Mars Emergency Robot

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***Abstract*—Emergency robot will help you to get current information about mars by testing soil, sending you images. It will go into the sunlight and when it gets there it will charge itself automatically. It will test the soil and take pictures of mars. After getting the information the emergency robot will process it and then It will send the information to your google drive folder.**

***Index Terms*—Arduino, esp32 cam, solar, PH meter.**

I. Project Overview

Mars emergency robot is basically made up to send us Mars information. It has a Plastic Soil Moisture Meter Soil Test Kit. This is a simple water sensor, and can be used to detect soil moisture. The electronic amplifier detects the difference in electrical potential between the two electrodes generated in the measurement and converts the potential difference to pH units. The magnitude of the electrochemical potential across the glass bulb is linearly related to the pH according to the Nernst equation. We used a component which which name is ESP-32 CAM. ESP32-CAM is a low-cost ESP32-based development board with an onboard camera, small in size. Using the ESP32-Cam Module to click pictures after any specific duration of time and upload it to a specific folder. This project is different as in this we will be using Google Drive API to upload images. It takes images. And then our emergency robot will help to send them to Google drive.So robots generally need electrical energy. This robot has a unique feature which charges the robot. Many flying robots and many tiny robots also use solar energy as the main energy source. We used the solar system for this robot. When it finds the sunlight it goes to the sunlight automatically. Then it takes energy from the sunlight then charges it. So there is no hassle of charging the robot. A solar car is an eco-friendly vehicle because it has zero emission levels. They do not burn fuels. The motors generate electricity that does not emit any toxic gases or produce any pollution in the environment. This Solar car vehicle has no fuel cost and it requires a low cost for maintenance. Since the solar car is made of light-weighted components, the car runs faster and smoothly as compared to normal vehicles. In the solar car, solar panels derive the energy from the sunlight/bright bulbs and store them. This stored energy can be used in the future as well.

II. Component List

1) Solderless breadboard
2) Arduino Uno
3) 16*2 LCD display
4) HC-05 Monitor
5) LM-35 temperature sensor
6) 10uf capacitor
7) 100R resistor
8) 4.7k resistor
9) 1k resistor
10) Male to male jumper
11) DC gear motor
12) 3.7v battery
13) Bread board
14) Jammer box
15) ESP-32 cam
16) 12V adapter
17) LDR
18) Boost
19) Male header
20) SG-90
21) UNO
22) Soil sensor
23) NANO
24) Solar

A. Solderless breadboard

Breadboards feature a grid of holes into which wires or components can be placed and electrically connected.

B. Arduino Uno

The Arduino Uno is programmed using the Arduino Software (IDE), our Integrated Development Environment common to all our boards and running both online and offline.

*C. 16*2 LCD display*

It is used for display after testing the soil.

D. HC-05 Monitor

Designed to replace cable connections, HC-05 uses serial communication to communicate with the electronics.

E. LM-35 temperature sensor

LM35 is a temperature measuring device having an analog output voltage proportional to the temperature.

F. 10uf capacitor

A Device for storing electrical energy.

G. Resistor

Resistor is used electrical component that limits or regulates the flow of electrical current in an electronic circuit

H. Male to male jumper

Used in connecting female header pin of any development board (like Arduino) to other development board or bread-board.

I. DC gear motor

Works for moving or rotating the robot.

J. Battery

The energy comes out of the positive and negative ends, and the machine feeds on that energy.

K. ESP-32 cam

SP32-based development board with onboard camera.

L. Adapter

It charges battery from the solar.

M. LDR

The LDR/IR Robot is designed to seek out light and avoid obstacles.

N. LDR

The LDR/IR Robot is designed to seek out light and avoid obstacles.

O. Male header

Male headers are the simplest type and generally ship with any board that uses them. Use male headers if you want to build your project into a breadboard - solderless or permanent. They are also used in conjunction with female headers if you want to stack your boards together.

P. SG-90

Micro Servo Motor SG90 is a tiny and lightweight servo motor with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos.

Q. UNO

UNO is a low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. This board can be interfaced with other Arduino boards, Arduino shields, Raspberry Pi boards and can control relays, LEDs, servos, and motors as an output.

R. Soil sensor

Soil moisture sensors measure the water content in the soil and can be used to estimate the amount of stored water in the soil horizon. Soil moisture sensors do not measure water in the soil directly. Instead, they measure changes in some other soil property that is related to water content in a predictable way.

S. NANO

Nanoelectronics is the term used in the field of nanotechnology for electronic components and research on improvements of electronics such as display, size, and power consumption of the device for practical use. This includes research on memory chips and surface physical modifications on electronic devices.

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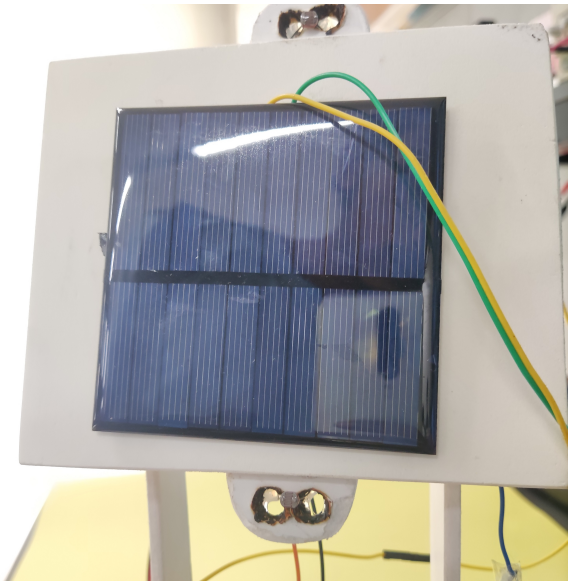

Fig. 1. Solar

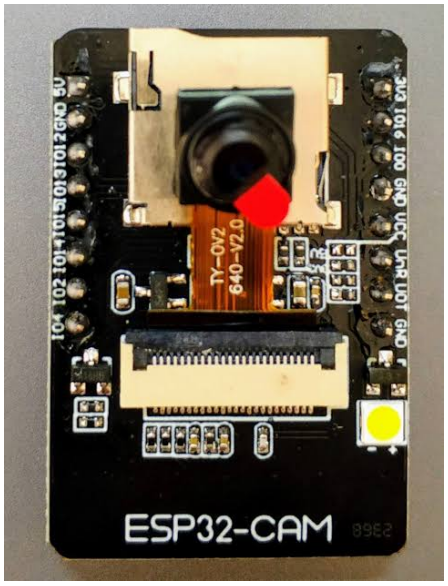

Fig. 2. ESP-32 Cam

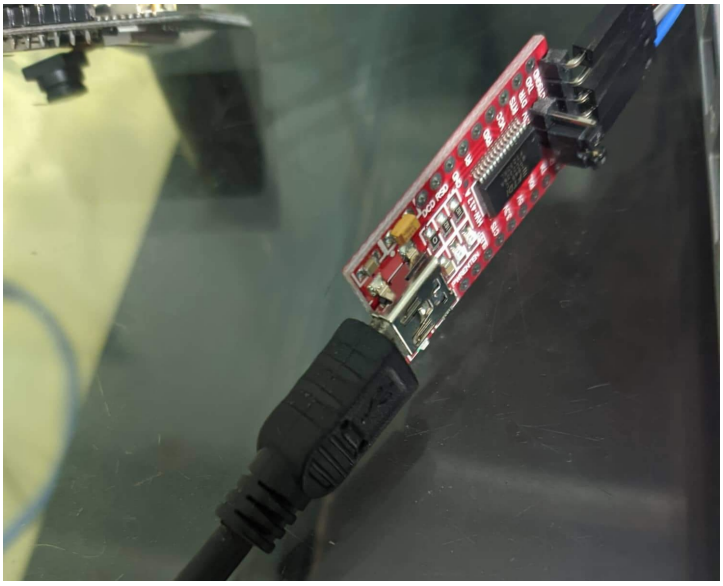

Fig. 4. Arduino mini port

Fig. 5. Arduino

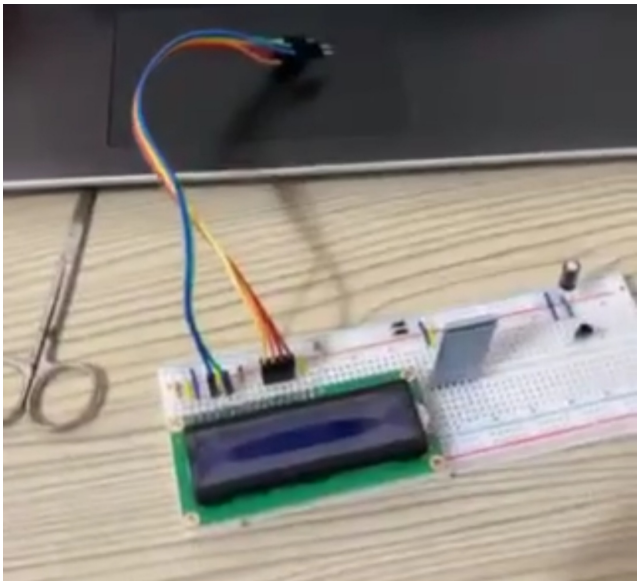

Fig. 3. 16*2 LCD display

III. Implementation

Solar Tracker

- Solar panel: Solar panel is placed on a piece of cardboard (just for demonstration) and the bottom of the cardboard is connected to Servo motor. Solar panel consists of photovoltaic cells arranged in an order. Photovoltaic cell is nothing but a solar cell. Solar cell is made up of semiconductor material silicon.
- LDR: Light Dependent Resistors or LDRs are the resistors whose resistance values depend on intensity of the light. As the intensity of light falling on the LDR increases, resistance value decreases. In dark, LDR will have maximum resistance. LDR will output an analog

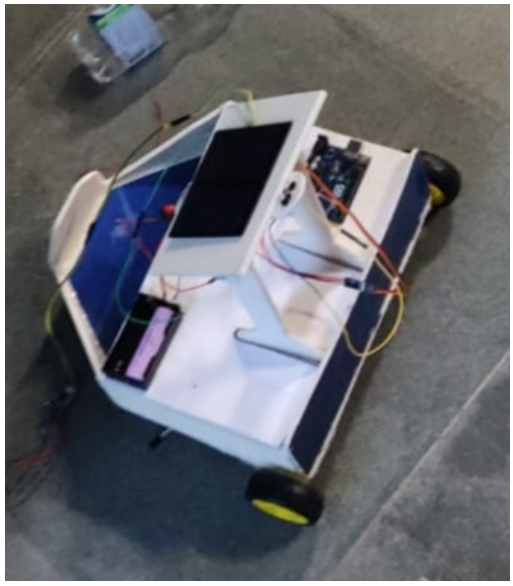

Fig. 6. Image of the car

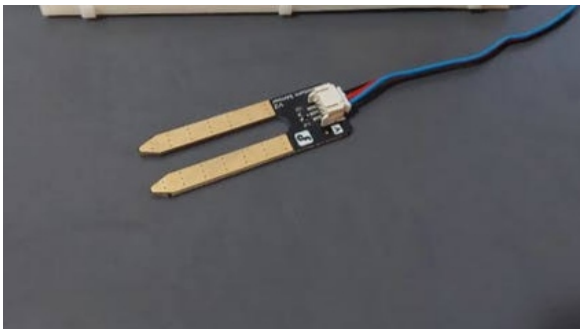

Fig. 7. Soil moisture sensor

value which should be converted to digital. This can be done using analog to digital converter.

- Servo motor: Servo motor is used to rotate the panel. To drive the servo motor, a PWM Signal must be provided to its control pin and hence Pin 17 (which has PWM) is connected to the control pin of the servo motor.
  By connecting a battery to the solar panel, you can store the energy generated by the solar cells and this energy can be used when required. There are separate charge controller circuits dedicated to efficiently control the charge acquired from solar panels and charge the batteries.
- Arduino: Connection between the Charge Controller to the Battery.
  Then locate the battery terminals on charge controller.
  Connection the Solar Panel to the Charge Controller.
  Connection the 12V to 5V Converter to the Charge Controller.
  Plug in to the Arduino into the USB Port.

Soil test:

- we connected bluetooth module HC-05 with Arduino.
  VCC to 5v
  Ground to ground
  TX to RX
  RX to TX

- Now we will connect Arduino UNO with soil moisture sensor(YL69).
  7k to D0
  A0 to A0
  Ground to Ground
  3.3v to VCC

- Lastly we will connect sensor's positive side with positive side and negative side with negative side.

ESP32 Cam:

- ESP32-CAM FTDI Connection:
  GND to GND
  5V to VCC
  U0R to TX
  GPIO0 to GND
- Install ESP32CAM Library Arduino to Sketch to include library to add.zip library
- Source code
- Install python library
- Setting up Google Drive API
- Python Code for Sending ESP32 CAM Captured Image to Google Drive
- Run

Path tracker:

- 2 DC moto to 2 Tires
- Connection the left terminal of the sensor to digital pin 10 of Arduino. Middle terminal to GND and Right terminal to 5V pin of Arduino. Now Arduino IDE software download a library for IR remote.
- Uploading the code
- Circuit Diagram
- Implementing code
- Run

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[2] https://github.com/espressif/esp32-camera
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[4] 2005, building upon the work of Hernando Barragán (creator of Wiring), Massimo Banzi and David Cuartielles.
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