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Durable Motion Detection System using Node MCU

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Abstract: ***Motion detection is the main agenda of this paper, with smart technologies. This paper shows how motion can be detected with efficiency and at the same time with durability of the system. Many IOT (Internet of Things) systems are designed for the same purpose but cannot assure a long run of the system. This paper makes use of chip set called NodeMCU that is well known for its durability and also efficient enough by consuming low power and cost effective. We generally find other boards like Raspberry Pi which aren't very durable in nature. The same system can be developed using these chips in a cost effective manner, the only problem with these chips is their durability.***

Keywords: Motion Detection, smart technologies, IOT, NodeMCU, Raspberry Pi.

I. INTRODUCTION

Internet of things is in every persons mind these days. The Internet of things aims at connecting anything at any time and at any place. It is the most happening technology of this era. There is wide range of applications of Internet of things like farming, pharmacy, smart cities, smart energy etc. This paper shows how a low cost device enabled with Raspberry Pi computer board and wireless internet could detect objects in motion. This device could be used in various aspects like military based security, surveillance cameras for various places like forest areas and other remote locations. Strangers or any suspicious act could be easily identified by a remote user on a workstation. The system could further generate alarm even before any damage takes place. This paper is an attempt to make use of IOT approach for any kind of surveillance systems by detection of any kind of motion. It is a smart approach to detect motion. Any kind of motion when detected could alert the user and send images of the target if a USB camera is installed.

II. HARDWARE MODULES

Motion detection is achieved by the following components:

1) PIR Sensor
2) NodeMCU Board
3) Alarm
4) Power Supply

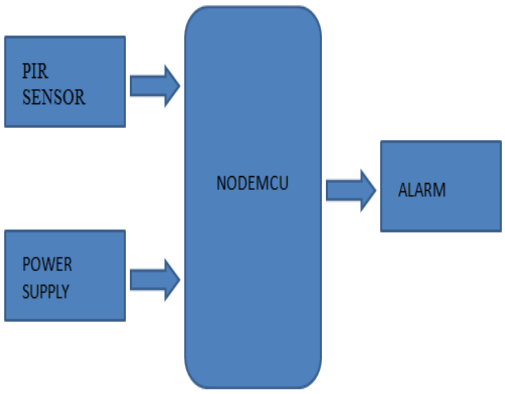

Fig 1 : Hardware Components

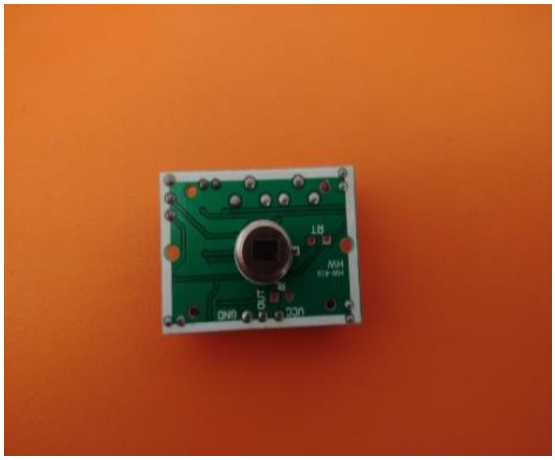

Fig 2: PIR Sensor without dome

1) PIR Sensor: PIR sensors are also called as Passive Infrared sensors. It senses any object in motion in its sensor range. This sensor consumes a very less amount of power and it does not wear out very soon. This sensor is also inexpensive. It senses any object in motion with the help of infrared radiations from the object in its range. As every object emits some amount of infrared radiations, the more hot the object the more radiations it would emit. When there is no moving object in the range of the sensor then the sensor detects a constant amount of radiation but as soon as there is a movement in the sensor's range, the amount of radiation detected differs and hence motion is detected. Figure 2, 3 and 4 shows the PIR Sensor.

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Fig 3: PIR Sensor

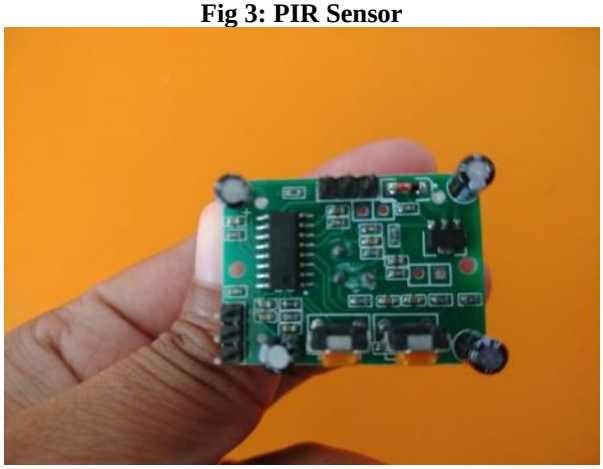

Fig 4: PIR Senor Chip

2) NodeMCU board: NodeMCU is a low cost chip. It is an open source LUA based chip. This chip comes with in an inbuilt Wi-Fi module, which makes this chip useful in various IOT projects where we store the data in cloud. This indeed makes NodeMCU practical in use as it is cost effective and also durable. NodeMCU is open source platform which makes it possible to edit or modify its hardware modules.We are using version 2 in our paper. This board is enabled by LUA script. To run the script we could use either ESPlorer IDE or Aurdino IDE. This Chip has a 128 KB RAM and 4MB flash memory and 17 GPIO pins. Fig 6 displays the NodeMCU chip and Fig 5 displays the Wi-Fi unit in the chip.

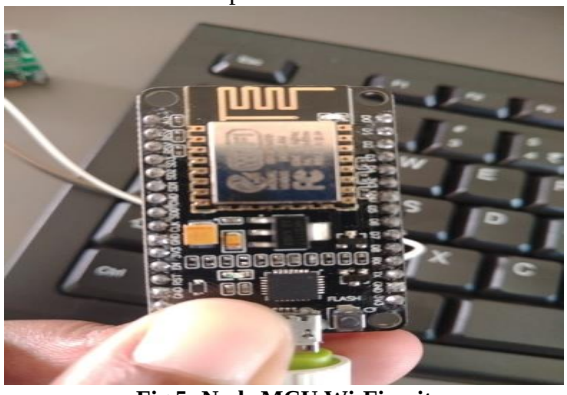

Fig 5: Node MCU Wi-Fi unit

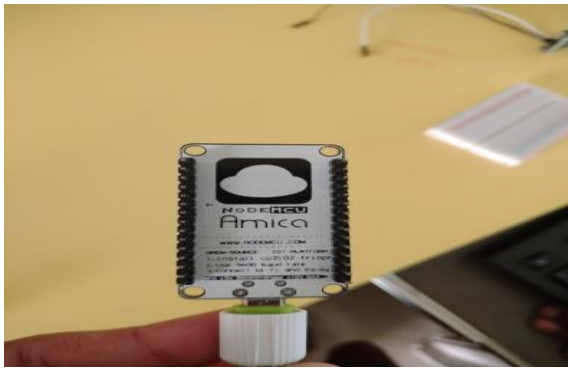

Fig 6: Node MCU Chip

3) Alarm: for generating the alarm we made use of a buzzer. As per our paper the buzzer would buzz on detecting any kind of motion in the range of the PIR sensor.

4) Power Supply: Node MCU consumes a very low power and hence we made use of 5v power that was available with us.

III. RESULTS AND CONCLUSION

Our idea is that the PIR sensor when detects motion then there also should be an alarm which would buzz and let any person notify about the motion being detected. Making use of Node MCU made the task very simpler and efficient. Below given figure shows the script written in Aurdino IDE and the system designed in figure responds on detecting motion.

Fig 9 shows the connections between Node NCU and PIR Sensor, Fig 8 displays the response given by Aurdino IDE on detecting motion.

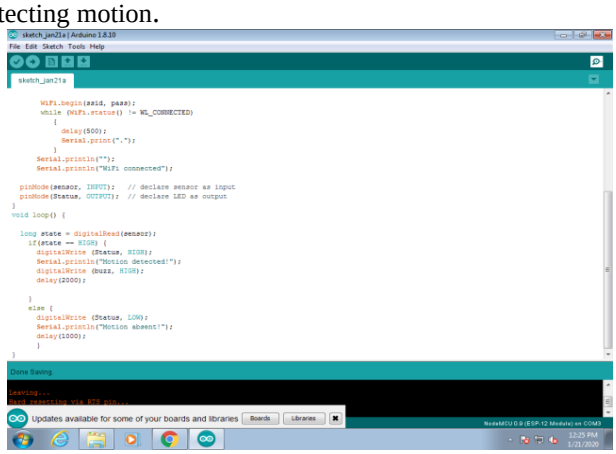

Fig 7: Script written in Aurdino IDE

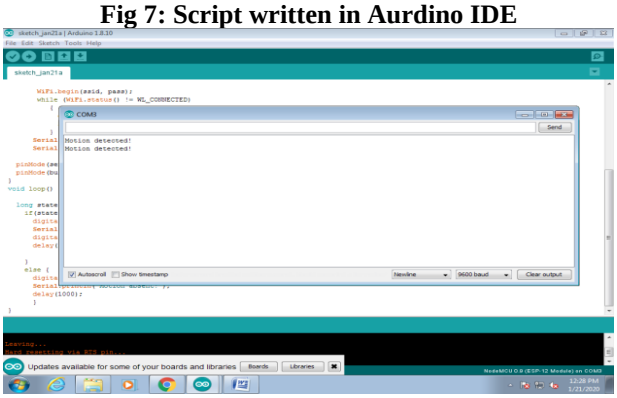

Fig 8: Output

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Fig 9: Connections with PIR Sensor

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