MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

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Project Report

on

Motion Detector with Photo Capture

Submitted By:

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Faculty Mentor:

Dr.Tej Singh

Assistant Professor, Centre for Artificial Intelligence

CENTRE FOR ARTIFICIAL INTELLIGENCE

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE
GWALIOR - 474005 (MP) est. 1957
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CERTIFICATE

This is certified that **Shreyash Lodhi (0901AI211061)** and **Pradeep Patel (0901AI211048)** has submitted the project report titled **Motion Detector with Photo Capture** under the mentorship of **Dr. Tej Singh,** in partial fulfilment of the requirement for the award of degree of Bachelor of Technology in **Artificial Intelligence and Robotics** from Madhav Institute of Technology and Science, Gwalior.

Dr.Tej Singh
Faculty Mentor
Assistant Professor
Centre for Artificial Intelligence

Dr. R. R. Singh
Coordinator
Centre for Artificial Intelligence

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DECLARATION

I hereby declare that the work being presented in this project report, for the partial fulfilment of requirement for the award of the degree of Bachelor of Technology in **Artificial Intelligence and Robotics** at Madhav Institute of Technology & Science, Gwalior is an authenticated and original record of my work under the mentorship of **Dr.Tej Singh , Assistant Professor, Centre for Artificial Intelligence.**

I declare that I have not submitted the matter embodied in this report for the award of any degree or diploma anywhere else.

Shreyash Lodhi (0901AI211061) Lodhi

Pradeep Patel (0901AI211048) Pradeep

III Year

Centre for Artificial Intelligence

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ACKNOWLEDGEMENT

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I would sincerely like to thank my department, **Centre for Artificial Intelligence,** for allowing me to explore this project. I humbly thank **Dr. R. R. Singh**, Coordinator, Centre for Artificial Intelligence, for his continued support during the course of this engagement, which eased the process and formalities involved.

I am sincerely thankful to my faculty mentors. I am grateful to the guidance of **Dr.Tej Singh, Assistant Professor, Centre for Artificial Intelligence,** for her continued support and guidance throughout the project. I am also very thankful to the faculty and staff of the department.

Shreyash Lodhi (0901AI211061) Shodhi

Pradeep Patel (0901AI211048) Pradeep

III Year

Centre for Artificial Intelligence

ABSTRACT

This project focuses on the development of a motion detection system using the ESP32-CAM microcontroller, coupled with a Passive Infrared (PIR) sensor for efficient detection of human movement. The ESP32-CAM's integrated camera module is utilized to capture photos upon detecting motion, providing a visual record of the triggered events. The system is designed for applications such as home security, surveillance, or automation where a low-cost, compact, and wireless solution is desired.

The PIR sensor serves as a reliable motion detection mechanism, enabling the ESP32-CAM to enter a capture mode when movement is detected within its range. Upon activation, the camera captures high-resolution images, storing them locally or transmitting them to a designated server or cloud storage for further analysis or archival purposes. The project leverages the capabilities of the ESP32 platform, including its connectivity options, to enhance the overall functionality of the motion detection system.

Key components of the project include configuring the ESP32-CAM for camera functionality, integrating the PIR sensor for motion detection, and implementing a robust capture and storage mechanism for the acquired images. Additionally, considerations for power efficiency and optimization are addressed to ensure the longevity of the system in remote or battery-powered scenarios. The project showcases a practical implementation of an ESP32-CAM-based motion detection system with photo capture capabilities, providing a foundation for further customization and integration into various IoT applications.

TABLE OF CONTENTS

Chapter 1: Introduction

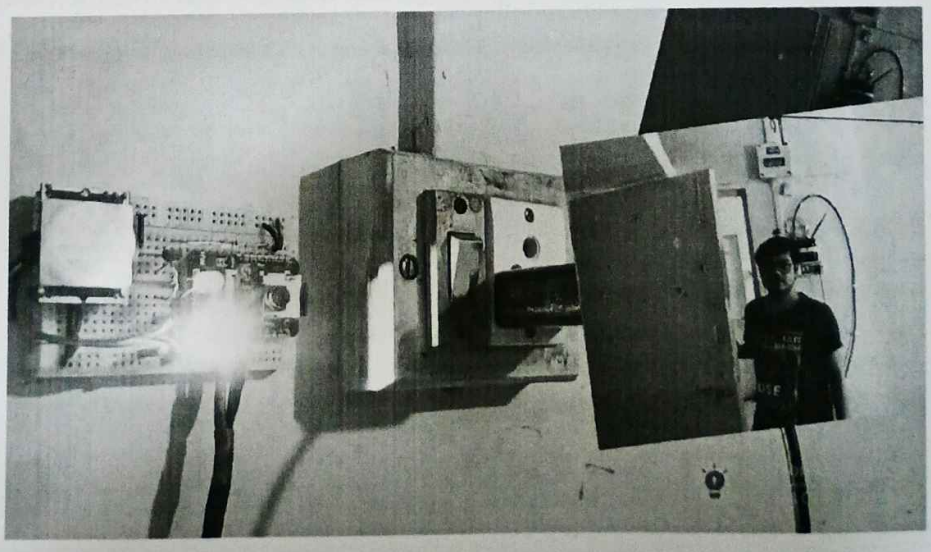
ESP32-CAM PIR Motion Detector with Photo Capture

Description:

In this **ESP32-CAM** project, we will make a Motion sensor camera with ESP32CAM and PIR Motion Detector sensor. All the pictures will be stored in the **microSD card** connected with the ESP32-CAM.

As we will use the **Deep Sleep mode** of the **ESP32CAM** so the circuit will consume very little power. And you can use the circuit continuously without any problem. So this is a very useful electronics project.

I have shared the **esp32-cam pinout**, esp32 PIR motion sensor **circuit diagram**, esp32 PIR sensor **program**, and how the esp32-cam deep sleep works. So, you can easily make this esp32-cam project at home.



Chapter 2: System Overview

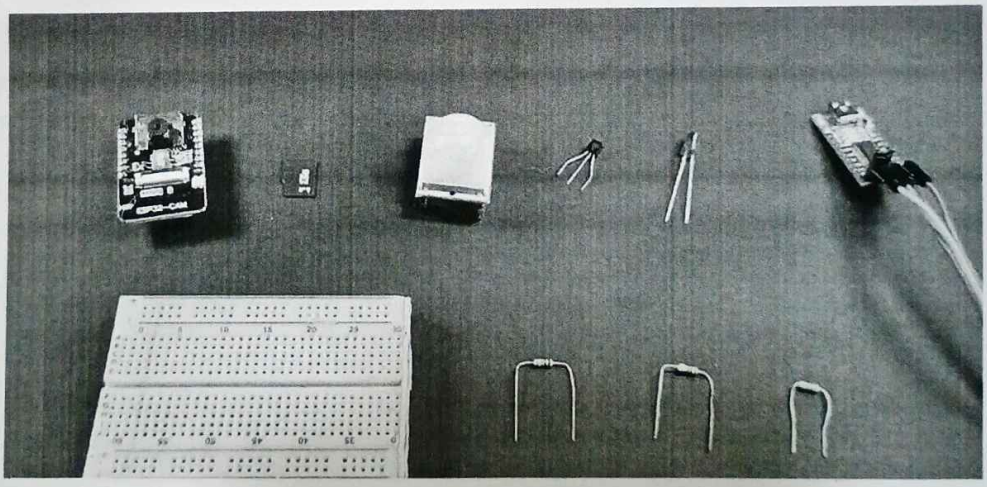
Circuit Diagram of ESP32-CAM project:

We can easily design this motion sensor with a photo capture circuit using ESP32-CAM, PIR sensor, and some basic electronics components. And we can easily supply this circuit with a 5V DC charger.

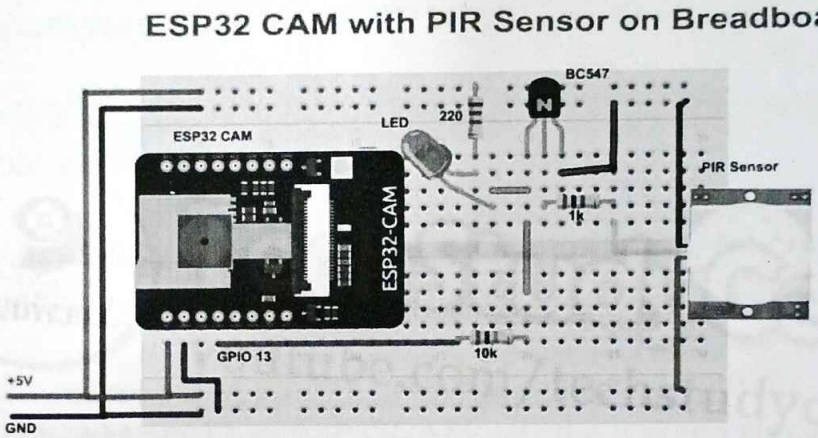
Chapter 3: Hardware and Power Management

Component Required for this ESP32-CAM project:

1. ESP32-CAM (AI Thinker)
2. PIR Motion Sensor Module
3. BC547 NPN Transistor
4. 220ohm, 1k, 10k Resistor.
5. LED 5-mm
6. FTDI 232 USB to Serial Interface board
7. 5 volt DC supply



Breadboard Schematic for this ESP32-CAM project



This the breadboard schematic of the motion sensor camera with ESP32CAM projects. This will help you to design the ESP32CAM PIR circuit on the breadboard.

Chapter 4:Hardware and Power Management

Working Principle:

Lets understand **how this ESP32CAM circuit works:**

The ESP32CAM is in Deep-sleep mode with external wake-up enable at PIN 13.

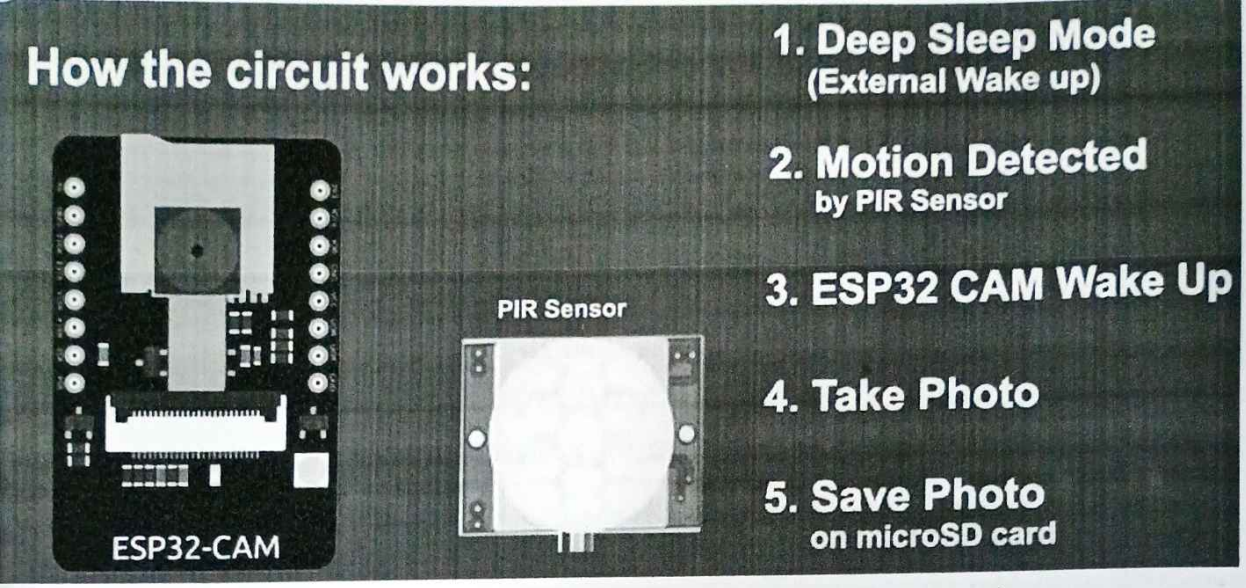
Whenever the PIR sensor sense any motion within the range the output pin of the PIR sensor becomes high.

As the output pin of the PIR sensor is connected with the ESP32CAM pin 13 so ESP32CAM gets the wakeup signal.

The ESP32CAM wakes up and take the picture. The picture stored to the microSD card connected with ESP32CAM.

After some millisecond delay, the ESP32CAM again goes to the Deep Sleep Mode until it gets the next wake-up signal at pin 13.

Thus this circuit consumes very little power and takes the picture only when any motion detected by the PIR sensor.

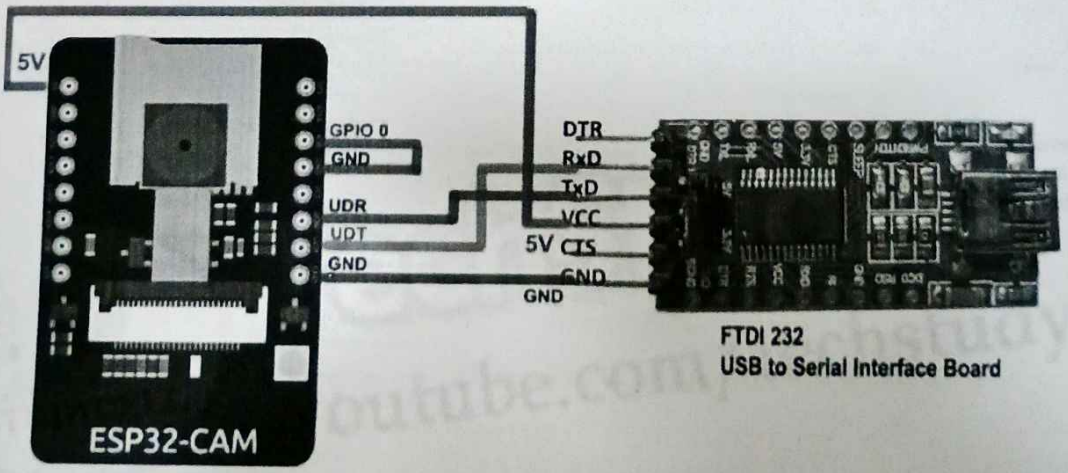


Programming ESP32CAM

To program the ESP32CAM, I have used **FTDI232** USB to Serial interface board. I have connected the FTDI232 with ESP32CAM as per the above circuit.

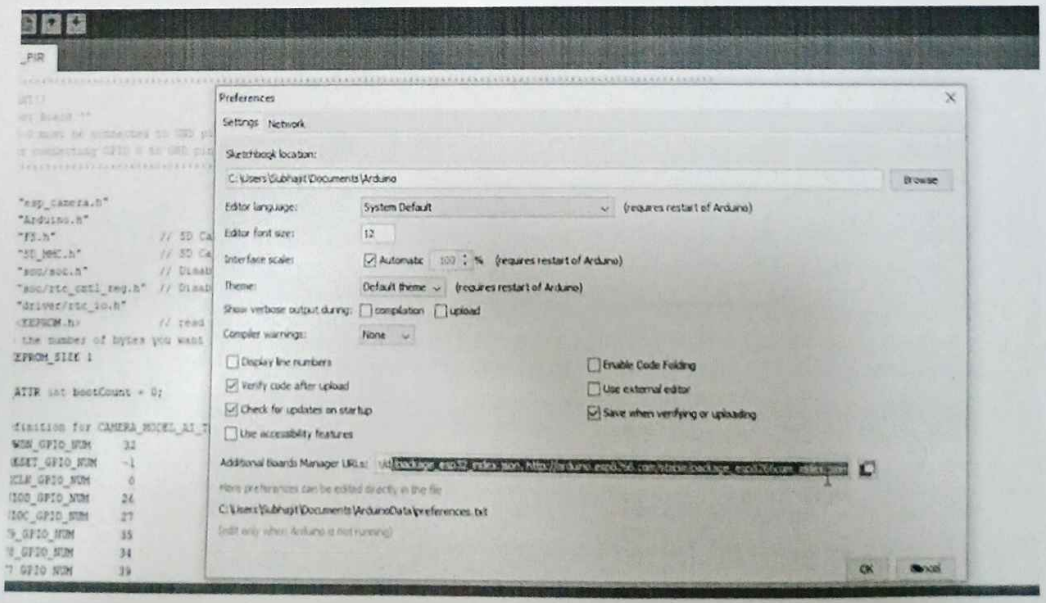
While uploading the code we have to connect GPIO 0 with the GND pin of ESP32CAM.

Circuit for Programming ESP32 CAM



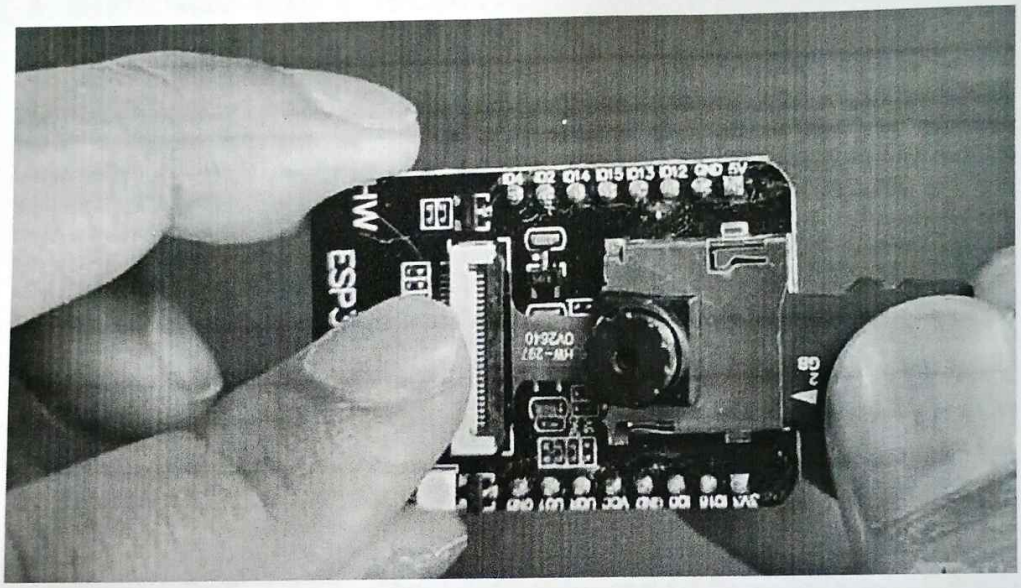
Before uploading the code to ESP32CAM, please check the following setting:**Update the Preferences –> Aditional boards Manager URLs: https://dl.espressif.com/dl/package_esp32_index.json, http://arduino.esp8266.com/stable/package_esp8266com_index.json**

- **Board Settings:**
  - Board: "ESP32 Wrover Module"
  - Upload Speed: "921600"
  - Flash Frequency: "80MHz"
  - Flash Mode: "QIO"
  - Partition Scheme: "Hue APP (3MB No OTA/1MB SPIFFS)"
  - Core Debug Level: "None"
- COM Port: Depends *On Your System*
- GPIO 0 must be connected to GND pin while uploading the sketch



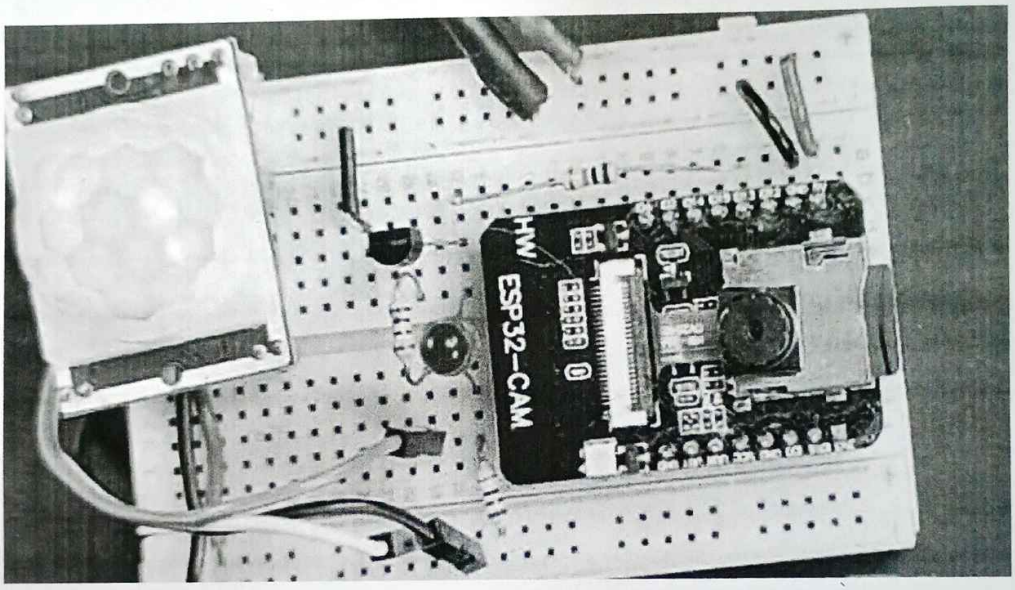
- After connecting GPIO 0 to GND pin, press the ESP32 CAM on-board RESET button to put the board in flashing mode

Insert the microSD card



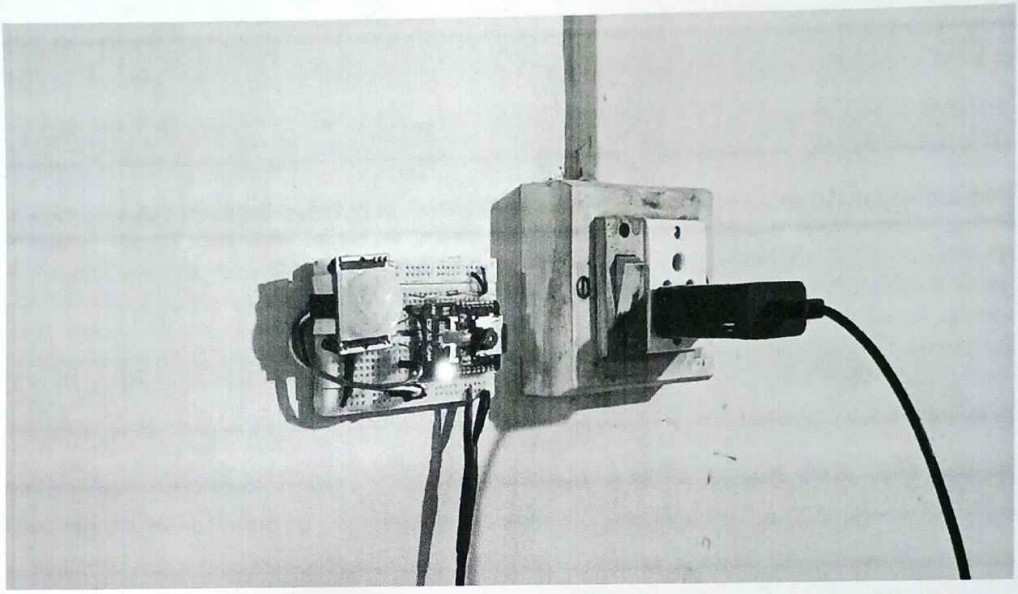
Chapter 5 Results, Discussion, and Conclusion:

Complete the Circuit:



Complete the circuit as per the circuit diagram. Here I have used 5-volt mobile charger as a power supply for this ESP32CAM project.

Use the ESP32CAM as Security Camera



Here I have fitted the ESP32CAM infront of the main door. So when somone enter or exit from the main door ESP32CAM will take the picture and store it to microSD card.

Pictures, taken by the ESP32CAM

Anytime we can remove the microSD card from ESP32CAM and connect the microSD card with laptop to see the pictures.