Mobile Smoke Monitoring Device

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ABSTRACT: This   project proposes a video-based fire surveillance named as Mobile Smoke Monitoring Device. It will be a robo-car having two wheels and a camera on it along with a smoke volume sensor , a fan, and an air purifier attached to it . And it will be controlled by a remote controller using Blynk application, the robo-car will be able to move anywhere and can take pictures and videos. And this device will be used by firemen who save people stuck in fire by risking their lives, without even knowing if somebody is present inside the location or not and store managers as self safety for their stores. And the Robo-car can take the pictures and videos   at any angle because its movement can be controlled by us using controller.

1. INTRODUCTION

Various of studies have previously had investigated the use of camera for fire detection and the monitoring and applied variety of visual features such as colour motions, edge and shape of fire region.

[1] J.chen, P.WU   and Y.chiore in year 1004 held an international conference on fire detection based on image processing i.e. an early fire detection method. This conference was on image processing.
[2]Chenetal[2] used an RGB/MIS colour model and dynamic analysis of flames that matches the distorted characteristics of flames with the growth of pixel to check for the existence of fire.
[3]Y.Shimososa,J.Kanemoto,Khakamada,H.floria,T.Ariki,Y.Su gawara,F.Kojio, A.Kimura and S.Yuta. in a conference at location: Nagoya, japan on 11-18 oct,1000 proposed a security guard system for buildings. Mobile guard robot is a wheel type autonomous robot that could move on a fixed path watching around anything unusual such as fire, water.While moving robot could send images to the monitoring station.
[4]Kun-Ru-Wu, and Jia-Ming Liang, Xin Zhang, Kuan-Yili, Yi-Tinglin and Yu-chee Tseng in a conference at location brasilia, Brazil on 10-13 october 10-16 presented a device of the smart video surveillance system using the pan-tilt zoom cameras with environment sensors such as the fire, motion, door sensor .This device could adaptively monitor in terms of pixel per foot.
[5]Nazirah ahmad zaini, Norliza zaini, mohd.Fuad Abdul Latip. faculty of the electrical engineering universities, technology. NARA(UITM)shah alam mala in year 1016

proposed the monitoring cameras that are mobile and can move around the area being monitored, they focused to use this in the surveillance of the many of large buildings but the device would incur high cost in installing. So, many cameras at many places and monitoring the large area was also difficult.

Existing systems:- Using, colour models and sensors to make vision sensor based fire and smoke detection and monitoring system that works as the   precautionary method since they can only alarm about incident. Also, the previous Robots were able to move on a fixed path and were too costly to install.

Mobile smoke monitor device will be a robo-car having two-wheel and a camera on it. So that the robot will be able to move at any location, along with a smoke volume sensor, a fan, and an air purifier attached to it . And it will be controlled by a remote and the camera placed on the robot will be able to take the pictures and videos. The robot will be controlled by a mobile using the Blynk Application .The robot-car can move in any direction in which we want it to move.

Especially, In our car robot-car we are using the ESP-32 CAM is a small camera module with the ESP-32 S chip. It also features a microSD card slot that will be useful to store images taken with the cameras or to store files to serve to clients.

2.PROBLEM STATEMENT

Smoke monitoring is a critical idea to implement since it is difficult to see through smoke and take idea where to move and where to not move .Most previous work related to it had their devices either fixed at ceilings and which were moving had their devices a considerable heights , hence once a room is filled with smoke or gas Smoke monitoring is a critical idea to implement since it is difficult to see through smoke and take idea where to move and where to not move. Most previous work related to it had their devices either fixed at ceilings and which were moving had their devices a considerable heights , hence once a room is filled with smoke or gas monitoring capability because it is close to ground and we know smoke has a tendency to move upwards so being at low height it can capture better view it also has a fan which will help it further to move smoke just in front of camera and air purifier will get

limited amount of smoke to purify at a time and smoke volume sensor will tell us about changes in volume of smoke simultaneously.

3.APPROACH

The Proposed method consist of main modules which are as follows (1) Camera view (1) Smoke volume sensor (3) Air purifier and a fan.

3.1 CAMERA VIEW

ESP-32 CAM is a small camera module with the ESP-32 S chip. It also features a micro SD card slot that will be useful to store images taken with the cameras or to store files to serve to clients. It has OV1640 Camera and several GPIOs to connect peripherals with it. The camera will capture video live and will sent to controller.

ESP-32 CAM has following features like- TF card holder, reset button, tantalum capacitor IPEX block output, FPC connector, flash Lamp, voltage regulator chip, PSRAM and other several features which are very helpful in monitoring purpose.and also the monitoring view would be very clear.
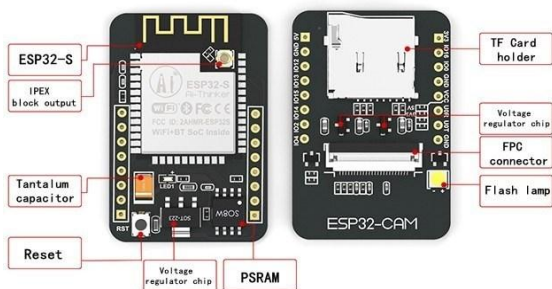
Fig(1)- ESP-32 CAM features
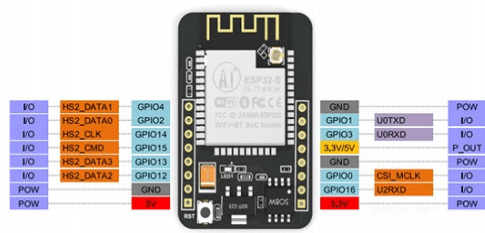
Fig(2) - ESP-32 CAM pin diagram

Here, GPIO1 and GPIO 3 are serial pins used to upload code to our board using an connector FTDI programmer, GPIO 0 is also important and is used to determine whether ESP-32 is in flashing mode or not. We used Arduino IDE to program ESP-32 CAM.
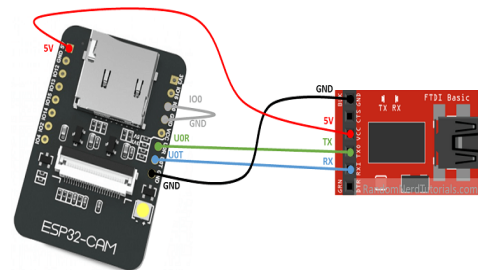

Fig (3)- connections of ESP-32 Cam with FTDI programmer

ESP-32 CAM	FTDI Programmer
GND	GND
5V	VCC(5V)
UOR	TX
UOT	RX
GPIO 0	GND

Table- 3.1.1(Connection points between ESP-32 Cam and FTDI Programmer)

For uploading the code, once it has been compiled we need to connect ESP-32 CAM to FTDI Programmer which is basically an uploader that is used to connect Complied code executed on Arduino to ESP-32 CAM module for transferring compiled code in it .once code is transferred ESP-32 CAM will start giving view of all the things placed in front of it that is it will start working as a camera capturing live videos and images in front of it.

Above Table 3.1.1 shows the connecting points between ESP-32 CAM and FDTI Basic programmer that is GND of ESP-32 CAM should be connected with GND of FTDI BASIC Programmer, 5V to 5v(vcc),UOR Pin to TX,UOT Pin to RX, GPIO 0 to GND respectively to ensure zero connection problem.

3.2 SMOKE VOLUME SENSOR

To measure quantity of smoke and gases like carbon Monoxide and Methane we have used MQ1 gas/smoke sensor. Once ESP-32 CAM camera starts taking live videos of testing room that is filled with smoke or gas then MQ2 smoke/gas volume sensor will be used to measure volume of smoke/gas present in the incident area. MQ2 gas sensor is basically Metal oxide semiconductor type gas sensor also known as chemo resistors as its detection is depend upon change of resistance of sensing material when smoke comes in its contact. It uses simple voltage divider network to detect concentration of gas.

Fig(4)-MQ2 Smoke sensor   **Fig(5)**-External structure of smoke sensor
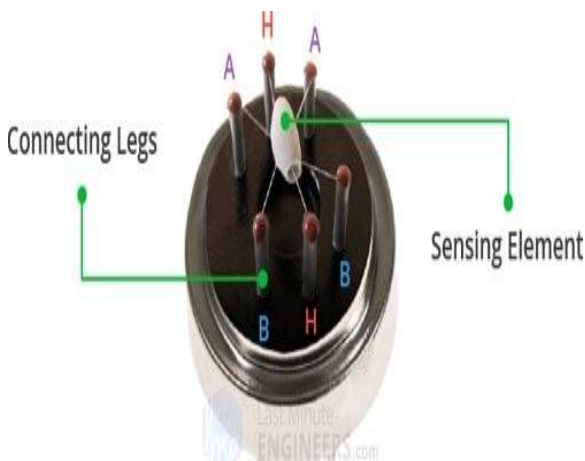
Fig(6)-Internal structure of smoke sensor

It can detect smoke and gas concentration anywhere from 100 to 10000 ppm .Above fig(6) represent internal structure of sensor that is star shaped formed by sensing element and six connecting legs extended beyond Bakelite base there are two legs H out of six legs that are responsible for heating the sensing element and are connected through Nickel-Chromium coil that is a conductive alloy rest four(A&B) are for output signals connected using platinum wire .These wires are connected to the body of sensing element and convey small changes in the current the passes through sensing element .

Six connecting legs that are connected to sensing element placed exactly at the middle of these connecting legs basically convey changes in current when it passes through the Sensing element

3.3 AIR PURIFYING AND FAN

To purify air we will use Activated carbon filter .It is a bed of activated carbon in granual or powdered block form and consist of millions of tiny absorbent pores. This air filter is extremely porous and is a popular filteration method used for smoke and gases .It is also called HEGA(High Efficiency Gas Absorption) filter. During Absorption the pollutant stick outside the Activated carbon filter and this filter can be used again after cleaning. Fan

attached with allow certain quantity of smoke in room to reach purifier hence will not get exhausted fast

4. CONCLUSIONS

This paper proposes a more useful and reliable device to take up as remedy as well as precaution for smoke and gas incidents .

Mobile smoke monitor device can offer following advantages-

It can provide more better monitoring view through smoke because it operates at lower height and smoke has tendency to move upwards as well as it has a fan attached with it to blow away a part of smoke in front of camera and activated carbon filter to filter smoke simultaneously. It is a remedial device and previous made device are precautionary devices .It consist of a smoke volume sensor and air purifying filter. We can control movement of device so better dealing with obstacles. More over small Store owners can operate it themselves when needed without waiting for external help.

ACKNOWLEDGMENTS

REFERENCES

[1]J.chen, P.WU and Y.chiore,1004,IEEE international conference on fire detection based on image processing.

[2] Chenetal[1], dynamic analysis of flames that matches the distorted characteristics of flames with the growth of pixel to check for the existence of fire.

[3] Y.Shimososa, J.Kanemoto, Khakamada, H.floria, T.Ariki, Y.Sugawara, F.Kojio, A.Kimura and S.Yuta in a conference at location: Nagoya, japan on 11-18 oct,1000, security guard system for building.

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[5] Nazirah ahmad zaini, Norliza zaini, mohd.Fuad Abdul, Latip Faculty of electrical engineering, universities technology. NARA(UITM) shah alam mala in year 1016 proposed monitoring cameras .