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FORM 1
THE PATENTS ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003
APPLICATION FOR GRANT OF PATENT
[See sections 7,54 & 135 and rule 20(1)]

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(FOR OFFICE USE ONLY)

Application No.: ....
Filing Date: ....
Amount of Fee Paid: ....
CBR No.: ....
Signature: ....

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1. APPLICANT(S):

Sr.No.	Name	Nationality	Address	Country	State
1	University of Engineering and Management Kolkata	India	University Area, Plot, Street Number 03, Action Area III, B/5, Newtown, Kolkata, West Bengal 700160	India	

2. INVENTOR(S):

Sr.No.	Name	Nationality	Address	Country	State
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2	Anirban Das	India	University Area, Plot, Street Number 03, Action Area III, B/5, Newtown, Kolkata, West Bengal 700160	India	West Bengal
3	Moyantri Koley	India	University Area, Plot, Street Number 03, Action Area III, B/5, Newtown, Kolkata, West Bengal 700160	India	West Bengal
4	Abhinav	India	University Area, Plot, Street Number 03, Action Area III, B/5, Newtown,	India	West Bengal

			Kolkata, West Bengal 700160		
5	Debalikh Chatterjee	India	University Area, Plot, Street Number 03, Action Area III, B/5, Newtown, Kolkata, West Bengal 700160	India	West Bengal
6	Subham Mondal	India	University Area, Plot, Street Number 03, Action Area III, B/5, Newtown, Kolkata, West Bengal 700160	India	West Bengal
7	Hrichik Ghosh	India	University Area, Plot, Street Number 03, Action Area III, B/5, Newtown, Kolkata, West Bengal 700160	India	West Bengal

3. TITLE OF THE INVENTION: An Intelligent Helmet to detect toxic, flammable, suffocating gases and heat hazards in under earth mines

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT / AUTHORISED PATENT AGENT IN INDIA:
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Telephone No.: 03323572969
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5. PRIORITY PARTICULARS OF THE APPLICATION(S) FILED IN CONVENTION COUNTRY:

Sr.No.	Country	Application Number	Filing Date	Name of the Applicant	Tilte of the Invention

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE APPLICATION:

International Application Number	International Filing Date as Allotted by the Receiving Office
PCT// /	01/01/1900 00:00:00

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION

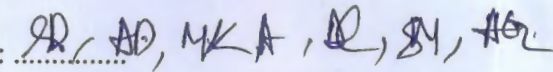| Original (first) Application Number	Date of Filing of Original (first) Application
	01/01/1900 00:00:00

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main Application / Patent Number:	Date of Filing of Main Application
	01/01/1900 00:00:00

9. DECLARATIONS:

(i) Declaration by the inventor(s)

. I/We ,Somsubhra Das,Anirban Das,Moyantri Koley,Abhinav,Debalikh Chatterjee,Subham Mondal,Hrichik Ghosh, is/are the true & first inventor(s) for this invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: 21·12·2020

(b) Signature(s) of the inventor(s): AR, AD, MKA, DC, SM, AG

(c) Name(s): Somsubhra Das,Anirban Das,Moyantri Koley,Abhinav,Debalikh Chatterjee,Subham Mondal,Hrichik Ghosh

(ii) Declaration by the applicant(s) in the convention country

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

(a) Date: -----

(b) Signature(s) : ....

(c) Name(s) of the singnatory: University of Engineering and Management Kolkata,University of Engineering and Management Kolkata,University of Engineering and Management Kolkata

(iii) Declaration by the applicant(s)

- I am/We are, in the possession of the above mentioned invention.
- There is no lawful ground of objection to the grant of the Patent to me/us.
- I am/We are, the assignee or legal representative to true first inventors.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

Sr.	Document Description	FileName
1	COMPLETE SPECIFICATION	Complete Specification.pdf
2	DRAWINGS	Drawing.pdf

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated hering are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this(Final Payment Date): 21.12. 2020

Signature: ....

Name: Satyajit Chakrabarti

To The Controller of Patents

The Patent office at KOLKATA

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21.12. 2020

FORM 18

THE PATENT ACT, 1970
(39 of 1970)
&
THE PATENTS RULES, 2003

REQUEST/EXPRESS REQUEST FOR EXAMINATION OF APPLICATION FOR PATENT

[See section 11B and rules 20(4) (ii),24B (1) (i)]

1. APPLICANT(S)/OTHER INTERESTED PERSON(S):

(a) Name :1. University of Engineering and Management Kolkata
(b) Nationality :1 .India
(c) Address :1 .University Area, Plot, Street Number 03, Action Area III, B/5, Newtown, Kolkata, West Bengal 700160
(d) Date Of Publication Under Section 11A :29/07/2022 00:00:00

2. STATEMENT IN CASE OF REQUEST FOR EXAMINATION MADE BY THE APPLICANT(S)

I/We University of Engineering and Management Kolkata hereby request that my/our application for patent invention number 202131003592 filed on 27 Jan 2021 for the titled AN INTELLIGENT HELMET TO DETECT TOXIC, FLAMMABLE, SUFFOCATING GASES AND HEAT HAZARDS IN UNDER EARTH MINES shall be examined under section 12 and 13 of the Act.
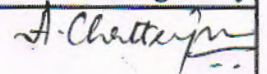
4. ADDRESS FOR SERVICE

University Area, Plot, Street Number 03, Action Area III, B/5, Newtown, Kolkata, West Bengal 700160

Dated this(Final Payment Date):08/08/2022

Signature
Name of the Signatory

A. Chatterjee

To,
The Controller of Patents,
The Patent Office
At Kolkata

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Title: An Intelligent Helmet to detect toxic, flammable, suffocating gases and heat hazards in under earth mines

Inventors:

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Anirban Das, CSE, UEM Kolkata, anirban-das@live.com

ABSTRACT: This smart mining helps the workers in mining industry. Harmful events keep on happening and can cause injury and accidents. This helmet is eco-friendly and economical, and harmless to the environment due to its ability to harness electrical energy for nearly all its work. It involves security systems embedded into the body. This Helmet is based on Arduino Uno.

DESCRIPTION:
FIELD OF THE INVENTION:
Here my field of application is the three components based mining helmet which ensures the safety of the workers, working in coal mines.

Here the first component is the gas sensor mq2 which detects any harmful gases like methane, Carbon monoxide, etc present in the mining environment.

The helmet is equipped with the 2nd component-the temperature sensor DHT 11, which detects if the surrounding temperature in mines is more than 50°C.

The 3rd component is the LDR- Light-dependent Register or photoresistor which detects the intensity of light energy present in the surrounding of the worker, working in mines.

The helmet is also equipped with a buzzer, breadboard, a red led and a white led which beeps and glows at different hazardous conditions.

The positioning of the components and the design of the helmet is in such a way that it causes no problem for the workers to work.

The whole system is powered by a lithium 9V rechargeable battery.

BACKGROUND OF THE INVENTION:

The main toxic gases in mines are carbon monoxide (CO) and carbon dioxide (CO2); the flammable gases are methane (CH4), CO, and hydrogen (H2); the suffocating gases are CO2, nitrogen (N20), and CH4; and the toxic gases are CO, nitrogen oxides (NOx), and hydrogen sulfide (H2S). Exposure to coal mine dust during mining can cause a spectrum of the disease termed CMDLD. This spectrum includes classic forms of CWP and silicosis, mixed dust pneumoconiosis, DDF (which can be mistaken for IPF), and chronic obstructive airways disease, including emphysema and chronic bronchitis. Thus the Gas Sensor mq2 can prevent such gases from entering the worker's body fending off such deadly diseases.

Heat, also considered a physical hazard, has contributed to approximately 150 miners suffering from some type of non- fatal heat-related illness such as heat stroke, heat exhaustion, heat cramps, and heat rash.

Miners are subjected to high temperatures and pressure. Thus the temperature sensor DHT11 will help to prevent such heat-related issues to the workers in mines.

The mines are dark and difficult to work. Workers get injured due to low light intensities. They can even fall from high locations and it may result in death. As a result, severe accidents are very common in mines. So they carry torches which are attached to the helmets. But the torch needs to be switched on or off. The LDR- Light-dependent Register or photoresistor will not require any kind of switches.

SUMMARY OF THE INVENTION:

The smart mining helmet involves a simplified structure of a standard helmet.
The helmet is based on Arduino Uno technology. The whole system is powered by a single lithium 9v battery. The helmet is light in weight, so it can easily be wearable. It is eco-friendly and economical, and harmless to the environment due to its ability to harness electrical energy for nearly all its work. Three components are connected to the Arduino UNO.

First, the gas sensor mq2 has three terminals, the positive, negative and signal. The positive and negative terminals are connected to the positive and negative holes of the breadboard, the signal pin is connected to A1 of the Arduino UNO. When it detects any harmful gases, the buzzer which is connected to the back of the helmet starts to beep, the red led which is connected to the front of the helmet starts to blink. The pattern of beeping and blinking of the buzzer and the red led changes as the intensity of gases received by the mq2 increases. The mq2 can detect any gas within a range of 10 meters.

Second, the temperature sensor DHT 11 detects if the surrounding temperature goes above 50°C the buzzer beeps with a different sound which must be known by the worker that the sound signal is indicating the rise in temperature above 50°C. DHT11 sensor has four pins- VCC, GND, Data Pin and a not connected pin. A pull-up resistor of 4.7 Kiloohms is provided for communication between sensor and micro-controller. The data pin is connected to the number 12 digital pin of the Arduino Uno. The VCC and GND are connected to the positive and negative of the breadboard.

Third, The LDR- Light-dependent Register or photoresistor is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. It has two regular terminals, one of them is connected to the positive of the breadboard, the other is connected to a 10k ohm resistor then it is connected to the analogue A0 of the Arduino Uno. The LDR will light up the white led depending on the intensity of light in the surroundings. The buzzer's positive is connected to the number 4 of the Arduino UNO and the negative to the negative of the breadboard. The positive of the red led is connected to the no 4 digital pin of Arduino UNO and the negative is connected with a 120ohm resistor to the negative of the breadboard. The positive terminal of the white led is connected with the negative of the NPN transistor, negative terminal is connected to the negative of the breadboard. The positive terminal of the NPN transistor is connected to the no 7 digital pin of Arduino UNO and the other negative terminal of the NPN transistor is connected to the negative of the breadboard. The breadboard is getting the power from the lithium 9V rechargeable battery.

BRIEF DESCRIPTION OF THE DRAWINGS:

Fig 1: Right view of mining helmet.
Fig 2: Left view of mining helmet
Fig 3: Front view of mining helmet
Fig 4: Circuit diagram of the mining helmet.

CLAIMS :

- The integrated helmet is intelligent enough to detect the harmful gases like carbon monoxide (CO) and carbon dioxide (CO_2).
- The integrated helmet is intelligent enough to detect the flammable gases like methane (CH4), CO, and hydrogen (H2).
- The integrated helmet is intelligent enough to detect the suffocating gases like CO_2, nitrogen (N20), and CH4
- The integrated helmet is intelligent enough to detect the toxic gases like CO, nitrogen oxides (NOx), and hydrogen sulfide (H_2S)
- During mining a spectrum of the disease termed CMDLD inclusive of classic forms of CWP and silicosis, mixed dust pneumoconiosis, DDF (which can be mistaken for IPF), and chronic obstructive airways, outbreaks. The gas sensors detect and defend in the entry of the said dreadful diseases in mining workers.
- The intelligent helmet detects the heat and indicates the workers to go for a safe place.

PATENT CITATIONS :

Cited Patent	Filing Date	Publication Date	Applicant	TITLE
CN204599450U	2015-04-29	2015-09-02	杨军伟 魏中举 杜海刚 梁华杰 李健 赵忠义 汤铸	Special intelligent helmet of mining

IMAGES OF HELMET

Fig1. Right view of mining helmet
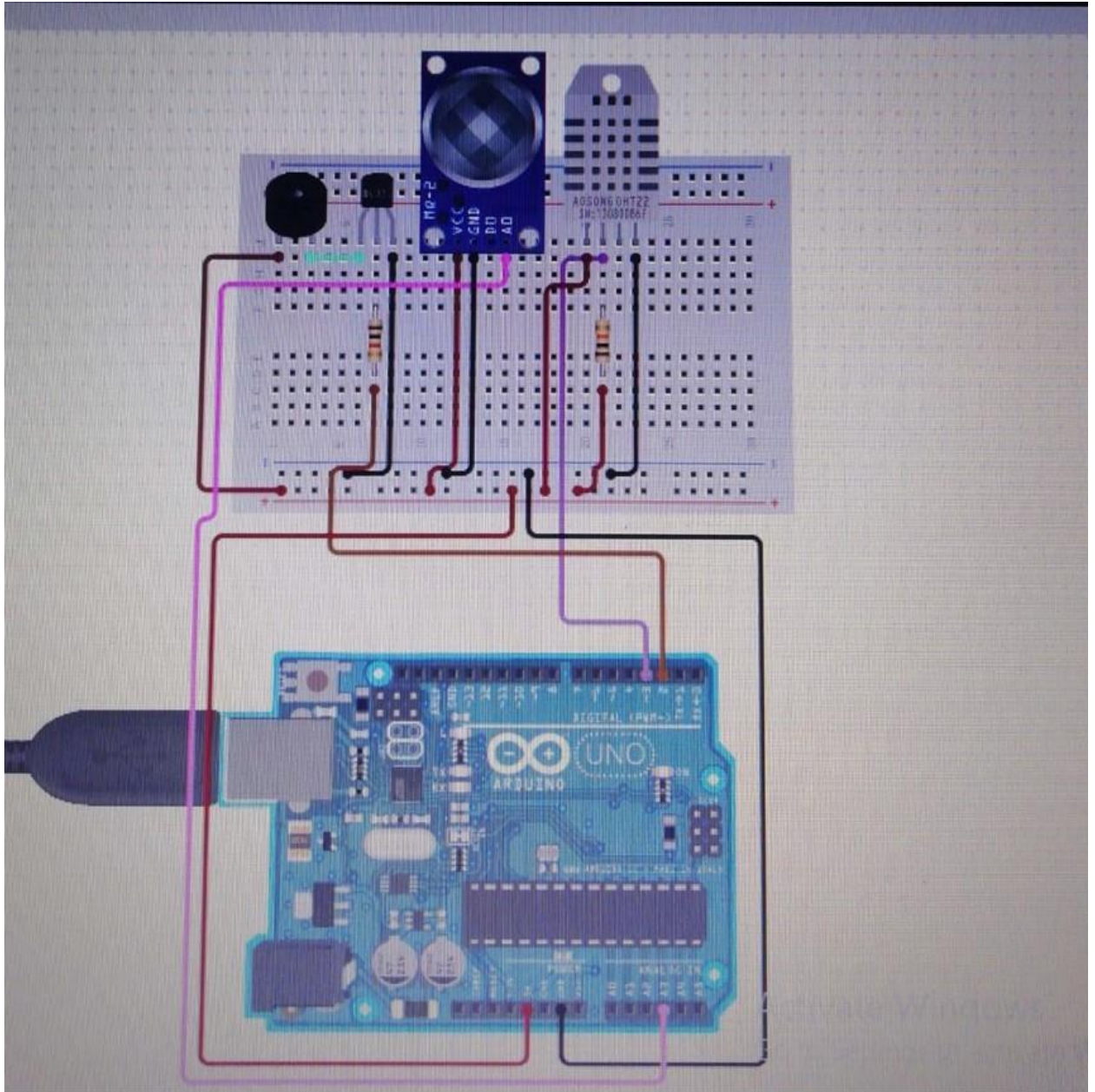
Fig2: Left view of mining helmet

Fig3: Front view of mining helmet

Fig4: Circuit diagram of mining helmet