CAPTAIN AMIGO-An Army Robot using IOT

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Abstract – *Nowadays we see a lot of attention is given towards safe guarding our country or in this matter any country at their respective borders. Many army men risk their precious life on the borders of the country to help people have a peaceful night's sleep without any worry. Captain AMIGO, is an army robot whose main intention is to save the lives of all the army men on the borders. It plays the role of a CAPTAIN that is leads from front by itself going into the risk prone areas and detecting if there is any danger to the soldiers. Also acts like a detective by taking the live footage of the enemies at the other side of the border and delivers the same to official in charge so that they can see what is happening and have a clear idea about it. This robot camouflages itself according to the surrounding area so that it doesn't become all the way more evident to the enemies about its existence. With these been its key features it also has many other components like PIR sensor, Gas sensor, Metal sensor to find out more about the enemies place and also checks if our country's army men will remain safe if they walk-in by the same path.*

Key Words: IOT, Camouflage, PIR Sensor, Army, Gas Sensor, Colour Sensor, Metal Sensor

1. INTRODUCTION

A robot majorly does work similar to human with less risks and efforts. When it comes to utilising a robot instead of an army men, everyone will find making a robot work a more feasible option as there is a high risk of losing a person's life on the borders. Army robots are hence in more demand nowadays so that the safety of the army men is achieved to the maximum. In recent times we can see that countries all over the world are ready to spend and invest on any new technologies that safeguards the nation and their people.

Fig -1: Army men in action

Captain AMIGO is a specialised army robot using IoT technologies. The word AMIGO is taken from the language Spanish which means "Friend". The same is used as the robot's name to bring out the message that Captain AMIGO is a friend to the entire nation as it puts itself in danger to save the army men from losing their precious life. Also, the captain in the name suggests that

the robot leads from the front. This robot acts as a detective by capturing the live footage from the risk-prone areas and send the same to the army officials so that they get a complete picture of what the situation is on the other side of the border. The key feature of this entire robot is that it has the capabilities to camouflage itself based on the surroundings similar to how a chameleon changes its colour to green when it's on the grass and brown when it's on the land. This technique is used my AMIGO so that they aren't visible to the naked eyes of the people from the opponent country. Here, the robot can changes colours to either red or green or blue based on the surrounding colour and later the same can be converted to combination of colours when implemented in a sophisticated level. It also has many other features that add on the importance and value of the robot as a whole like the feature where any metals beneath the surface can be detected using the sensors. Even the harmful gas can be sensed by the robot so that a message is sent later on after the detection of harmful gases to make army men alert that this might cause serious problems if not taken care of while they pass through the same location. In the same way the details about the changing surroundings can also be detected and sent on to the application on the phone. All the details that the robot collects would be available to the person in-charge and the same person can also assist the robot in a proper locomotion.

2. SYSTEM ARCHITECTURE

The Fig -2 below shows the system's architecture and the various components added to them. Majorly Arduino is used to connect various sensors as shown below.
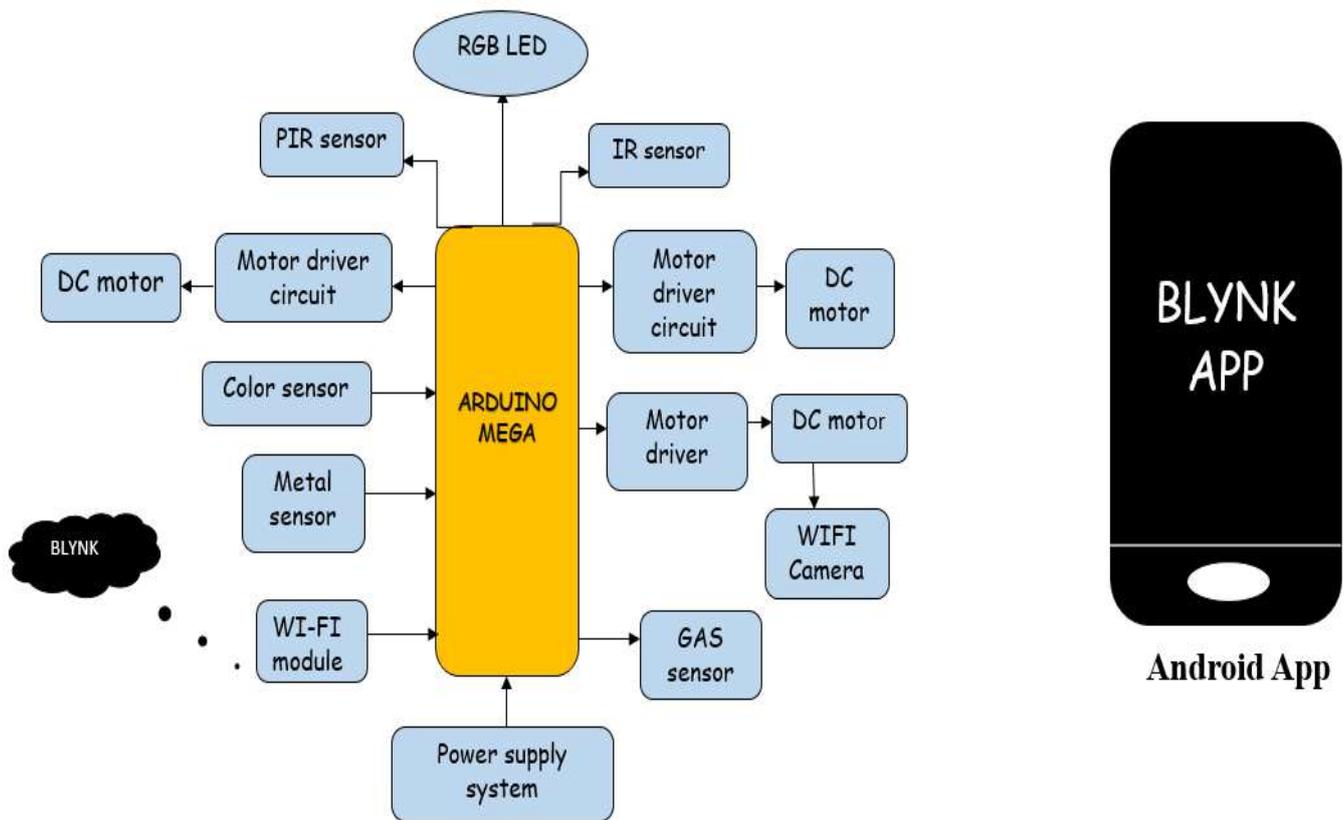

Fig -2: Block Diagram for Captain AMIGO

Table -1 describes each component from the block diagram above and their major functionalities with respect to the AMIGO robot as a complete unit.

Table -1: Block diagram functionalities

Sl No.	Block Name	Functions
1.	RGB Led	Red, Blue and Green LEDs. Any colour can be produced using these 3 colours by configuring the intensity of each LED.
2.	IR Sensor	Infrared Sensor which is analogous to human's visionary senses and can be used to detect obstacles.
3.	PIR Sensor	Passive Infrared sensor used to detect the presence of human beings and their movement.
4.	Motor driver Circuit	It is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver act as an interface between Arduino and the motors.
5.	DC Motor	A Direct Current motor is simple electric motor that uses electricity and a magnetic field to produce torque, which causes it to turn. Hence mainly used for the movement of the robot.
6.	Colour Sensor	Used to recognize the colour of an object present in front of the sensor
7.	Wi-Fi Module	It is a wireless internet access interface used for data communication
8.	Power Supply	Used to convert electric current from a source to the correct voltage, current, and frequency to power the load.
9.	Gas Sensor	Used to detect the presence of toxic gases in that particular area
10.	Motor Driver	It is a module for motors that allows to control the working speed and direction of two motors simultaneously.
11.	Arduino Mega	The Arduino Mega is a micro-controller board based on the ATmega2560. It contains everything needed to support the micro-controllers.

3. METHODOLOGY

Amigo being an army robot is made functional with the Internet of Things technology. It uses Arduino which is a micro-controller board and this supports the various functionalities of the robot. A user interface application called the Blynk App is used to control the movement of the robot. Along with the movement it also takes information regarding the metal sensor, PIR sensor and the gas sensor status. Fig -3 shows this interface.
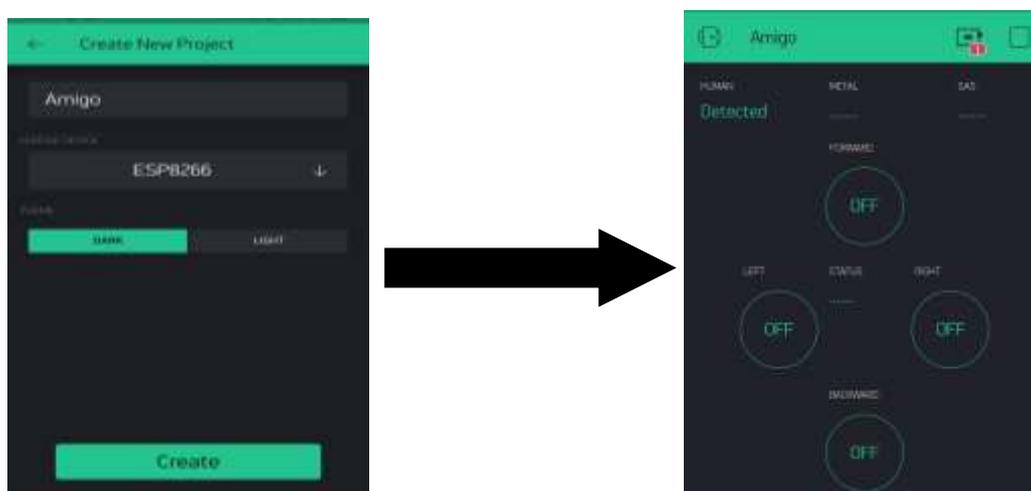

Fig -3: Blynk App-Amigo

Once the robot moves it adjusts itself to the surrounding colour that is, it gets camouflaged. Amigo has the ability to change its colour to three basic colours- red, green and blue. Fig -4 shows the robot changing its colour according to the surrounding using the colour sensor which is placed on the robot.
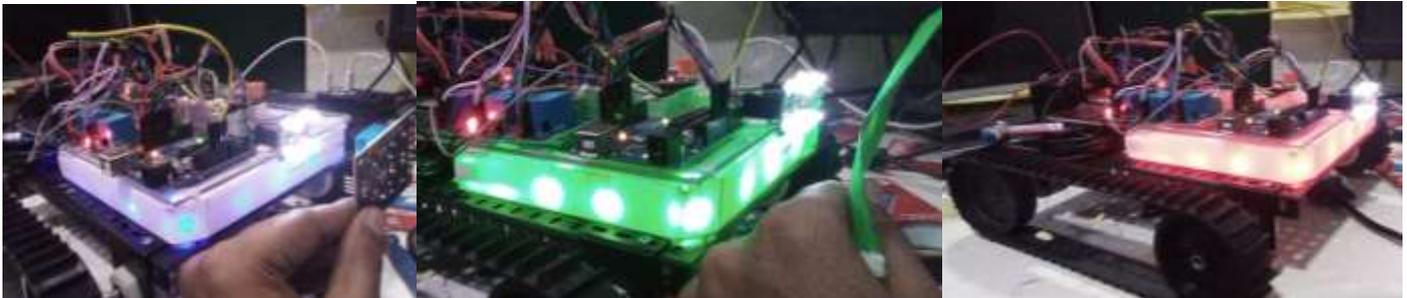

Fig -4: Amigo getting camouflaged

The other functionality of the robot like the PIR sensor that is used to detect if there is any human around, and the gas sensor which is used to detect the harmful gases along with metal sensor that is majorly used to detect if there is any metal or any sharp things placed around which can be dangerous, is all shown in Fig- 5. It is a data flow diagram for all the major functionalities of the robot.
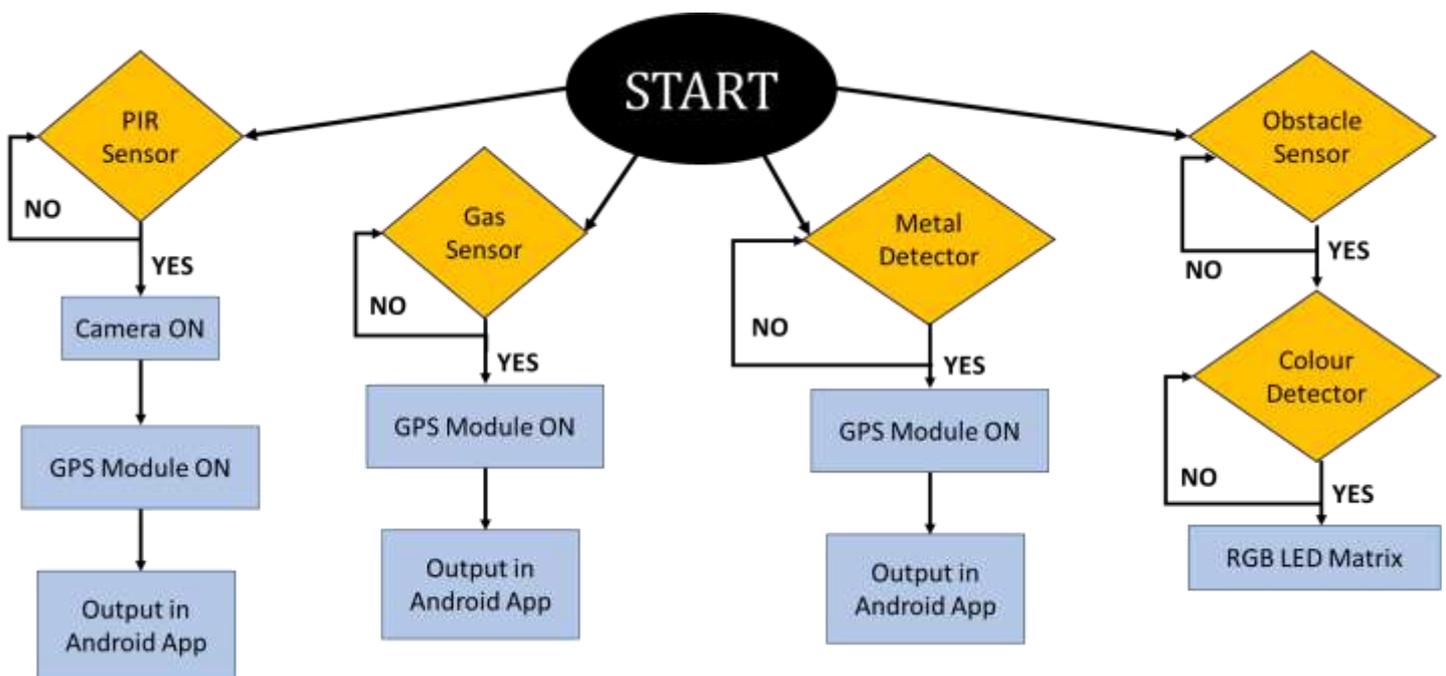

Fig -5: Data flow diagram

One of the major functionality of Amigo is to send the live footage from the risk prone areas. To make this unit functional a Wi-Fi camera is used which moves 360 degrees. This camera is made to work using an app named, V380 Pro. Multiple cameras can be connected and viewed simultaneously using this app. Since Amigo uses a single camera, the same is connected via this app and the live footage is delivered. Along with live footage we can control the movement of the camera in all the four directions. It sends the date and time of the captured video along with the video. Any part of the video can be recorded and stored back on the device and viewed on later. This functionality makes the army men to look into the major footages and plan on their next move with cent percent surety. This camera works even when it's dark and adjust itself to greyscale and sends the same. So eventually, we don't have any issue regarding the working of the camera during night or under any underground places where there is no proper light facility. Fig -6 shows the application's interface along with few pictures captured using the camera during the movement of Amigo.
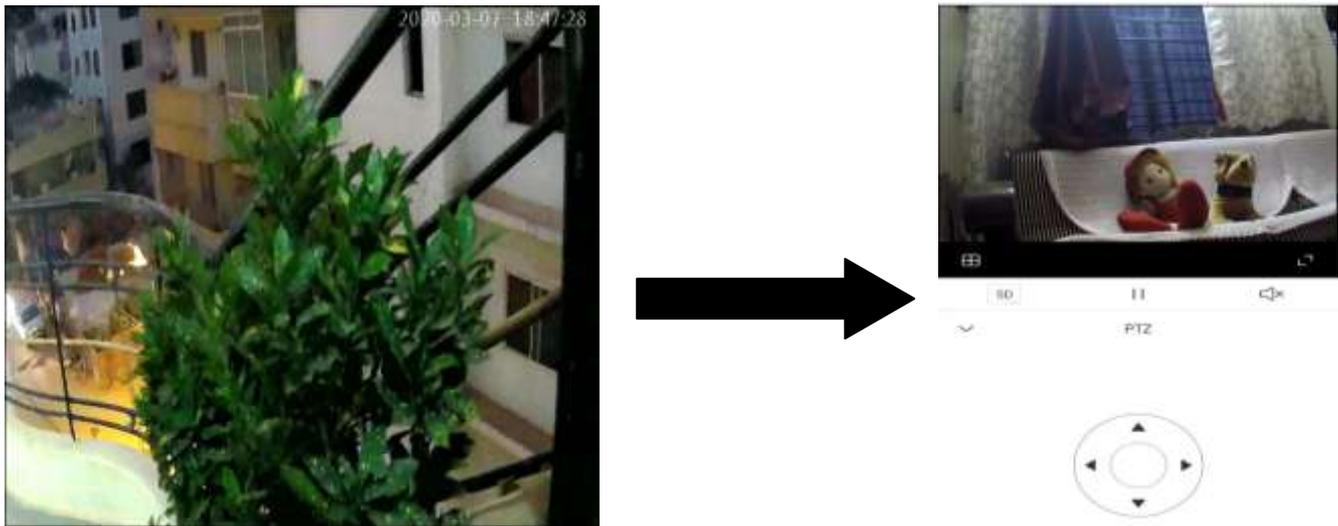
Fig -6: Wi-Fi camera live footage

4. CONCLUSION

Amigo is mainly used in the army field to save the valuable lives of many army men. Fig- 7 shows the complete structure of the robot. It is designed in order to get the information and the live footage from the enemies land and make our army men well prepared about the various challenges that they might face or encounter on their journey to the same place. The various other sensors used in the robot pass on the information about harmful gases present that might go to extend of taking army men's life. Also information about the metals and human present in the surrounding is passed on to the officials controlling the robot. Overall, it acts as a saviour and leads from the front like a captain and ensures that the more valuable lives are saved and their labor and hard-work is used at the right place and not in places that risk their lives.
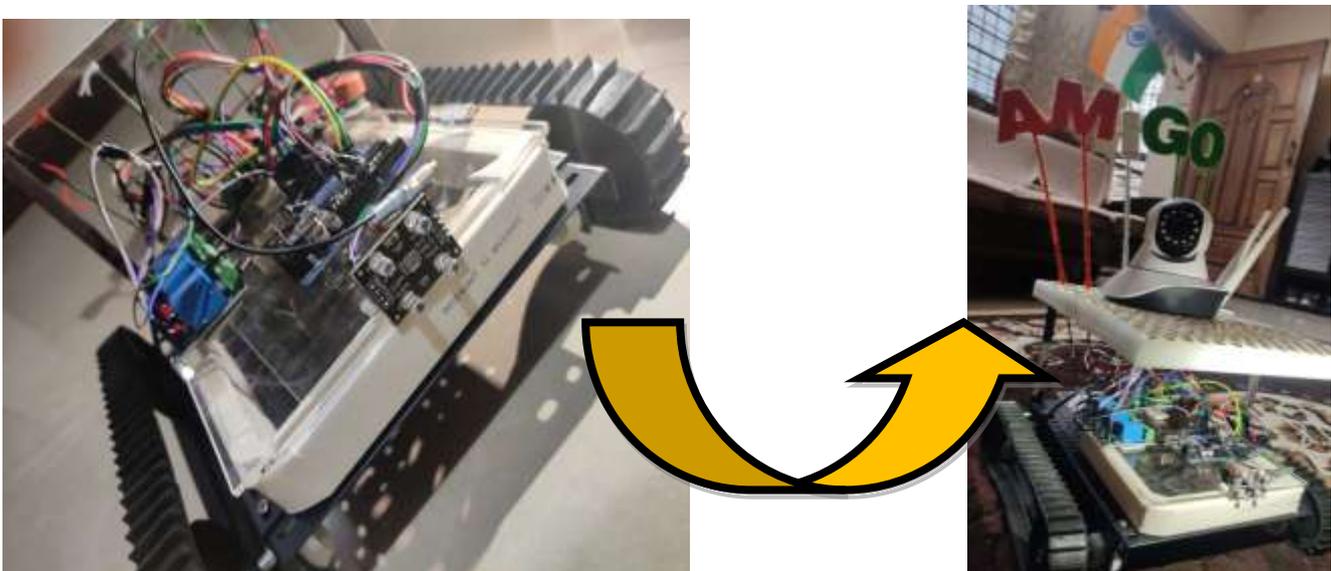

Fig -7: Captain Amigo

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