for crop

Table 2: Camera Calibration and Parameter

	Calibration	Parameter
Camera	Size	25×24×9mm
	Weight	3G
	Resolution	5Mpixels
	Sensor	Omni vision 5647
	Sensor images area	3.76×2.74 mm

Table 3: Input data required for image processing

Description	Per Band	Percentage	H:MIN
SD card	0.4	1.4	0:14
Data conversion	1.4	7.8	1:10
Bit conversion	1.6	9.8	1:41

Table 4: Comparison of cultivation of crops

Soil	Ph level	Soil moisture	crop
Very bad	15	30	Acidity
Bad	10	20	Moderate acidity
Subnormal	6	14	Sub moderate
Normal	3	9	Min acidity
Excellent	0	4	No acidity

A. IMPLEMENTATION

The result of this test takes a note of the identification and investigation of the dirt dampness in phenomenal programming , which is simple to recognize and advances the speed and places the streamline speed, which is normally fast moreover less time and considerably less power for detecting the carbon dioxide(CO2) for E-nose machine, besides the ideal is relies upon remove from the warm soil source and distinction is bolstered on low , mid and high velocity is changing ,furthermore constant following E-nose contraption likewise its exceptionally compelling and presents day devours inspecting leisure activity charge and figure the dirt dampness assets and territory by method for utilizing E-nostril framework table 2 and 3.

IV. CONCLUSION

The method was developed by exploitation AN a UAV, CNG4 gas sensor device to monitor work, distinctive the soil quality and unstable vapors. This technique is by exploitation using quad copter with success and soil quality measuring is analyzed by exploitation and mat science laboratory techniques. It provides 99% correct declaration of the target analysis during the conclusion which is very effective. The affectability of the device sensor and controller payload in quad copter.

REFERENCES

1. Phillip lottes, Raghav khan, et al., "UAV based harvest and weed grouping of savvy cultivating ", Swiss government foundation of innovation Zurich Switzerland by the EC under substance number H2020-ICT 644227-prosper.
2. Sebastian, olere-oltmanns, et al., "Unmanned flying vehicle for observing soil disintegration in morocco", Remote sensor. 2012, 4, 3390-3416.
3. [3] Leila Hassan, Esfahani et al., "appraisal of surface soil dampness utilizing high determination multi-unearthly symbolism and counterfeit neural systems", Remote sensor. 2015, 7, 2627-2646.
4. Intiluna and agustin lobo et al., "mapping crop planting quality in sugarcane from UAV imsgery: A pilot think about in Nicaragua", remote detecting, 10 April 2016.
5. Marc wehrhan, philipp raunekar et al., "UAV based estimation of carbon trades from heterogeneous soil scenes A contextual analysis from the carbo ZALF exploratory territory", sensor (Basel), 2016 Feb 16(2):255.
6. Andrea S. laliberte, check A goforth et al., "multispectral remote detecting from unmanned air ship picture handling work processes and applications for rangeland conditions", remote sensor, 2011, 3, 2529-2551.
7. C. stocks, F. Nex, et al., "quality evaluation of consolidated IMU/GNSS information for coordinate geo-referencing in the substance of UAV based mapping https://www.applanix.com, got to on june 26, 2017.
8. Guglielmo rossi, luca tanteri, et al., "brief correspondence utilization of multi-copter ramble optical pictures for avalanche mapping and portrayal", Nat perils earth syst., sci. 13 Feb., 2017.
9. Jurgen Jasperneite, max falser, et al., "PC correspondence inside modern circulated condition a review", IEEE exchanges on mechanical informatics, volume 9, issue 1.
10. Bhuvaneshwari s., sahaya anseline, nisha a., "usage of TCP/IP on implanted web server utilizing raspberry pi in modern application", International diary of propel examine in PC and correspondence designing, vol. 3, issue 3, walk 2014.
11. Umesh Kamble Pravin Shingne, et al., "Testing of Agriculture Soil by Digital Image Processing", IJSRD, vol. 5, issue 1, 2017: 2321-0613.
12. Makera M Aziz, Dena Rafaa Ahmed, Banar Fareed Ibrahim, "Decide the Ph. of Soil by Using Neural Network Based on Soil's Color", IJARcsse, vol. 6, issue 11, November 2016.
13. C. Y. Niu1,2, A. Musa1, and Y. Liu1,2, "Examination of soil dampness condition under various land utilizes as a part of the bone-dry locale of Horqin sandy land, northern China", Solid Earth, 6, 1157– 1167, 2015.
14. Miss. Vrushali r. deore, profe. V. M. umale, "remote checking of the green house framework utilizing inserted controllers", vol. 3, issue 2, Feb. 2012. 1. ISSN 22295518 IJSER.
15. Soham banerjee, divyashika sethai, tanuj mitta, ujjwal arora, akash chauhan, "secure sensor hub with raspberry pi", IMPACT-201, 978—4799-1205-6/13@ IEEE.

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